

Maritime Rules

Part 42B: Safety Equipment – Fire Appliances Performance Standards

Maritime New Zealand Consolidation

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Part objective

Part 42B prescribes performance standards for fire appliances, including fixed fire detection and alarm systems, various types of fixed extinguishing systems, fire pumps, portable and non-portable fire extinguishers, breathing apparatus and fire crew outfits.

Part 42B complements Parts 40A to 40D, which specify the numbers and types of appliances to be carried on various types of ships operating in defined limits.

Part 42B, together with the Part 40 series maritime rules, replaces the regulations entitled the *Shipping (Fire Appliances) Regulations 1989*. These regulations incorporate codes of practice and performance standards made by the Minister of Transport pursuant to the Shipping and Seamen Act 1952, which were published as a supplement to the *New Zealand Gazette* of 26 October 1989 (issue number 190) and dated 31 October 1989.

The proposed maritime rules will supersede the 1989 regulations and associated codes of practice and performance standards.

The authority for making Part 42B is section 36(1)(b) and (f) of the Maritime Transport Act 1994.

Maritime Rules (rules) are secondary legislation under the Legislation Act 2019. Under that Act, the rules are required to be presented to the House of Representatives. The House may, by resolution, disallow any rule. The Regulations Review Committee is the select committee responsible for examining all secondary legislation and may consider any matter relating to secondary legislation and report on it to the House. Anyone can make a complaint to the Regulations Review Committee about the operation of secondary legislation.

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www.maritimenz.govt.nz

History of Part 42B

Part 42B first came into force on 1 February 2001 and now incorporates the following amendments:

Amendment	Effective date
Amendment 1	4 September 2008
Amendment 2	4 September 2008
Amendment 3	1 April 2010
Amendment 4	1 April 2010
Amendment 5	1 April 2011
Amendment 6	1 January 2015
Amendment 7	1 April 2015
Amendment 8	7 February 2024
Amendment 9	1 December 2025

Summary of amendments

Amendment 1 Maritime (Various Amendments) Rules 2008	42B.20
Amendment 2 Maritime (Portable Fire Extinguishers) Amendment	42B.57, 42B.72
Amendment 3 Part 42B – Safety Equipment – Fire Appliance Performance Standards Amendment 2010	42B.2, 42B.57(13) & (14)
Amendment 4 Part 40E: Design, Construction and Equipment – Sailing Ships	42B.20(13), 42B.61(3A), 42B.61(9), 42B.62, 42B.63(1)
Amendment 5 Maritime Rules Various Amendment 2011	42B.2, 42B.9(4), 42B.20(12) & (13), 42B.42(3), 42B.57, 42B.66, 42B.67
Amendment 6 Maritime Rules Various Amendments 2014	42B.2, 42B.3(1), 42B.9(3)(b), 42B.19(3)(a), 42B.20(1), 42B.22(2), 42B.23(1), 42B.31(1), 42B.59(8)(a), 42B.68(2)

Amendment 7 Maritime Rules Various Amendments 2015	Part Objective, 42B.2
Amendment 8 Maritime Rules Various Amendments 2023	42B.57
Amendment 9 Maritime Rules Amendments 2025 (No 2)	Part objective, 42B.2

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<http://www.maritimenz.govt.nz/Rules/List-of-all-rules/Part42B-maritime-rule.asp>

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General

42B.1 Entry into force

Part 42B comes into force on 1 February 2001.

42B.2 Definitions

A Class divisions means those divisions formed by bulkheads and decks that are:

- (a) constructed of steel or other equivalent material; and
- (b) suitably stiffened; and
- (c) constructed so as to be capable of preventing the passage of smoke and flame to the end of the one-hour standard fire test; and
- (d) insulated with non-combustible materials, with the effect that—
 - (i) the average temperature of the unexposed side will not rise above the original temperature by more than 139° C; and
 - (ii) the temperature, at any one point, including any joint, will not rise above the original temperature by more than 180° C,

within the times listed below:

Class "A-60" 60 min

Class "A-30" 30 min

Class "A-15" 15 min

Class "A-0" 0 min:

accommodation spaces means those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, hairdressers, pantries containing no cooking appliances and similar spaces:

B Class divisions means those divisions formed by bulkheads, decks, ceilings or linings that—

- (a) are constructed so as to be capable of preventing the passage of flame to the end of the first one-half hour of the standard fire test; and
- (b) have an insulation value such that—
 - (i) the average temperature of the unexposed side will not rise more than 139° C above the original temperature; and
 - (ii) the temperature, at any one point, including any joint, will not rise more than 225° C above the original temperature,

within the time listed below:

