Secondary Legislation

DCE - MTI 3D-1/1

Maritime Transport (Fire Protection) Instrument [year]

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Contents

Section 1 Preliminary provisions

1.1 Title

This MTI is the *Maritime Transport (Fire Protection) Instrument* [year].

1.2 Commencement

This MTI comes into force on [same date as the *Part 3D].*

1.3 What this MTI does

This MTI specifies, for the purposes of *Part 1A: Maritime (Design, Construction, and Equipment – Survey and Certification) Rules* and *Part 3D: Maritime (Design, Construction, and Equipment – Fire Protection) Rules*, standards and requirements for the design and construction of New Zealand ships that are commercial ships and on-board fire systems, equipment, fittings, and fire-related information.

1.4 Application of MTI provisions

(1) This MTI specifies—

(a) requirements with which a ship described in rule 3D: A1.3, must comply; and

(b) standards that are, for the purposes of rule 3D: C1.1, the relevant design, construction, equipment, and installation standards.

(2) If there is a conflict between this MTI and the maritime rules, the maritime rules apply.

(3) If there is a conflict between this MTI and material incorporated by reference in this MTI, the MTI applies.

1.5 Interpretation

(1) A term that is used in this MTI and defined in *Part 3D* has the same meaning as in that Part.

(2) In this MTI, unless the context otherwise requires,—

electrical equipment means any equipment that uses, or is designed or intended to use, electricity, and includes electrical appliances

evacuation station means a deck space forming a survival craft embarkation station or muster station

firefighter's outfit means fire protective clothing, boots, gloves, helmet, self-contained breathing apparatus, electric safety lamp, and axe

fire-resisting division means a division that has the properties specified in clause 3.2(1)

fire-restricting material is material with the properties specified in clause 3.2(1)

FRP means fibre-reinforced plastic

gastight space means a space with the properties specified in clause 8.4

large galley means a galley that is not a small galley

low-flame spread surface means a surface with the properties specified in clause 4.2(7)

non-combustible material means material with the properties specified in clause 3.2(1)

small galley means a galley containing a single compact domestic range, consisting of burners or hotplates and oven, with total gas consumption less than 65 mJ/hr or total electricity consumption less than 9 kW

watertight means capable of preventing the passage of water through the structure in any direction under a head of water for which the surrounding structure is designed

(3) In this MTI, codes and official standards (such as AS/NZS and ISO) are referred to as standards and by the abbreviations listed in Appendix 3.

Section 2 Recording of ship as low, medium, or high fire-risk ship

2.1 Ship fire-risk categorisation

For the purposes of rule 3D: C2.2, a ship must be categorised as a low, medium, or high fire-risk ship and a surveyor must make a record of the fire-risk category on the certificate of survey, in accordance with *Part 1A: Maritime (Design, Construction, and Equipment – Survey and Certification) Rules.*

Section 3 Structural fire protection

3.1 Application of structural fire protection requirements

This Section specifies requirements for structural fire protection on a ship for the purposes of rule 3D: C3.2.

3.2 Type and design of structural fire protection

Fire-resisting divisions

(1) For the purposes of this Section—

(a) a non-combustible material is a material that does not burn or give off flammable vapours in sufficient quantity for self-ignition when heated at approximately 750 degrees Celsius and that complies with 1 of the following standards:

(i) *FTP Code,* Annex 1, Part 1:

(ii) *NZS/AS 1530.1*:

(iii) *ISO 1182*:

(b) a fire-resisting division is a division formed by bulkheads and decks having insulation or inherent fire-resisting properties as demonstrated by assessment in accordance with 1 of the following standards:

(i) *FTP Code,* Annex 1, Part 3 or Part 11:

(ii) for wood and FRP constructions, the test procedures in Appendix 1; and

(c) fire-restricting material means material that has properties complying with the relevant criteria in the *FTP Code,* Annex 1, Part 10.

(2) Divisions formed by bulkheads and decks must comply with the structural fire protection requirements in—

(a) Table 3.1 for—

(i) a high fire-risk ship of 15 metres or more, and less than 35 metres in LOA; or

(ii) a medium fire-risk of 24 metres or more in LLL; and

(b) Table 3.2 for a high fire-risk ship of 35 metres or more in LOA.

(3) Where 2 fire divisions having different structural fire protection times intersect, the insulation of the division with the higher structural fire protection time must extend on the deck or bulkhead with the insulation of the lesser structural fire protection time, for a distance of at least 450 millimetres.

(4) An internal stairway in a ship described in subclause (2) must be enclosed, with smoketight divisions of non-combustible or fire-restricting materials—

(a) at each level, if the level serves more than 2 decks of accommodation; and

(b) on at least 1 level, if the level serves 2 decks of accommodation.

(5) Spaces on a ship described in subclause (2) that are enclosed behind ceilings and linings of accommodation spaces, service spaces, and control stations must be divided by close-fitting draught stops spaced not more than 14 metres apart.

Maintenance of structural integrity

(6) The main load-carrying structures within major fire hazard areas and moderate fire hazard areas must be arranged to distribute load so as to ensure that the hull and superstructure will not collapse when it is exposed to fire for the applicable fire protection time specified in Tables 3.1 and 3.2.

(7) The structures specified in subclause (6), other than steel, must be insulated in accordance with the following requirements:

(a) a structure made of aluminium alloy must be insulated to ensure that the temperature of the core does not rise more than 200 degrees Celsius above the ambient temperature within the applicable fire protection times specified in Tables 3.1 and 3.2:

(b) a structure made of combustible material must be insulated to ensure that its temperature does not rise to a level where deterioration of the construction will occur during exposure to the fire test specified for load-bearing fire-resisting divisions in *Test Procedures for Fire-Resisting Divisions of High Speed Craft* adopted by the *IMO* by *Resolution MSC.45(65)*.

Doors in fire-resisting divisions and gastight spaces

(8) A door or other closure of an opening within a bulkhead forming a fire-resisting division or gastight space on a ship described in rule 3D: C3.2(2) must be—

(a) constructed to the same level of fire protection as the bulkhead in which it is installed unless it is a steel watertight door which is not required to be insulated; and

(b) equivalent in strength to the surrounding unpierced bulkhead; and

(c) self-closing, unless it is a fire door to a machinery space which also serves as a watertight door and the following requirements are complied with:

(i) signage, in a clearly visible location proximate to the door, states that the door must be closed when not in use:

(ii) an indicator is fitted at the helm or continuously manned control station to alert the master and crew as to whether the door is open or closed:

(iii) the indicator remains active during normal operations and in an emergency:

(iv) the door is of a quick-acting or single-action type:

(v) maintenance of the alarm or indicator is included in the maintenance plan for the ship:

(vi) the Maritime Transport Operator Plan for the ship includes an operating procedure to keep the door closed when not in use.

Penetrations to fire-resisting divisions

(9) The fire integrity of a bulkhead or deck that forms fire-resisting divisions on a ship described in rule 3D: C3.2(2) must not be impaired if they are penetrated for the passage of electrical cables, pipes, ducts, and similar products.

Electric ships

(10) A ship, that has an electrical energy storage system used to power main propulsion machinery of 120 kW or more output, must have minimum time-related fire-resisting divisions in the space where the electrical system is located of—

(a) 30 minutes, if the ship is less than 35 metres in LOA; or

(b) 60 minutes, if the ship is 35 metres or more in LOA.

Table 3.1: Structural fire protection for high fire-risk ship, 15 m or more LOA but less than 35 m LOA; or a medium fire-risk ship, 24 m or more LLL

Area		1	2	3	4	5
Major fire hazard areas	1	30 / 30	15 / 30	STNC / 30	STNC / 30	STNC / 30
Moderate fire hazard areas	2		15 / 15	STNC / 15	STNC / 30	STNC / 15
Minor fire hazard areas	3			STNC / STNC	STNC / STNC	STNC / STNC
Control stations	4				STNC / STNC	STNC / STNC
Evacuation stations	5					Nil

Table 3.2: Structural fire protection for high fire-risk ship, 35 m or more LOA

Area		1	2	3	4	5
Major fire hazard areas	1	60 / 60	30 / 60	STNC / 60	STNC / 60	STNC / 60
Moderate fire hazard areas	2		30 / 30	STNC / 30	STNC / 60	STNC / 30
Minor fire hazard areas	3			STNC / STNC	STNC / STNC	STNC / STNC
Control stations	4				STNC / STNC	STNC / STNC
Evacuation stations	5					Nil

When reading Tables 3.1 and 3.2:

- the value above the diagonal line in a cell applies to the side of the bulkhead or deck exposed to the category of space corresponding to the vertical column
- the value below the diagonal line in a cell applies to the side of the bulkhead or deck exposed to the category of space corresponding to the horizontal row

Notes for tables 3.1 and 3.2

(1) 15 means a 15-minute time related fire-resisting division.
(2) 30 means a 30-minute time related fire-resisting division.
(3) 60 means a 60-minute time related fire-resisting division.
(4) Where adjacent spaces are in the same numerical category, a bulkhead or deck need not be required between such spaces, for example, two storerooms containing flammable products. However, a bulkhead is required between a galley and a storeroom containing flammable products, despite both spaces being in the same category.
(5) STNC means a smoke-tight division made of non-combustible or fire-restricting material.
(6) For the purposes of this Part, storage rooms for fixed fire-extinguishing mediums must be treated as control stations.

Section 4 Interior surface finishes and fit-out material

4.1 Application of interior surface finishes and fit-out material requirements

This Section specifies requirements for the type, design, and fitting of interior surface finishes and material on a ship for the purposes of rule 3D: C4.2.

4.2 Type, design, and fitting of interior surface finishes and fit-out material

(1) Exposed surfaces of FRP, constructed within accommodation spaces and service spaces, control stations, machinery spaces of Category A, and other machinery spaces of similar fire risk, must—

(a) have a final lay-up layer of resin with inherent fire-retardant properties; or

(b) be coated with a fire-retardant paint or veil; or

(c) be protected by non-combustible materials.

(2) Combustible veneers that are low flame-spread surfaces are permitted on non-combustible divisions and fire-resisting divisions.

(3) In spaces where penetration of oil products is possible,—

(a) the surface of insulation, including structural fire protection insulation, must be impervious to oil and oil vapours; and

(b) the insulation must have protection where it is vulnerable to damage.

(4) On a ship to which rule 3D: C4.2(2) applies, surface finishes and materials in accommodation spaces, major fire hazard areas, moderate fire hazard areas, and control stations must have non-combustibility or low flame-spread properties in accordance with a standard specified in subclause (6).

(5) Furniture and upholstery containing flexible polyurethane foam must not be fitted on a ship unless the foam has been tested to successfully demonstrate compliance with a standard specified in subclause (6).

(6) Flexible polyurethane foam must be tested to 1 of the following standards:

(a) *BS 5852* or *BS 5852-2*:

(b) *ISO 8191-1* or *ISO 8191-2*:

(c) *AS/NZS 3744.1* or *AS/NZS 3744.2*.

Standards for surface finishes and material

(7) For the purposes of rule 3D: A2.3, and this MTI, a low flame-spread surface means a surface having properties that restrict the spread of flame which, when assessed in accordance with the *FTP Code,* Annex 1, Part 5 or when assessed in accordance with *AS/NZS 1530.3*, is demonstrated to meet—

(a) all the following acceptance criteria 1:

(i) Spread of Flame Index not exceeding 3:

(ii) Ignitability Index plus Heat Evolved Index not exceeding 7 (in total):

(iii) Smoke Developed Index not exceeding 4; or

(b) all the following acceptance criteria 2:

(i) Spread of Flame Index not exceeding 1:

(ii) Ignitability Index plus Heat Evolved Index not exceeding 3 (in total):

(iii) Smoke Developed Index not exceeding 5.

(8) Surface finishes and materials on a ship must be tested to successfully demonstrate compliance with the appropriate sections of the *FTP Code* or, as applicable, 1 of the following standards for each type of surface or material:

(a) linings, ceilings, and doors:

(i) *AS/NZS 1530.1*:

(ii) *ISO 1182*:

(b) paint and other surface finishes:

BS 476-7:

(c) furniture and upholstery:

(i) *BS 5852-2*:

(ii) *ISO 8191-1*:

(iii) *AS/NZS 3744.1* and *AS/NZS 3744.2*:

(d) draperies and curtains:

(i) *BS 5867-2*:

(ii) *BS EN 13773*:

(iii) *AS 1530-2*:

(iv) *ISO 6940*:

(e) deck finish materials:

(i) *Level 1,* when tested to *AS ISO 9239-1*:

(ii) *ISO 9239-1.*

(9) The testing of linings, ceilings, doors, and deck finish materials under subclause (8) must include smoke generation potential and toxicity testing in accordance with the *FTP Code,* Annex 1, Part 2 or *AS/NZS 1530.1*.

Section 5 Arrangements for heating, cooking, and LPG and other highly flammable liquids

5.1 Application of layout and arrangement requirements

This Section specifies requirements for the type, design, and general layout of requirements for heating, cooking, and LPG on a ship for the purposes of rule 3D: C5.2.

5.2 Heating and cooking general safety requirements

(1) For the purposes of rule 3D: C5.2(2), a ship must not carry, or have installed, in a contained space—

(a) an open gas-flame appliance; or

(b) an open fire; or

(c) an appliance, for heating or cooking, fuelled by petrol, white spirit or Category 1 or Category 2 flammable liquids having a flash point below 23 degrees Celsius.

(2) Despite subclause (1), the following may be installed provided that, if in a contained space, there is adequate ventilation to remove fumes and possible gas leakage to a safe space:

(a) appliances and fires described in subclause (1):

(b) a stove or water heater or domestic refrigerator:

(c) an enclosed wood-burner heater that complies with *BS 8511-2010*.

5.3 Liquid petroleum gasfitting on ships

For the purposes of rule 3D: C5.2(7), the installation of an LPG appliance on a ship must comply with the following requirements:

(a) gasfitting work must be in accordance with *AS/NZS 5601.2*:

(b) an automatic safety gas shut-off device must be fitted to shut off the flow of gas to an appliance supplied with gas if there is—

(i) a loss of pressure in the gas main pipe; or

(ii) flame failure.

5.4 Storage of liquefied gas and highly flammable liquids

(1) For the purposes of rule 3D: C5.2(8), compartments used for the storage of liquefied gas and highly flammable liquids must be arranged to ensure that—

(a) different types of compressed gas are stored in separate compartments; and

(b) combustible products, tools, and objects that are not part of the gas distribution system are not stored in the compartments; and

(c) compartments are free draining and direct access is only possible from open decks; and

(d) pressure-adjusting devices and relief valves only emit exhaust within the compartment or directly into the atmosphere; and

(e) where boundary bulkheads of such compartments adjoin other enclosed spaces, they are gastight; and

(f) sources of heat are kept clear of the compartments; and

(g) "No smoking" and "No naked light" notices are displayed in a prominent position; and

(h) containers are adequately secured to prevent movement or rotation from vibration or movement at sea or chafe or undue pressure on plastic containers; and

(i) containers and connected equipment and hoses are protected from mechanical damage, ultraviolet degradation, excessive temperature changes, and accumulation of snow and ice.