Class "B-15" 15 min

Class "B-0" 0 min; and

- (c) are constructed of non-combustible materials, including all materials used in the construction and erection of "B" class divisions, with the exception that combustible veneers may be permitted by a surveyor, provided the surveyor is satisfied that the use of a combustible veneer does not compromise the requirements of subsections 1 and 2 of the Fire Protection provisions of Part 40D:

cargo area means that part of the ship that contains—

- (a) cargo tanks, slop tanks and cargo pump-rooms, including pump-rooms, cofferdams, ballast and void spaces adjacent to cargo tanks; and

- (b) deck areas throughout the entire length and breadth of the part of the ship over the above-mentioned spaces:

cargo spaces are all spaces used for cargo (including cargo oil tanks) and trunks to such spaces:

combination carrier means a ship designed to carry either oil or solid cargoes in bulk:

competent person means a person with relevant industry training and experience as defined in the New Zealand Standard NZS 4503:2005 *Hand Operated Fire-Fighting Equipment*.

control stations are those spaces in which the ship's radio or main navigation equipment or the emergency source of power is located, or where the fire recording or fire control equipment is centralised:

closed ro-ro cargo spaces means ro-ro cargo spaces that are neither open ro-ro cargo spaces nor weather decks:

deadweight means the difference in tonnes between the displacement of a ship in water of a specific gravity of 1.025 at the load waterline corresponding to the assigned summer freeboard and the lightweight of the ship:

Director means the person who is for the time being the Director of Maritime Safety under section 439 of the Maritime Transport Act 1994:

fire appliance means any device, arrangement, apparatus or thing intended to provide protection against fire:

Fire Test Procedures Code means the *International Code for Application of Fire Test Procedures* adopted by Resolution MSC.61(67) of the International Maritime Organization's Maritime Safety Committee dated December 1996, as amended by that committee from time to time:

fishing ship means a ship used for catching fish, whales, seals, or other living resources of the sea for profit; and includes a ship that is recognised by the Director as being engaged in fisheries research:

gas-safe space means a space in which the entry of hydrocarbon gases would produce flammability or toxicity hazards:

gastight means capable of preventing the passage of gas in any direction:

length means 96 percent of the length on a waterline at 85 percent of the least moulded depth measured from the keel line, or as the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that be greater. In ships designed with rake of keel the waterline on which this length is measured must be parallel to the designed waterline:

lightweight is the displacement of a ship in tonnes without cargo, fuel, lubricating oil, ballast water, fresh water and feedwater in tanks, consumable stores, and passengers and crew and their effects:

machinery spaces means those machinery spaces of Category A and all other spaces containing propulsion machinery, boilers, fuel oil units, steam and internal combustion engines, generators, steering gear, major electrical machinery, oil filling stations, refrigerating, stabilising, ventilating and air conditioning machinery and similar spaces, and trunks to such spaces:

machinery spaces of Category A means those spaces and trunks to such spaces that contain:

- (a) internal combustion machinery used for main propulsion; or
- (b) 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
- (c) any oil-fired boiler or oil fuel unit:

main vertical zones are those sections into which the hull, superstructure, and deckhouses are divided by A Class divisions, the mean length of which on any deck does not in general exceed 40 metres. For ships constructed on or after 1 October 1994, the 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:

master means any person (except a pilot) having command or charge of any ship:

moulded breadth means the maximum breadth of the ship, measured amidships to the moulded line of frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other metal:

moulded depth means the vertical distance, measured amidships from the keel line to the top of the working deck beam at side. Where the working deck is stepped and the raised part of the deck extends over amidships, the moulded depth is to be measured to a line of reference extending from the lower part of the deck along a line parallel with the raised part:

new ship means a ship built on or after the date of entry into force of this Part:

New Zealand ship means a ship that is registered under the Ship Registration Act 1992; and includes a ship that is not registered under that Act but is required or entitled to be registered under that Act:

non-combustible material means a material that 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:

non-passenger ship means any ship that is not a passenger ship or a fishing ship:

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

open ro-ro cargo spaces mean ro-ro cargo spaces either open at both ends, or open at one end and provided with adequate natural ventilation effective over their entire length through permanent openings in the side plating or deckhead to the satisfaction of the Director or a surveyor:

Part means a group of rules made under the Act:

passenger means any person carried on a ship, other than:

- (a) the master and members of the crew, and any other person employed or engaged in any capacity on board the ship on the business of the ship;
- (b) a person on board the ship either in pursuance of an obligation laid upon the master to carry shipwrecked, distressed, or other persons, or by reason of any

circumstances that neither the master nor the owner nor the charterer (if any) could have prevented or forestalled:

- (c) a child under the age of 1 year:

passenger ship means a ship which carries more than 12 passengers on a voyage beyond restricted limits, or any passengers on a voyage within restricted limits:

passenger space means space provided for the use of passengers:

public spaces means those portions of the accommodation which are used for halls, dining rooms, lounges and similar permanently enclosed spaces:

restricted limits has the same meaning as in Part 20:

ro-ro cargo spaces mean spaces not normally subdivided in any way and extending to either a substantial length or the entire length of the ship in which goods (packaged or in bulk, in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, demountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction:

service spaces are those spaces used for galleys, pantries containing cooking appliances, lockers and store-rooms, workshops other than those forming part of the machinery spaces, and similar spaces and trunks to such spaces:

ship means every description of boat or craft used in navigation, whether or not it has any means of propulsion; and includes—

- (a) a barge, lighter, or other like vessel; and
(b) a hovercraft or other thing deriving full or partial support in the atmosphere from the reaction of air against the surface of the water over which it operates; and
(c) a submarine or other submersible:

slop tank means a tank specifically designated for the collection of tank drainings, tank washings, and other oily mixtures:

special category A spaces mean those enclosed spaces above or below the bulkhead deck intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access:

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. Each specimen is to—

- (a) have an exposed surface of at least 4.65 square metres and a height (or length of deck) of 2.44 metres; and
(b) resemble as closely as possible the intended construction; and
(c) include where appropriate at least one joint.

The standard time-temperature curve is defined by a smooth curve drawn through the following temperature points measured above the initial furnace temperature:

at the end of the first 5 minutes	556° C
at the end of the first 10 minutes	659° C
at the end of the first 15 minutes	718° C
at the end of the first 30 minutes	821° C
at the end of the first 60 minutes	925° C

surveyor means any suitably qualified person who:

- (a) has been recognised by the Director under rule 44.22 of Part 44 as a surveyor entitled to undertake the particular function referred to in any rule contained in Part 42B; and
- (b) holds a valid maritime document as a surveyor issued under section 41 of the Maritime Transport Act 1994:

tanker means a non-passenger ship constructed or adapted for the carriage in bulk of liquid cargoes of an inflammable nature:

weather deck means a deck that is completely exposed to the weather from above and from at least two sides.

42B.3 Application

- (1) Subject to rule 42B.3(2), Part 42B applies to fire appliances that are installed or intended to be installed on any New Zealand ship, if maritime rules¹—
 - (a) require the ship to be provided with that type of fire appliance; and
 - (b) require that type of fire appliance to meet the requirements of Part 42B.
- (2) Part 42B does not apply to a fire appliance that—
 - (a) was placed on a ship before 1 February 2001, as required by the legislation in force at the time of its placement; and
 - (b) complies with the applicable standard for that appliance prescribed by the legislation in force at the time of its placement on the ship; and
 - (c) remains fit for purpose to the satisfaction of a surveyor.

Fire alarm and fire detection systems

42B.4 General

- (1) A fixed fire detection and fire alarm system with manually operated call points must be capable of immediate operation at all times.
- (2) Power supplies and electrical circuits necessary for the operation of such a system must be monitored for loss of power or fault conditions as appropriate. Occurrence of a fault condition must initiate a visual and audible fault signal at the control panel. The fault signals must be distinct from the ship's fire signals.
- (3) There must be at least two sources of power supply for the electrical equipment used in the operation of the system, one of which must be from the emergency source of power required by maritime rules. Separate feeders reserved solely for that purpose must provide the supply. Such feeders must run to an automatic change-over switch within or adjacent to the control panel for the fire detection system.
- (4) Detectors and manually operated call points must be grouped into sections. The activation of any detector or manually operated call point must initiate a visual and audible fire signal at the control panel and indicating units. If the signals have not received attention within two minutes, an audible alarm must be automatically sounded throughout the crew accommodation spaces and service spaces, control stations and machinery spaces of Category A.²
- (5) The control panel must be located on the navigation bridge or in the main fire control station.

¹ Such requirements are found in Part 40A in respect of passenger ships which are not SOLAS ships; Part 40C in respect of non-passenger ships which are not SOLAS ships; and Part 40D in respect of fishing ships.

² This alarm sounder system need not be an integral part of the detection system.

- (6) Indicating units must denote the section in which a detector or manually operated call point has operated. At least one unit must be located so that it is easily accessible to a responsible member of the crew at all times when at sea or in port, except when the ship is out of service. One indicating unit must be located on the navigation bridge if the control panel is located in the main fire control station.
- (7) Clear information must be displayed on or adjacent to each indicating unit about the spaces covered and the location of each section.
- (8) If a section of detectors in the system does not incorporate means of remotely identifying each detector individually, that section must not serve:
 - (a) more than one deck within accommodation spaces, service spaces and control stations, except in the case of an enclosed stairway; and
 - (b) more than 50 enclosed spaces; and
 - (c) in the case of a passenger ship, both sides of the ship or more than one main vertical zone.
- (9) If the system incorporates the means of remotely identifying each detector individually in a passenger ship, a section must not serve more than one main vertical zone.
- (10) A section of fire detectors that covers a control station, a service space, or an accommodation space must not include a machinery space of Category A.
- (11) Detectors must be operated by heat, smoke, or other products of combustion, flame, or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be accepted by the Director or a surveyor, provided that they are no less sensitive than such detectors. Flame detectors must only be used in addition to smoke or heat detectors.
- (12) Instructions and component spares for testing and maintenance of the system must be provided to the satisfaction of the surveyor.
- (13) The function of the system must be periodically tested to the satisfaction of a surveyor³ 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.

The detectors referred to in rule 42B.4(11) must be able to be tested for correct operation and restored to normal working order without the renewal of any component.
- (14) The system must not be used for any purpose other than for that which it is designed, except that closing of fire doors and similar functions may be permitted at the control panel.
- (15) Any system with a zone address identification capability fitted on or after 1 October 1994 must be so arranged that—
 - (a) a loop cannot be damaged at more than one point by a fire; and
 - (b) means are provided to ensure that any fault (for example, a power break, short circuit, or earth) occurring in the loop will not render the whole loop ineffective; and
 - (c) the initial configuration of the system is restored in the event of failure (electrical, electronic, informatic); and
 - (d) the first initiated fire alarm will not prevent any other detector from initiating further fire alarms.

³ It is recommended that annual checks and tests be carried out in accordance with the requirements of New Zealand standard *NZS 4512:1997 Fire Alarm Systems in Buildings*.

- (16) A fixed fire detection and fire alarm system must comply with rules 42B.5 to rule 42B.8.

42B.5 Installation

- (1) Manually operated call points must be installed throughout the accommodation spaces, service spaces, and control stations. One manually operated call point must be located at each exit. Manually operated call points must be 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.
- (2) Smoke detectors must be installed in all stairways, corridors and escape routes within accommodation spaces.⁴
- (3) Where a fixed fire detection system and fire alarm system is required by maritime rules for the protection of spaces other than those specified in rule 42B.5(2), at least one detector complying with rule 42B.4(11) must be installed in each such space.
- (4) Detectors must be located—
- (a) for optimum performance; and
 - (b) so as to avoid positions—
 - (i) near beams and ventilation ducts or other positions where patterns of air flow could adversely affect performance; and
 - (ii) where impact or physical damage is likely.

Detectors which are located in overhead positions must be at least 0.5 metres away from bulkheads.

- (5) The maximum spacing of detectors must be in accordance with the table below.

Type of detector	Maximum floor area per detector	Maximum distance apart between centres	Maximum distance away from bulkheads
Heat	37m ²	9m	4.5m
Smoke	74m ²	11m	5.5m

- (6) The Director or a surveyor may require or permit other spacings based on test data which demonstrate the characteristics of the detectors.
- (7) Electrical wiring which forms part of the system must be so arranged as to avoid galleys, machinery spaces of Category A, and other enclosed spaces of high fire risk, except where it is necessary to provide for fire detection or fire alarm in such spaces or to connect to the appropriate power supply.
- (8) The system must be maintained in accordance with the applicable requirements of New Zealand standard NZS 4512:1997 *Fire Alarm Systems in Buildings*.

42B.6 Design requirements

- (1) Any fixed fire detection and fire alarm system and its equipment must be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact, and corrosion normally encountered in ships.
- (2) The smoke detectors required by rule 42B.5(2) must be certified—
- (a) to operate before the smoke density exceeds 12.5 percent obscuration per metre; and
 - (b) not to operate until the smoke density exceeds 2 percent obscuration per metre.

⁴ Consideration should be given to the installation of special purpose smoke detectors within ventilation trunks.

Smoke detectors installed in other spaces must operate within sensitivity limits to the satisfaction of the Director or a surveyor, having regard to the avoidance of detector insensitivity or oversensitivity.

- (3) Heat detectors must be certified—
 - (a) to operate before the temperature exceeds 78°C; and
 - (b) not to operate until the temperature exceeds 54°C,when the temperature is raised to those limits at a rate less than 1°C per minute. At higher rates of temperature rise, the heat detector must operate within the temperature limits to the satisfaction of the Director or a surveyor, having regard to the avoidance of detector insensitivity or oversensitivity.
- (4) The permissible temperature of operation of heat detectors may be increased to 30°C above the maximum deckhead temperature in drying rooms and similar spaces of normal high ambient temperature.