(2) For the purposes of rule 3D: C5.2(9), the storage of liquefied gas and highly flammable liquids on a ship, and the electrical equipment and fittings installed within the compartments, must comply with subclauses (3) to (5), as applicable.

(3) Small quantities of different types of liquefied gases or highly flammable liquids may be stored in the same storage compartment if this is provided for in the *Health and Safety at Work (Hazardous Substances) Regulations 2017*.

(4) Electrical equipment and fittings must only be installed within a compartment used for the storage of liquefied gas and highly flammable liquids if—

(a) necessary for operational or safety purposes; and

(b) of a certified safe type in accordance with 1 of the following standards:

(i) *AS/NZS 60079.0*:

(ii) *IEC 60079-7.*

(5) The method of installation and application of electrical equipment suitable for use in explosive gas atmospheres must be in accordance with 1 of the following standards:

(a) *IEC 60079-14*:

(b) *AS/NZS 60079.14.*

Section 6 Ventilation systems

6.1 Application of ventilation requirements

This Section specifies requirements for the type, design, and installation of ventilation systems, including ventilation ducts and fire dampers, on a ship for the purposes of rule 3D: C6.2.

6.2 Type, design, and installation of ventilation ducts and fire dampers and closings

(1) A means must be provided to stop fans and close main openings to ventilation systems from outside the space served and it must—

(a) have readily accessible controls; and

(b) be positioned so that it cannot be readily cut off in the event of a fire in the spaces served; and

(c) be prominently and permanently marked.

(2) A ventilation fan must be spark-free if fitted in an ESS space.

Ventilation ducts

(3) A ventilation duct that serves more than 1 space or that passes through 1 space to serve another space must be constructed of non-combustible material or insulated to protect it from fire.

(4) Subclause (5) applies to a ventilation duct—

(a) for a machinery space of Category A or an ESS space that passes through an accommodation space, service space, or control station; or

(b) for an accommodation space, a service space, or a control room, that passes through machinery spaces of Category A, or an ESS space.

(5) The ventilation duct must be constructed of steel or an equivalent material and arranged to protect the integrity of any fire-resisting division.

(6) A ventilation duct that passes through a fire-resisting division required on a ship to which rule 3D: C3.2(2) applies, must comply with the following requirements:

(a) a thin plated duct with a free cross-sectional area equal to, or less than, 0.02 square metres must have an opening that is fitted with a steel sheet sleeve having a thickness of at least 3 millimetres and a length of at least 200 millimetres, divided preferably into 100 millimetres on each side of a bulkhead or, in the case of a deck, wholly laid on the lower side of the decks penetrated:

(b) a ventilation duct with a free cross-sectional area exceeding 0.02 square metres, but not more than 0.075 square metres, must have openings that are lined with steel sleeves and the ducts and sleeves must have—

(i) a thickness of at least 3 millimetres; and

(ii) a length of at least 900 millimetres which, when passing through bulkheads, must be divided preferably into 450 millimetres on each side of the bulkhead; and

(iii) fire insulation with at least the same fire integrity as the division through which the duct passes:

(c) except as provided in subclause (9), automatic fire dampers must be fitted—

(i) in each duct, with a free cross-sectional area exceeding 0.075 square metres that passes through a fire-resisting division, and the duct must not be divided into smaller ducts at the penetration of a fire-resisting division and then recombined into the original duct once through the division to avoid installing the damper; and

(ii) close to the division penetrated and the duct between the damper and the division penetrated must be constructed of or lined with a 4 millimetres thick steel sleeve.

(7) A store room containing flammable products must be provided with a ventilation system that is independent of ventilation systems serving other spaces.

Fire dampers and closings

(8) A fire damper required by subclause (6)(c) must—

(a) operate automatically and be of a fail-safe, automatic-closing type; and

(b) be capable of being closed or opened manually; and

(c) have an indicator to show if it is open or closed.

(9) A fire damper is not required where a duct—

(a) passes through a space surrounded by fire-resisting divisions does not serve that space; and

(b) does not serve that space; and

(c) has the same fire integrity as the divisions it pierces.

Section 7 Fire detection and fire alarms

7.1 Application of requirements for fire detection and fire alarm systems and appliances

This Section specifies requirements for the number, type, design, and installation of fire detection and fire alarm appliances and systems on a ship for the purposes of rule 3D: C7.2.

7.2 Type, design, and installation of fire detection and fire alarm systems and appliances

Gas detection systems in ESS spaces

(1) For the purposes of rule 3D: C7.2(2)(a), a suitable gas detection system must be installed in an ESS space.

Standards for fire detection and fire alarm appliances and systems

(2) For the purposes of rule 3D: C7.2(2)(c), a fire detection and fire alarm appliance on a ship must comply, as applicable, with 1 of the following standards for each type of appliance:

(a) a smoke detector and alarm:

(i) *NZS 4512*:

(ii) *AS 3786*:

(b) a heat detector and alarm:

(i) *AS 1603*:

(ii) *AS 1851*:

(c) a fixed fire detection and fire alarm system:

(i) *FSS Code*:

(ii) *HSC Code* – clauses 7.7.1 and 7.7.2:

(iii) *NZS 4512*:

(iv) *AS 1603.*

(3) A heat detector must only be installed where a smoke detector is considered inappropriate.

(4) The function of a fire detection system must be periodically tested to the satisfaction of a surveyor by means of—

(a) equipment producing hot air at the appropriate temperature; or

(b) smoke or aerosol particles having the appropriate range of density or particle size; or

(c) other phenomena associated with incipient fires to which the detector is designed to respond.

Low fire-risk ships

(5) For the purposes of rule 3D: C7.2(3), a low fire-risk ship of more than 6 metres in LOA that has an inboard machinery space used for main propulsion of 120 kW or more output, must have at least 1 smoke detector and alarm installed in any of the following spaces:

(a) a machinery space of Category A:

(b) a galley:

(c) an enclosed accommodation space:

(d) any space that presents a non-negligible risk of fire.[1]

(6) Despite subclause (5)(c), a heat detector and alarm may be installed instead of a smoke detector and alarm in a galley.

Medium fire-risk ships and high fire-risk ships

(7) For the purposes of rule 3D: C7.2(6), a medium fire-risk ship or a high fire-risk ship must have a fixed fire detection and fire alarm system that complies with subclauses (8) and (11) and has detectors covering all internal spaces except those spaces that present a negligible fire risk.

[1] Examples of spaces referred to here and in subclause (6) are void spaces, cofferdams or spaces which contain no appreciable amount of combustible material or sources of ignition.

(8) The system must have at least 1 control panel that—

(a) is capable of individually identifying which detector or section of detectors has been activated; and

(b) is located so that it is readily accessible to a responsible person at all times.

(9) A fixed fire detection and fire alarm system on a high fire-risk ship must automatically detect and indicate any loss of system functionality.

(10) A fixed fire detection and fire alarm system must—

(a) be capable of immediate operation at all times and no action by the crew must be necessary to set it in operation; and

(b) initiate audible and visual alarms, distinct in both respects from the alarms of any other system in the ship not indicating fire, sufficient to immediately alert crew to the presence of fire.

Manually operated call points

(11) A medium fire-risk ship and a high fire-risk ship of 24 metres or more in LLL must have manually operated call points that—

(a) initiate visible and audible alarms sufficient to immediately alert crew to the presence of fire; and

(b) are located in accommodation spaces, service spaces, and control stations, with 1 manually operated call point at each exit; and

(c) are readily accessible in the corridors of each deck so that no part of the corridor is more than 20 metres from a manually operated call point.