42B.7 Special requirements for periodically unattended machinery spaces

- (1) In addition to the requirements of rules 42B.4 to 42B.6, a fixed fire detection and fire alarm system for periodically unattended machinery spaces must be so designed, and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces under—
 - (a) any normal conditions of operation of the machinery; and
 - (b) any variations in ventilation as required by the possible range of ambient temperatures.
- (2) Detection systems using only thermal detectors are not permitted, except in spaces of restricted height and in other spaces where a surveyor considers their use is specially appropriate.
- (3) The detection system must initiate audible and visual alarms, distinct in both respects from the alarms of any other system on the ship not indicating fire, in sufficient places to ensure that the alarms are heard and observed on the navigation bridge by a responsible engineer officer. When the navigation bridge is unmanned, the alarm must sound in a place where a responsible member of the crew is on duty.
- (4) After installation, the system must be tested under varying conditions of engine operation and ventilation.

42B.8 Special requirements for cargo spaces

In addition to the requirements of rules 42B.4 to 42B.6, any fixed fire detection and fire alarm system for cargo spaces must comply with the following requirements:

- (a) detectors must be grouped into separate sections, with each section—
 - (i) covering no more than one cargo space; and
 - (ii) containing no more than 100 detectors:
- (b) the type, number, and spacing of detectors must be to the satisfaction of the Director or a surveyor taking into account the conditions of ventilation and other factors prevailing in the space in which the detectors are installed:
- (c) in special Category A spaces and ro-ro cargo spaces, the system must be capable of rapidly detecting the onset of fire. After being installed, the system must be tested under normal ventilation conditions and must give an overall response time to the satisfaction of the Director or a surveyor.

Automatic sprinkler, fire detection and fire alarm system

42B.9 General

- (1) An automatic sprinkler, fire detection and fire alarm system must be capable of immediate operation at all times and no action by the crew must be necessary to set it in operation. The system must be of the wet pipe type, but small sections may be of the dry pipe type where the Director or a surveyor consider this to be a necessary precaution. Any parts of the system that may be subject to freezing temperatures in service must be suitably protected against freezing. The system must be kept charged at the necessary pressure and must provide for a continuous supply of water as required by this Part.
- (2) Each section of sprinklers must give a visual and audible alarm signal automatically at one or more indicating units whenever any sprinkler comes into operation. Such alarm systems must indicate if any fault occurs in the system and must—
 - (a) indicate in which section served by the system any fire has occurred; and
 - (b) be centralised on the navigation bridge.

Visible and audible alarms from the unit must be located in a position other than on the navigation bridge, so as to ensure that the indication of fire is immediately received by the crew.

- (3) The sprinkler system must—
 - (a) comply with rules 42B.10 to 42B.16 inclusive; or
 - (b) be an equivalent sprinkler system that complies with the International Maritime Organization's Assembly resolution A.800(19) *Revised Guidelines for Approval of Sprinkler Systems Equivalent to that Referred to in SOLAS Regulation II-2/12*.
- (4) An automatic sprinkler, fire detection and fire alarm system must comply with rules 42B.10 to 42B.16.

42B.10 Sprinklers

- (1) Sprinklers must be grouped into separate sections, each of which must contain not more than 200 sprinklers. In a passenger ship, no section of sprinklers may serve more than two decks or be situated in more than one main vertical zone. However, the Director or a surveyor may permit such a section of sprinklers to serve more than two decks or be situated in more than one main vertical zone if that person is satisfied that the protection of the ship against fire will not be reduced as a result.
- (2) Each section of sprinklers must be capable of being isolated by one stop valve only. The stop valve in each section must be readily accessible and its location must be clearly and permanently indicated. Means must be provided to prevent the operation of the stop valves by any unauthorised person.
- (3) The sprinklers must be resistant to corrosion by marine atmosphere.
- (4) In accommodation spaces and service spaces, the sprinklers must come into operation within the temperature range 68°C to 79°C, except that in locations such as drying rooms, where high ambient temperatures might be expected, the temperature at which the sprinklers come into operation may be increased by not more than 30°C above the maximum deckhead temperature.
- (5) A list or plan must be displayed at each indicating unit showing the spaces covered and the location of the zone in respect of each section. Instructions for testing and maintenance must be available on board the ship.
- (6) Sprinklers must be placed in an overhead position and spaced in a pattern that maintains an average application rate of at least 5 litres per square metre per minute over the nominal area covered by the sprinklers. Alternative distribution arrangements or sprinklers providing other amounts of water may be permitted provided that the Director or a surveyor is satisfied that the arrangements are no less effective.

- (7) Sprinklers must be spaced not more than 4 metres apart and not more than 2 metres from a bulkhead. They must be placed—
 - (a) as clear as possible of beams and other objects likely to obstruct the projections of water; and
 - (b) in such positions that combustible material in the space concerned will be well sprayed.
- (8) At least 6 spare sprinklers must be provided for each section.