Section 8 Fixed fire-extinguishing systems

8.1 Application of requirements for fixed fire-extinguishing systems

This Section specifies requirements for the type, design, and installation of fixed fire-extinguishing systems on a ship for the purposes of rule 3D: C8.2.

8.2 Type, design, installation, and maintenance of fixed fire-extinguishing systems

(1) No part of a fixed fire-extinguishing system may be situated forward of the collision bulkhead.

(2) The fire-extinguishing medium must not be automatically released except in the following systems:

(a) an aqueous fixed fire-extinguishing system:

(b) an automatic local fire-extinguishing system, in a galley space, that directs the extinguishing medium at the cooking appliance or extraction system.

(3) A fixed fire-extinguishing system must provide an automatic audible and visual warning within the protected space—

(a) of the release of a fire-extinguishing medium into any space in which crew normally work or to which they have access; and

(b) that operates for a sufficient period, before the medium is released, to allow for the safe evacuation of persons on board from the protected space.

Standards for fixed fire-extinguishing systems

(4) For the purposes of rule 3D: C8.2(2), a fixed fire-extinguishing system must comply with 1 of the following standards:

(a) for a gaseous fixed fire-extinguishing system, *FSS Code,* Chapter 5:

(b) for a fixed foam fire extinguishing system, *FSS Code,* Chapter 6:

(c) for a fixed pressure water-spraying or water-mist fire-extinguishing system, *FSS Code,* Chapter 7:

(d) for an aerosol fixed fire-extinguishing system:

(i) *MSC/Circ.1270*: or

(ii) *NFPA 2010.*

(5) A fixed fire-extinguishing system must be maintained in accordance with 1 of the following standards:

(a) for a fixed gas fire-extinguishing system, *AS 1851:*

(b) *MSC.1/Circ. 1432.*

Portable fire extinguisher may be carried instead of a fixed fire-extinguishing system

(6) A fixed fire-extinguishing system is not required to be installed to protect an engine space if a portable fire extinguisher, that complies with Section 9 of Part 3D,—

(a) is stored outside the engine space and is readily available to extinguish fires within it; and

(b) can be discharged into the protected space from outside that space through a readily identifiable, appropriately situated discharge opening that is sized so that it is no larger than necessary to accommodate the nozzle; and

(c) uses an extinguishing medium appropriate for the likely type of fire hazard; and

(d) has an extinguishing medium and capacity sufficient to flood the entire protected space and extinguish any fire that may arise within it; and

(e) is protecting a space with a total volume of no more than 10 cubic metres.

(7) A portable fire extinguisher carried on a ship for the purposes of complying with subclause (6) must be in addition to a portable fire extinguisher required for the purpose of clause 9.2(1).

Maintenance manual

(8) A ship must carry an instruction manual covering the operation and maintenance requirements for, and the safety and occupational health hazards of, a fixed fire-extinguishing system.

8.3 Storage and conveyance of fixed fire-extinguishing medium

(1) For the purposes of rule 3D: C8.3, a fixed fire-extinguishing medium must comply with subclauses (2) to (12).

(2) A container required for the storage of a fixed fire-extinguishing medium may only be located in a protected space if the container complies with item 11 of *MSC/Circ.848*.

Note item 11 of MSC/Circ 848 has now been amended by another circular, MSC.1/Circ.1267

Storage rooms

(3) A fire-extinguishing medium stored outside a protected space must be stored in a space that is—

(a) situated in a safe and readily accessible position; and

(b) ventilated to the open atmosphere.

(4) Any entrance to a storage space described in subclause (3) must,—

(a) if possible, be from the open deck and, in any case, must be independent of the protected space; and

(b) if it is an access door, open outwards.

(5) Bulkheads and decks (including doors and other means of closing any opening in the bulkheads or decks) must be gastight if they form the boundaries between storage spaces and adjoining enclosed spaces.

(6) For the purpose of the application of Tables 3.1 and 3.2, a storage space must be treated as a control station.

Conveyance of fire-extinguishing medium

(7) The pipes for conveying the fire-extinguishing medium into protected spaces must be provided with control valves that—

(a) are located where they will be easily accessible and not readily cut off from use by an outbreak of fire within the protected space; and

(b) are permanently marked to indicate clearly the spaces to which the pipes lead; and

(c) prevent the inadvertent admission of the medium into any space.

Electrical ESS

(8) A fixed fire-extinguishing system protecting a space where an electrical ESS is located must be suitable for the battery type.

(9) For the purposes of subclause (8), particular regard must be had to lithium ion batteries and—

(a) the risk of thermal runaway and the temperatures in which this results; and

(b) the potential for the extinguishing agent to develop into toxic or unstable compounds at extremely high temperatures produced by lithium ion battery thermal runaway.

Gaseous systems

(10) A fixed carbon dioxide fire-extinguishing system must comply with the following requirements:

(a) 2 separate controls must be provided for releasing carbon dioxide into a protected space and to ensure the activation of the alarm with—

(i) the first control capable of operation to open the valve of the piping that conveys the gas into the protected space; and

(ii) the second control not capable of operation to discharge the gas from its storage containers:

(b) the 2 controls must be located inside a release box clearly identified for the particular space and, if the box containing the controls is to be locked, a key to the box must be in a conspicuous breakglass-type enclosure next to the box.

(11) The means of control of a fixed gas fire-extinguishing system must be—

(a) readily accessible; and

(b) simple to operate; and

(c) grouped together in as few locations as possible and at positions not likely to be cut off by a fire in a protected space; and

(d) accompanied at each location with clear instructions relating to how the system is to be safely operated by crew.

(12) If the release of a fire-extinguishing medium produces significant over- or under-pressurisation in the protected space, a means must be provided to keep the induced pressures within acceptable levels to avoid structural damage.

8.4 Gastight requirements

(1) For the purposes of rules 3D: A2.3 and 3D: C8.4, a gastight space must be arranged to contain a fire-extinguishing medium so that the machinery space is capable of being closed down to prevent the fire-extinguishing medium from escaping.

(2) The boundaries of a gastight space must prevent the passage of smoke and flame for 15 minutes with openings in the boundaries of the space provided with closing arrangements that are either—

(a) constructed of steel; or

(b) not constructed of steel and fitted with insulation approved to comply with B-15 or fire-resisting division 30, in accordance with Part 3 or Part 11 (as applicable) of Annex 1 of the *FTP Code,* or greater for use with steel construction; or

The insulation need not be fitted lower than 300 mm below light waterline on the hull sides

(c) constructed of FRP or wood and a prototype of the boundary which, under the test procedure in Appendix 2, prevent the passage of smoke and flame for 15 minutes, provided that solvent-borne intumescent paints are not used.

Fire resistance of FRP may be achieved by use of woven roving glass layers or additives, which must be added, strictly in accordance with manufacturers' requirements, to resin. Intumescent polyester, epoxy, vinyl ester or phenolic resin surface coatings may also be used, provided it can be demonstrated coating can protect integrity of bulkhead or structure.

(3) A protected space is not required to be gastight in a ship of less than 24 metres in LLL if—

(a) the space is as gastight as it can reasonably and practicably be made, taking into account the ship's arrangement and construction materials; and

(b) the effectiveness of the fixed fire-extinguishing system, taking into account the volume of free air that may be drawn into the space in the event of fire and the nature of the extinguishing medium, is sufficient; and

(c) the protected space is separated from an accommodation space by divisions that prevent fumes from the protected space entering the accommodation space.

Section 9 Portable fire extinguishers, and fire blankets

9.1 Application of requirements for portable fire extinguishers, and fire blankets

This Section specifies requirements for the number, type, design, location, and maintenance of portable fire extinguishers and fire blankets on a ship for the purposes of rule 3D: C9.2.

9.2 Number, type, design, location, and maintenance of portable fire extinguishers and fire blankets

Minimum number of portable fire extinguishers to be carried according to space

(1) A ship must carry the following minimum number of portable fire extinguishers:

(a) in a machinery space of Category A or where an electrical ESS space used for main propulsion is located, in an accommodation space, and in any large galley—

(i) 1 portable fire extinguisher, if it is a low fire-risk ship or a medium fire-risk ship of less than 15 metres in LOA; or

(ii) 2 portable fire extinguishers, if it is a medium fire-risk ship of 15 metres or more in LOA or a high fire-risk ship:

(b) in an auxiliary machinery space, 1 portable fire extinguisher:

(c) in a small galley, 1 portable fire extinguisher:

(d) in a control station or steering position, 1 portable fire extinguisher.

(2) A medium fire-risk ship of 24 metres or more in LLL, and a high fire-risk ship, must carry—

(a) sufficient portable fire extinguishers, which must be suitable for extinguishing oil fires, located within each engine space and auxiliary machinery space so that no portable fire extinguisher is more than 10 metres walking distance from any point in the space; and

(b) 1 replacement portable fire extinguisher of the same type for every 2 portable fire extinguishers required in subclause (1).

Barges

(3) A barge is not required to comply with subclauses (1) and (2) but must carry—

(a) portable fire extinguishers that comply with subclauses (4) to (17); and

(b) for the spaces and equipment specified in Table 9.1, 1 of the following:

(i) 1 foam fire extinguisher of at least 135 litres capacity:

(ii) 1 carbon dioxide fire extinguisher of at least 45 kilograms capacity:

(iii) 1 portable fire extinguisher suitable for extinguishing an oil fire:

(iv) 2 or more portable fire extinguishers suitable for extinguishing an oil fire:

(v) 1 portable fire extinguisher suitable for extinguishing an electrical fire.

Table 9.1 Requirements for number and type of portable fire extinguisher on barges

	Space containing oil-filled boilers or oil fuel units	Space containing an internal combustion engine,	Space, containing electric generators or large motors, that does not have an enclosed ventilation system	Outside and adjacent to space containing emergency electric motors or generators	Crane with internal combustion engine
Type of portable fire extinguisher	Requirement in cl 9.2(3)(a) or (b)(i) and (ii)	For each 750 kW brake power, requirements in cl 9.2(3)(iii), and for each space, cl 9.2(3)(iv) (but no more than 6 is required).	For each generator or motor, requirement in cl 9.2(3)(v)	Requirement in cl 9.2(3)(v) For each 750 kW brake power, requirements in cl9.2(3)(b)(iii) and (iv) (but no more than 6 required).	Requirement in cl 9.2(3)(iii)

Standards for portable fire extinguishers and fire blankets

(4) A portable fire extinguisher on a ship must comply with *AS/NZS 1841*.

(5) A galley on a ship must contain a fire blanket that complies with *AS/NZS 3504*.

Location of portable fire extinguishers

(6) A portable fire extinguisher must be easily identified and permanently mounted with a quick-release mechanism and must be suitably located for immediate use in the protected space.

(7) At least 1 of the portable fire extinguishers for each protected space must be located near the entrance to the protected space, unless the fire extinguisher protects more than 1 space under subclause (9).

(8) A carbon dioxide fire extinguisher must not be located in or near the entrance to sleeping accommodation.

Type and design of portable fire extinguisher

(9) On a low fire-risk ship, a single portable fire extinguisher may be used for more than 1 protected space, provided that—

(a) it is of a type suitable for fighting the likely type of fires in each protected space; and

(b) the size and rating is at least equivalent to that required in Table 9.2 for each of the spaces it protects; and

(c) it is readily accessible for use within each protected space.

(10) Except as provided in subclause (11), a portable fire extinguisher must be of the minimum size and comply with classification ratings and capacity specified in Table 9.2 in accordance with *AS/NZS 1850*.

(11) The minimum size of a portable fire extinguisher specified in Table 9.2 may be met by a ship carrying 2 portable fire extinguishers that are each less than the minimum size provided that—

(a) each extinguisher has the same classification rating; and

(b) the 2 extinguishers are, in aggregate, of at least the same size as the extinguisher required in Table 9.2 and can be co-located for the purposes *of* subclause (7).

(12) The 2 portable fire extinguishers referred to subclause (11)(b) are equivalent to a single portable fire extinguisher for the purposes of subclause (7).

Table 9.2: Size and classification rating of portable fire extinguishers

Fire Type	Type of portable fire extinguisher	Length of the ship			
		Ships 24 m or more LLL	**Ships 12 m or more m LOA but less than 24 m LLL**	**Ships more than 6 m but less than 12 m LOA**	**Ships of up to 6 m LOA**
For fires involving solids such as wood, cloth, paper, rubber and plastics[2]	Water or foam	3A: 4.5 litres	2A: 4.5 litres	2A: 4.5 litres	2A: 4.5 litres
	Wet chemical	3A: 7 litres	3A: 7 litres	2A: 7 litres	2A: 7 litres
	Dry powder	3A: 4.5 kg	2A: 4.5 kg	2A: 2.5kg	2A: 2kg
For fires involving flammable gases	Dry powder	C: 4.5 kg	C: 4.5 kg	C: 4.5 kg	C: 2.5 kg
For fires involving flammable and combustible liquids[3]	Foam	20B: 9 litres	20B: 9 litres	20B: 4 litres	20B: 4 litres
	Dry powder	80B: 9kg	60B: 4.5kg	40B: 2.5kg	30B: 2kg
For fires involving electricity[4]	Dry Powder	E: 3.5kg	E: 3.5kg	E: 2kg	E: 1.5kg
	CO_2	E: 5kg	E: 5kg	E: 3kg	E: 3kg
		Large galley		Small galley	
For fires involving cooking oils or fats	Wet chemical	4F: 3.5 litres		2F: 2.5 litres	

(13) For the purposes of rule 3D: C9.2, a portable fire extinguisher must be maintained in accordance with the manufacturer's instructions and be serviced by a competent person, in accordance with *NZS 4503.*

(14) For the purposes of subclause (13), a competent person means a person with relevant industry training and experience as defined in *NZS 4503*.

(15) A portable fire extinguisher must be fully replenished or replaced with a fully charged portable fire extinguisher of the same type, rating, and capacity, as soon as reasonably practicable after use.

(16) Subject to subclause (17), where portable dry powder fire extinguishers are provided in accommodation spaces and service spaces or in machinery spaces, their number must not exceed 1 half of the total number of extinguishers provided in any of those spaces.

(17) Where only 1 portable fire extinguisher is required in an accommodation space, a service space, or a machinery space, that extinguisher must not be a dry powder extinguisher.

[2] For example, fires in accommodations spaces in general.
[3] For example, fires in a machinery space.
[4] For example, switchboards, control rooms and navigation bridges.

Section 10 Firefighters' outfits

10.1 Application of requirements for firefighters' outfits

This Section specifies requirements for the number, type, and design of firefighters' outfits on a ship for the purposes of rule 3D: C10.2.

10.2 Number, type, and design of firefighters' outfits

Minimum number of firefighters' outfits

(1) A medium fire-risk ship or a high fire-risk ship, of 24 metres or more in LLL, must carry a minimum of 2 firefighters' outfits.