42B.11 Pressure tank

- (1) An automatic sprinkler, fire detection and fire alarm system must be provided with a pressure tank that—
 - (a) has a volume at least twice that of the charge of water specified in rule 42B.11(1)(b); and
 - (b) contains a standing charge of fresh water, equivalent to the amount of water which would be discharged in one minute by the pump required by rule 42B.12.
- (2) The pressure tank must at all times be provided with sufficient air pressure to ensure that, where the standing charge of fresh water in the tank has been used, the pressure is at least—
 - (a) the working pressure of the sprinkler; plus
 - (b) the pressure exerted by a head of water measured from the bottom of the tank to the highest sprinkler in the system.

Adequate means of replenishing both the air under pressure and the fresh water charge in the tank must be provided.

- (3) The pressure tank must be fitted with—
 - (a) an efficient relief valve; and
 - (b) a water gauge glass; and
 - (c) a pressure gauge.

Stop valves or cocks must be provided at each gauge connection. Means must be provided to prevent the inadvertent admission of seawater into the tank.

42B.12 Pumps and piping

- (1) An independent power pump must be provided solely for the purpose of continuing automatically the discharge of water from the sprinklers. The pump must be brought into action automatically by the pressure drop in the system before the standing fresh water charge in the pressure tank is completely exhausted.
- (2) The pump and piping system must be capable of maintaining the necessary pressure at the level of the highest sprinkler to ensure a continuous output of water sufficient for the simultaneous coverage of a minimum area of 280 square metres at the application rate specified in rule 42B.10(6).
- (3) The pump must have a test valve with a short open-ended discharge pipe fitted on the delivery side. The effective area through the valve and pipe must be adequate to permit the release of the required pump output while maintaining the pressure in the system specified in rule 42B.11(2).
- (4) The sea inlet to the pump must wherever possible be—
 - (a) located in the space containing the pump; and
 - (b) arranged so that when the ship is afloat it will not be necessary to shut off the supply of seawater to the pump for any purpose other than the inspection or repair of the pump.

42B.13 Pump and tank position

The sprinkler pump and tank must be situated in a position reasonably remote from any machinery space of Category A and must not be situated in any space required to be protected by the sprinkler system.

42B.14 Power supply

- (1) In this rule, paragraphs (2) to (5) apply to passenger ships and paragraphs (6) to (9) apply to non-passenger ships.

Passenger ships

- (2) There must be at least two sources of power supply for the seawater pump and automatic alarm and detection system.
- (3) If the sources of power for the pump are electrical—
- (a) they must be a main generator and an emergency source of power; and
 - (b) one supply for the pump must be taken from the main switchboard, and one from the emergency switchboard by separate feeders reserved solely for that purpose; and
 - (c) the feeders required by rule 42B.14(3)(b) must be—
 - (i) arranged to avoid galleys, machinery spaces and other enclosed spaces of high fire risk, except in so far as it is necessary to reach the appropriate switchboards; and
 - (ii) run to an automatic change-over switch situated near the sprinkler pump; and
 - (d) the switch required by rule 42B.14(3)(c) must—
 - (i) permit the supply of power from the main switchboard so long as such a supply is available; and
 - (ii) be designed so that upon failure of that supply, it will automatically change over to the supply from the emergency switchboard; and
 - (e) the switches on the main switchboard and the emergency switchboard must be clearly labeled and normally kept closed. No other switch may be permitted in the feeders concerned.
- (4) One of the sources of power supply for the alarm and detection system must be an emergency source.
- (5) If one of the sources of power for the pump is an internal combustion engine it must, in addition to complying with the requirements of rule 42B.13, be so situated that a fire in any space protected by the sprinkler system will not affect the air supply to the machinery.

Non-passenger ships

- (6) There must be at least two sources of power supply for the seawater pump and automatic alarm and detection system.
- (7) If the pump is electrically driven it must be connected to the main source of electrical power, which must be capable of being supplied by at least two generators.
- (8) The feeders must be so arranged as to avoid galleys, machinery spaces and other enclosed spaces of high fire risk except in so far as is necessary for the feeders to reach the appropriate switchboards.
- (9) One of the sources of power supply for the alarm and detection system must be an emergency source.

- (10) If one of the sources of power for the pump is an internal combustion engine, it must, in addition to complying with the requirements of rule 42B.13, be so situated that a fire in any protected space will not affect the air supply to the machinery.