(2) A medium fire-risk ship or high fire-risk ship, of 15 metres or more in LOA, must carry at least 1 fire axe and 1 electric safety lamp, complying with the *FSS Code,* Chapter 3 or, for fire axes, the standard in subclause (3)(c).

Standards for firefighters' outfits

(3) Each firefighter's outfit must comply with the *FSS Code,* Chapter 3 or 1 or more of the following standards for each item:

(a) protective clothing, gloves. helmet and boots:

(i) *ISO 11999-3*:

(ii) *NFPA 1971*:

(iii) *AS/NZS 4067*:

(b) self-contained breathing apparatus:

(i) *AS/NZS 1715*:

(ii) *NFPA 1981:ES EN 137*:

(c) fire axe:

BS 3054.

Section 11 Emergency escape breathing devices

11.1 Application of requirements for emergency escape breathing devices

This Section specifies requirements for the number, type, and design of emergency escape breathing devices on a ship for the purposes of rule 3D: C11.2.

11.2 Number, type, and design of emergency escape breathing devices

Minimum requirements for of emergency escape breathing devices

(1) A medium fire-risk ship and a high fire-risk ship, of 24 metres or more in LLL, must carry a minimum of 2 emergency escape breathing devices within each machinery space of Category A.

(2) Each emergency escape breathing device must be readily accessible and positioned along escape routes or at the foot of each escape ladder within the space.

Standards for emergency escape breathing devices

(3) An emergency escape breathing device must comply with 1 of the following standards:

(a) *ISO 23269-4*:

(b) *AS/NZS 1716*:

(c) *AS/NZS 1715*:

(d) *BS EN 1146.*

Section 12 Fire pump and hose appliances and fire buckets

12.1 Application of requirements for fire pump and hose appliances and fire buckets

This Section specifies requirements for the number, type, and design of fire pump and hose appliances and fire buckets on a ship for the purposes *of* rule 3D: C12.2.

12.2 Number, type and design of fire pumps

Number of main fire pumps and water jets

(1) A ship must provide the following minimum number of fire pumps and water jets for fire hose appliances:

(a) 2 main fire pumps and 2 water jets, if the ship is a high fire-risk ship of 24 metres or more in LLL:

(b) if paragraph (a) does not apply, 1 main fire pump and 1 water jet, if the ship is of 15 metres or more in LOA and has an inboard machinery space or an ESS space.

Emergency fire pumps

(2) The following ships must carry 1 emergency fire pump:

(a) a medium fire-risk ship of 24 metres or more in LLL, if the main fire pump is located in the main machinery space or ESS space:

(b) a high fire-risk ship of 15 metres or more in LOA and less than 24 metres in LLL, if the main fire pump is located in the main machinery space or ESS space:

(c) a high fire-risk ship of 24 metres or more in LLL, unless 1 of the main pumps required by subclause (1)(a), and its source of power, can provide redundancy if a fire in any 1 compartment on the ship could render a main fire pump inoperative.

Performance of fire pumps

(3) A fire pump (including a second or emergency fire pump) must be capable of—

(a) providing water of the capacity and pressure and inclined jet throw required in Table 12.1; and

(b) simultaneously supplying both jets, while maintaining the applicable performance for throw, capacity, and pressure specified in Table 12.1; and

(c) providing the required discharge to 2 hoses simultaneously, where more than 1 water jet is required under subclause (1).

Table 12.1: Fire hose appliance performance

Length	Minimum throw of inclined water jet (m)	Required hydrant pressure kPa	Minimum pump capacity per fire hose appliance per fire pump m3 /hr
Less than 24 m LLL	6	150	5.5
24 m or more LLL	11	150	7

Fire pumps' source of power

(4) A fire pump must be power-driven and, if a ship carries a single main fire pump and no emergency fire pump, the fire pump must be—

(a) operated by a means other than the ship's propulsion engines; and

(b) capable of being operated using a main and alternative source of electrical power, if the pump is electrically powered.

(5) If 2 main fire pumps are specified in subclause (1), they must—

(a) be driven independently from one another so that a failure in the source of power for 1 main fire pump, including a switchboard, will not prevent the starting and use of the other; and

(b) each be sized to simultaneously supply both jets specified, while maintaining the applicable performance for throw, quantity, and pressure specified in Table 12.1.

(6) An emergency fire pump must be independently driven.

Period of operation of main fire pumps and second or emergency fire pump

(7) A main and second or emergency fire pump and its source of power must be capable of continuous operation for a period not less than that specified for continuous operation of emergency electrical installations in *Part 3F: Maritime (Design, Construction, and Equipment – Electrical) Rules*.

For ships fitted with multiple main fire pumps, this requirement applies to any one of the main fire pumps that may be called upon to supply fire hydrant appliances.

Location of emergency fire pump

(8) The space containing the emergency fire pump and its ancillary items must not be contiguous to the boundaries of a machinery space of Category A or an ESS space, or a space containing main fire pumps.

(9) If it is not practicable to comply with subclause (8), the common bulkhead between the 2 spaces must be insulated to a standard of structural fire protection equivalent to that required for a control station in Section 3.

(10) If the space containing the emergency fire pump and its source of power is likely to be cut off in the event of fire, a second means of access to the space must be provided.

(11) An emergency fire pump may be a portable fire pump provided it is stored in a readily accessible location not likely to be cut off in the event of a fire and clearly marked for its use.

Use of non-dedicated pump as main fire pump

(12) A sanitary, ballast, bilge, or general service pump may serve as a main fire pump, provided that it is not a pump normally used for pumping oil or other combustible or flammable liquids.

(13) A pump that is occasionally used for the transfer or pumping of fuel may also serve as a main fire pump provided that suitable change-over arrangements are fitted and operating instructions are conspicuously displayed at the change-over position.

Main fire pump and emergency fire pump sea suction

(14) The sea suction inlet to each main fire pump and each second or emergency pump must be—

(a) located to draw water without interruption under all conditions of loading and trim of the ship, and under weather conditions liable to be encountered in service; and

(b) arranged to prevent the entry of objects that may block the pump.

(15) If a portable suction hose is carried on a ship, the hose must be—

(a) of a length necessary to maintain immersion under all conditions of loading and trim of the ship and under weather conditions liable to be encountered in service; and

(b) weighted to maintain immersion; and

(c) provided with fittings sufficiently robust to withstand emergency usage; and

(d) provided with a foot valve, and constructed so that it will not collapse under the effect of the pump suction.

Priming of main fire pumps and emergency fire pumps

(16) A main fire pump must be self-priming or capable of holding prime.

(17) An emergency fire pump is not required to be self-priming provided that, if the emergency fire pump will not self-prime from a dry suction, it is constructed so that it can be quickly and effectively primed.

Remote starting of main fire pumps on medium fire-risk ships and high fire-risk ships

(18) A high fire-risk ship, or a medium fire-risk ship that carries more than 200 passengers, must have at least 1 main fire pump arranged so that it will start remotely from a central control station.

12.3 Type and design of fire main and number of fire hydrants

Fire main capacity, purpose, and materials

(1) If a ship has power-operated fire pumps installed, the diameter of the fire main connecting the hydrants to the pumps must be sufficient for the effective distribution of the maximum discharge required by—

(a) clause 12.2(1) which specifies the required number of main fire pumps and water jets; and

(b) clause 12.2(3) which sets the performance requirements for fire pumps.

(2) The fire main for fire hose appliances must have no connections other than those necessary for fire-fighting and washing-down, or anchor-washing.

(3) The fire main piping and hydrants must not be constructed of materials readily rendered ineffective by heat unless they are adequately protected.

Number and location of fire hydrants and hoses

(4) A ship must carry the following minimum number of fire hydrants and hoses:

(a) 1 fire hydrant and 1 hose, if the ship is a medium fire-risk ship of 15 metres or more in LOA and less than 24 metres in LLL:

(b) 1 fire hydrant outside and 1 fire hydrant inside of the machinery space for general use and 1 hose for each hydrant, if the ship is of—

(i) 24 metres or more in LLL and is a medium fire-risk ship; or

(ii) 15 metres or more in LOA and is a high fire-risk ship.

(5) The fire hydrants required under subclause (4) must be located so that,—

(a) if subclause (4)(a) is applicable, the water jet from a fire hydrant using a single length of hose, must reach any location on the ship normally accessible to persons on board; and

(b) if subclause (4)(b) is applicable, the water jets from 2 fire hoses, from 2 different fire hydrants, must be able to reach any location on the ship normally accessible to persons on board.

(6) A fire hydrant must be placed so that—

(a) the fire hose can be easily and quickly coupled to it and operated without kinking; and

(b) the fire hydrant is located so that it is always readily accessible; and

(c) where deck cargo or vehicles may be carried,—

(i) the fire main is arranged to avoid the risk of damage by the deck cargo or vehicles; and

(ii) the placement of the deck cargo and vehicles does not prevent compliance with subclause (b).

Valves and fittings at fire hydrants

(7) Fire hydrants must each have—

(a) a valve fitted so that the fire hose may be readily removed while the fire pump is in operation; and

(b) the same end fitting so that hoses can be interchanged or used at all different hydrants on the ship.

(8) Fire hydrant valves and fire main isolating valves must not be one-way (non-return) valves.

Control of water pressure

(9) The maximum pressure at a fire hydrant must not exceed that at which the fire hose can be effectively controlled.

(10) Relief valves must be provided as part of the fire main to prevent water pressure exceeding the design of the water service pipes, fire hydrants, and fire hoses, unless the fire pumps are incapable of developing a pressure exceeding the design pressure of the piping, fire hydrants, and fire hoses.

Isolating valves

(11) On a ship fitted with more than 1 fire pump (main or emergency) connected to the fire main, isolating valves must be fitted—

(a) to separate those portions of the fire main that pass through a machinery space or ESS space containing a fire pump; and

(b) in an easily accessible position outside the machinery space or ESS space.

(12) The fire main must be arranged so that when the isolating valves are shut, all the fire hydrants on the ship, except those in the machinery space or ESS space referred to in subclause 4(b), can be supplied with water by the other main fire pump or the emergency fire pump.

(13) All isolating valves in the piping must be clearly marked.

12.4 Type and design of fire hoses and nozzles

Fire hose material

(1) A fire hose must be—

(a) made of closely woven flax-canvas and rubber, or synthetic material; and

(b) provided with couplings, branch pipes, nozzles, and other necessary fittings that comply with the following standards:

(i) *NZS PAS 4505*:

(ii) *BS 336*.

Fire hose length and diameter

(2) A fire hose must—

(a) be a length of at least 10 metres, but not more than—

(i) 15 metres in a machinery space; and

(ii) 20 metres in other spaces and open decks; and

(iii) 25 metres in open decks on ships with a maximum breadth more than 30 metres; and

(b) have an internal diameter of not less than—

(i) 19 millimetres for a reinforced elastomeric fire hose; and

(ii) 38 millimetres for a lay-flat fire hose.

Fire hose nozzles

(3) A fire hose nozzle must—

(a) be suited to the application, taking into account the design pressure at the hydrant and the corrosive effects of long-term stowage in a maritime environment; and

(b) have a diameter of 12, 16, or 19 millimetres, or as near to these measurements as possible; and

(c) have a flow rate sufficient to deliver the minimum required pump capacity specified in Table 12.1.

(4) A fire hose nozzle must incorporate a shut-off facility and be capable of producing both a water spray and a plain water jet.

12.5 International shore connection

A ship of 500 gross tonnage or more must carry on board at least 1 international shore connection that complies with the *FSS Code.*

12.6 Minimum number, type, and design of fire buckets

(1) For the purposes of rule C12.2(2), a ship of 6 metres or less in LOA must carry 1 fire bucket and a ship of more than 6 metres of LOA must carry 2 fire buckets if it does not have the minimum fire hose appliances specified in clause 12.2(1)(b).

(2) A fire bucket required in subclause (1) must—

(a) have a capacity of at least 8 litres; and

(b) be fitted with a handle; and

(c) be clearly identified for use as a fire bucket; and

(d) be manufactured from waterproof and robust material; and

(e) be fitted with a lanyard of sufficient length to allow the bucket to be cast over the side and retrieved full of water.

Section 13 Information for fire preparedness and response

13.1 Application of fire-related information requirements

This Section specifies requirements for the information for fire preparedness and response on a ship for the purposes of rule 3D: C13.1.

13.2 Fire-related information

Fire control plans

(1) A high fire-risk ship, and a medium fire-risk ship of 15 metres or more in LOA, must have a fire control plan permanently exhibited in a location so that it is available for ready reference by the crew, and any persons providing assistance in the event of fire.

(2) The fire control plan must, where applicable, clearly and graphically display the location on each deck of—

(a) a control station; and

(b) a section enclosed by fire-resisting divisions; and

(c) a fixed fire detection and alarm system; and

(d) a fixed fire-extinguishing system; and

(e) firefighters' outfits and emergency escape breathing devices; and

(f) a ventilation system, including fan controls, smoke flaps and fire dampers; and

(g) a means of access to compartments and decks; and

(h) an international shore connection; and

(i) a means to control fuel shut-off valves, ventilation fan shut-down, fixed fire detection and alarm systems, and fixed fire-extinguishing systems.

(3) A ship of 24 metres or more in LLL must carry a fire control plan that complies with *ISO 17631.*

(4) A fire control plan must be up to date and any changes must be recorded on the plan as soon as possible.

Signage

(5) A ship must have signs clearly identifying all fire systems, equipment, and fittings and their location.

(6) On a ship of 24 metres or more in LLL, the signage must comply with *ISO 17631*.

Appendix 1

Test procedure for fire-resisting divisions of ships of FRP or wooden construction

1. The fire test must use an indicative sized furnace capable of generating the standard time/temperature curve specified in *ISO 834-1*, with test panels of the same size as the indicative furnace.
2. The fire test must comply with *ISO 834-1* with fixings used to attach the insulation to the construction material that must be the same as that intended for use in the ship itself.
3. There must be at least 5 thermocouples on the exposed face of the structure and at least 1 thermocouple on the unexposed face.
4. FRP constructions tested in accordance with clauses 1 to 3 must, for the relevant test period—
   (a) not produce smoke or toxic fumes which would accumulate to the extent that they would be hazardous to persons on board; and
   (b) maintain temperatures on both the exposed and unexposed side that are below the heat deflection temperature for that material measured to *ISO 75*.
5. Wood constructions tested in accordance with clauses 1 to 3 must, for the relevant test period,—
   (a) prevent the passage of smoke and flame for the duration of the appropriate fire test exposure; and
   (b) maintain temperatures on the exposed and unexposed side that are below the onset of charring for that material.
6. Once an individual construction and insulation combination has been demonstrated to satisfy these requirements [to the surveyor] in a worst-case scenario, this arrangement or a less onerous variant can be used in any intended design without the need for further testing.