42B.15 Sprinkler – fire main connection and shore supply

- (1) The sprinkler system must have a connection from the ship's fire main by way of a lockable screw-down non-return valve at the connection, which will prevent a backflow from the sprinkler system to the fire main.
- (2) Any hose couplings fitted for the purpose of coupling to a shore supply must be provided with shut off valves and non-return valves situated close to the couplings. No other external connection may be fitted. The sprinkler system must be a self-contained unit.
- (3) Shut off valves for the shore supply and the ship's fire mains connections must be—
 - (a) clearly and permanently marked to show their purpose; and
 - (b) capable of being locked in the closed position.

42B.16 Testing of systems

- (1) A test valve must be provided for testing the automatic alarm for each section of sprinklers by a discharge of water equivalent to the operation of one sprinkler. The test valve for each section must be situated near the stop valve for that section.
- (2) Means must be provided for testing the automatic operation of the pump following a reduction of pressure in the system.
- (3) Switches must be provided at one of the indicating units required by rule 42B.9(2) which will enable the alarm and the indicators for each section of sprinklers to be tested.

Sample extraction smoke detection system

42B.17 General

- (1) A sample extraction smoke detection system must be capable of continuous operation at all times, except that a system operating on a sequential scanning principle may be accepted if the interval between scanning the same position twice gives an overall response time to the satisfaction of the Director or a surveyor.
- (2) Means must be provided to monitor power supplies necessary for the operation of the system for loss of power. Any loss of power must initiate a visual and audible fault signal at the control panel and the navigation bridge. The fault signals must be distinct from the signals indicating smoke detection.
- (3) An alternative source of power supply for the electrical equipment used in the operation of the system must be provided.
- (4) The control panel must be located on the navigation bridge or in the main fire control station.
- (5) The detection of smoke or other products of combustion must initiate a visual and audible signal at the control panel and navigation bridge.
- (6) Clear information must be displayed on or adjacent to the control panel designating the spaces covered.
- (7) The sampling pipe arrangements must be such that the location of the fire can be readily identified.
- (8) Instructions and component spares for testing and maintenance of the system must be provided to the satisfaction of a surveyor.
- (9) The function of the system must be periodically tested to the satisfaction of a surveyor. The system must be of a type that can be tested for correct operation and restored to normal surveillance without the renewal of any component.

- (10) The system must be designed, constructed, and installed so as to prevent the leakage of any toxic or flammable substances or fire-extinguishing media into any accommodation space or service space, control station, or machinery space.
- (11) A sample extraction smoke detection system must comply with rule 42B.18 and 42B.19.

42B.18 Installation requirements

- (1) At least one smoke accumulator must be located in every enclosed space in which smoke detection is required. However, where an enclosed space is designed to carry oil or refrigerated cargo alternately with cargoes for which a sample extraction smoke detection system is required, means may be provided to isolate the smoke accumulators in such compartments. Such means must be to the satisfaction of the Director or a surveyor.
- (2) Smoke accumulators must be—
 - (a) located for optimum performance; and
 - (b) located having regard to the effects of ventilation, if sample extraction smoke detection systems are used in spaces which may be mechanically ventilated; and
 - (c) spaced so that, measured horizontally, no part of the overhead deck area is more than 12 metres from an accumulator.
- (3) Smoke accumulators must be positioned where impact or physical damage to them is unlikely to occur.
- (4) No more than four accumulators may be connected to each sampling point.
- (5) Smoke accumulators from more than one enclosed space must not be connected to the same sampling point.
- (6) Sampling pipes must be self-draining and suitably protected from impact or damage from cargo working.

42B.19 Design requirements

- (1) The sample extraction smoke detection system and equipment must be designed to—
 - (a) withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact, and corrosion normally encountered in ships; and
 - (b) prevent ignition of flammable gas/air mixtures.
- (2) The sensing unit must operate before the smoke density within the sensing chamber exceeds 6.65 percent obscuration per metre.
- (3) Duplicate sample extraction fans must be provided. The fans must be—
 - (a) of sufficient capacity to operate with the normal conditions of ventilation in the protected area; and
 - (b) must give an overall response time to the satisfaction of the Director or a surveyor.
- (4) The control panel must permit observation of smoke in the individual sampling pipe.
- (5) Means must be provided to monitor the airflow through the sampling pipes. The pipes must be so designed as to ensure that as far as practicable equal quantities are extracted from each interconnected accumulator.
- (6) Sampling pipes must have an internal diameter of at least 12 millimetres, except when used in conjunction with fixed gas fire-extinguishing systems, in which case the minimum size of the pipe must be sufficient to permit the fire extinguishing gas to be discharged within the time required by rules 42B.21 or 42B.22, as applicable.
- (7) Sampling pipes must be provided with an arrangement for periodically purging the pipes with compressed air.