> See *Maritime & Coastguard Agency Marine Guidance Note 407: Procedure for the Testing of Fire Protection for use with Composite and Wooden Constructions* for information.

Appendix 2

Gastight test procedure for ships of FRP construction

1. The heat source for the fire test must be provided by a Butane or Propane fuelled Bunsen or Tirril burner with a nominal 9.525 millimetres inside diameter tube adjusted to give a pre-mixed air/gas flame of 38.1 millimetres length. The minimum temperature measured in the centre of the flame with a calibrated thermocouple pyrometer must be 843.33°Celsius.
2. The specimen must be 500 millimetres x 500 millimetres. The edges of the specimen must be housed in a steel frame sufficiently to prevent them igniting during the test. The specimen must be cured for at least 7 days at ambient temperature or 1 day at ambient temperature and 16 hours at 400°Celsius before testing. The lay-up of the panel must be representative of the structure being considered.
3. Test Procedure: The specimen must be oriented vertically in a draft free location. The flame should impinge on the centre of the specimen with the flame normal to its surface. The surface of the specimen affected by the fire risk must be exposed to the flame at a set distance of 19.1 millimetres from the end of the burner tube. The flame must not burn through the specimen within 15 minutes.

Appendix 3

Codes of practice and official standards

FSS Code means *International Code for Fire Safety Systems* adopted by IMO Resolution MSC.98(73).

FTP Code means *International Code for Application of Fire Test Procedures, 2010* adopted by IMO Resolution MSC.307(88).

HSC Code means *International Code of Safety for High-Speed Craft*, 2000 adopted by IMO Resolution MSC.97(73).

IBC Code means *International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk*.

ICG Code means *International Code of the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk*, adopted by resolution MSC.5(48).

IEC means International Electrotechnical Commission.

IMO means International Maritime Organization.

AS means *Australian Standard*, in the following:

AS 3786:2014 – Smoke alarms using scattered light, transmitted light or ionization:

AS 1603:1997 – Automatic fire detection and alarm systems - Heat detectors:

AS 1851:2012 – Routine service of fire protection systems and equipment:

AS/ISO means joint *Australian and International Organization for Standardization Standard*, in the following:

AS ISO 9239-1: Reaction to fire tests for floorings - Part 1: Determination of the burning behaviour using a radiant heat source.

AS/NZS means joint *Australian and New Zealand Standard*, in the following:

AS/NZS 1530.1:1994: Methods for fire tests on building materials, components and structures - Combustibility test for materials:

AS/NZS 1530-2.-1993: (R2016) Methods for fire tests on building materials, components and structures. Part 2: Test for flammability of materials:

AS/NZS 3744.1:1998 and AS/NZS 3744.2:1998; Furniture — Assessment of ignitability of upholstered furniture — Part 2: Ignition source: match-flame equivalent:

AS/NZS 3744.1:1998 Furniture - Assessment of the ignitability of upholstered furniture Ignition *source - Smouldering cigarette*:

AS/NZS 3744.2:1998 Furniture - Assessment of the ignitability of upholstered furniture Ignition source - Match-flame equivalent:

AS/NZS 1716: 2012: Respiratory protective devices:

AS/NZS 4067:2012 Protective helmets for structural firefighting:

AS/NZS 5601.2: Gas Installations. Part 2 LP Gas installations in caravans and boats for non-propulsive purposes:

AS/NZS 1715: 2009 Selection, use and maintenance of respiratory protective equipment:

AS/ NZS 1716:2021 Respiratory Protective Devices:

AS/NZS 60079.0. Explosive atmospheres - Part 0: Equipment - General requirements, subject to *clause 4.3(3)*:

AS/NZS 1850:2009 Portable fire extinguishers - Classification, rating and performance testing:

AS/NZS 3504:2006 Fire blankets.

BS means *British Standard,* in the following:

BS 476-7(1997): 199; Fire tests on building materials and structures - Method of test to determine the classification of the surface spread of flame of products:

BS 5852-2 (1982): Fire tests for furniture, Methods of test for the ignitability of upholstered composites for seating by flaming sources:

BS 5867-2(2008): 2008: Fabrics for curtains, drapes and window blinds - Flammability requirements. Specification.

BS EN means joint *British and European Standard*, in the following:

BS EN 13773:2003: Textiles and textile products - Burning behaviour - Curtains and drapes - Classification scheme:

BS 5852 (2006): 2006 Methods of Test for Assessment of the Ignitability of Upholstery:

BS 5852-2(1982): 1982 Fire Tests for Furniture - Part 2: Methods of Test For The Ignitability Of Upholstered Composites For Seating By Flaming Sources:

BS 336:1989 Specification for fire hose couplings and ancillary equipment:

BS 3054:1959 Specification for fireman's axe with rubber insulated handle:

BS EN 1146:2005 Respiratory protective devices. Self-contained open-circuit compressed air breathing apparatus incorporating a hood for escape. Requirements, testing, marking.

EN means *European Standard*, in the following:

EN 137:2006 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

IEC means *International Electrotechnical Commission*, in the following:

IEC 60079-7. Explosive atmospheres - Part 7: Equipment protection by increased safety "e".

ISO means *International Organization for Standardization*, in the following:

ISO 1182:2020 Reaction to fire tests for products – Non-combustibility test:

ISO 834-1 means *ISO--1:1999 Fire-resistance tests – Elements of building construction – Part 1: General requirements*:

ISO 1182:2020: Reaction to fire tests for products – Non-combustibility test:

ISO 8191-1:1987 Furniture — Assessment of the ignitability of upholstered furniture — Part 1: Ignition source: smouldering cigarette and ISO 8191-2:1988:

ISO 6940:2004 Textile fabrics - Burning behaviour - Determination of ease of ignition of vertically oriented specimens and ISO 6941:2003 Textile fabrics — Burning behaviour — Measurement of flame spread properties of vertically oriented specimens:

ISO 9239-1:2010 Reaction to fire tests for floorings — Part 1: Determination of the burning behaviour using a radiant heat source:

ISO 8191-1:1987 Furniture Assessment of the ignitability of upholstered furniture Part 1: Ignition source: smouldering cigarette:

ISO 8191-2:1988 Furniture Assessment of ignitability of upholstered furniture Part 2: Ignition source: match-flame equivalent:

ISO 11999-3:2015 PPE for firefighters — Test methods and requirements for PPE used by firefighters who are at risk of exposure to high levels of heat and/or flame while fighting fires occurring in structures — Part 3: Clothing:

ISO 23269-4:2010 Ships and marine technology — Breathing apparatus for ships — Part 4: Self-contained breathing apparatus for emergency escape required by the IMO, IBC and IGC Codes:

ISO 17631:2002 Ships and marine technology — Shipboard plans for fire protection, life-saving appliances and means of escape.

MSC means *Maritime Safety Committee*, in the following:

MSC/Circ.1270:

MSC/Circ.848 as amended *by MSC.1/Circ.1267.*

NFPA means *National Fire Protection Association, Massachusetts, US*A, in the following:

NFPA 2010 Standard for Fixed Aerosol Fire-Extinguishing Systems:

NFPA 1971 Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting:

NFPA Standard 1981 Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services; or *NZS/AS 1530.1:1994 Methods of fire tests on building materials, components and structures – Combustibility test for materials*.

NZS means *New Zealand Standard*, in the following:

NZS 4503:2005 Hand operated fire-fighting equipment:

NZS PAS 4505:2007. Specification for Fire-Fighting Waterway Equipment:

NZS 4512:2021 Fire detection and alarm systems in buildings – Section 3:

NZS 4512:2021 Fire detection and alarm systems in buildings.