Fixed gas fire-extinguishing systems⁵

42B.20 General

- (1) A fixed gas fire-extinguishing system must not contain any fire-extinguishing medium that itself or under expected conditions of use gives off other toxic gases in such quantities as to endanger personnel.
- (2) The pipes for conveying the medium into protected spaces must be provided with control valves that are located where they will be easily accessible and not readily cut off from use by an outbreak of fire within the protected space. Such control valves must be permanently marked to indicate clearly the spaces to which the pipes are led. Provision must be made to prevent the inadvertent admission of the medium into any space.
- (3) Where a cargo space fitted with a gas fire-extinguishing system is used as a passenger space, the gas connection must be blanked during such use.
- (4) Means must be provided to close all openings that may admit air or allow gas to escape from a protected space.
- (5) If the volume of free air contained in air receivers in any space would seriously affect the efficiency of the fixed fire-extinguishing system if released into that space, an additional quantity of fire-extinguishing medium must be provided to the satisfaction of the Director or a surveyor.
- (6) The system must be provided with an automatic audible warning of the release of any fire-extinguishing medium into any space in which personnel normally work or to which they have access. The period for which the alarm operates before the medium is released must be acceptable to the Director or a surveyor.
- (7) The means of control of any 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.

At each location, there must be clear instructions relating to the operation of the system having regard to the safety of personnel.

- (8) The automatic release of fire-extinguishing medium is not permitted.
- (9) If a quantity of fire-extinguishing medium is provided to protect more than one space, the quantity of medium need not be more than the largest quantity required for any one of the protected spaces.
- (10) Pressure containers required for the storage of fire extinguishing medium must be located outside protected spaces in accordance with rule 42B.20(13).
- (11) Means must be provided for the crew to safely check the quantity of medium in the pressure containers.
- (12) The storage containers and associated pressure components must be constructed of material acceptable to the surveyor and must be of efficient design and sufficient strength having regard to their locations and the maximum ambient temperatures expected in service.⁶
- (13) If the fire-extinguishing medium is stored outside a protected space, it must be stored in a room that is—

⁵ No reference is made to halogenated hydrocarbon systems, which are prohibited on new ships.

⁶ It is recommended that gas containers comply with BS 5045-7:2000 – *Transportable gas containers. Specification for seamless steel gas containers of water capacity of 0.5 litres up to 15 litres for special portable applications* and BS EN 1964-1:2000 *Transportable gas cylinders. Specification for the design and construction of refillable transportable seamless steel gas cylinders of water capacities from 0,5 litre up to and including 150 litres. Cylinders made of seamless steel with an Rm value of less than 1100 MPa.*

- (a) situated in a safe and readily accessible position; and
- (b) effectively ventilated to the satisfaction of the Director or a surveyor.

Any entrance to such a storage room must, if possible, be from the open deck and in any case must be independent of the protected space. Access doors must open outwards, and bulkheads and decks (including doors and other means of closing any opening in the bulkheads or decks) which form the boundaries between such rooms and adjoining enclosed spaces, must be gas-tight. For the purpose of the application of the fire integrity tables in Parts 40A, 40B, 40C, 40D and 40E, such storage rooms must be treated as control stations.

- (14) Spare parts for the system must be stored on board and be to the satisfaction of the Director or a surveyor.
- (15) No part of the control, storage or generating arrangement of any fixed gas fire-extinguishing system is to be situated forward of the collision bulkhead in any passenger ship.
- (16) Fixed gas fire-extinguishing systems must be maintained in accordance with Australian Standard AS 1851-2012, Routine service of fire protection systems and equipment, Section 7 *Special Hazard Systems*.
- (17) A fixed gas fire-extinguishing system must comply with rules 42B.21 or 42B.22, as applicable.

42B.21 Carbon dioxide systems

- (1) If carbon dioxide is used as the fire-extinguishing medium in cargo spaces other than ro-ro cargo spaces, the quantity of gas available must be sufficient to give a minimum volume of free gas equal to 30 percent of the gross volume of the largest cargo space that is so protected and is capable of being sealed.
- (2) If carbon dioxide is used as the fire-extinguishing medium in ro-ro cargo spaces that are capable of being sealed, the quantity of gas available must be sufficient to give a minimum quantity of free gas equal to 45 percent of the gross volume of the largest such cargo space. The arrangements must enable two thirds of the gas to be discharged into the space within 10 minutes.
- (3) When carbon dioxide is used as the fire-extinguishing medium in machinery spaces and cargo pump rooms, the quantity of gas available must be sufficient to give a minimum of free gas equal to the larger of the following quantities:
 - (a) 40 percent of the gross volume of the largest machinery space so protected, such space being measured up to the level at which the horizontal area of the casing is 40 percent or less of the gross area of such space measured midway between the tank top and the lowest part of the casing; or
 - (b) 35 percent of the gross volume of the largest machinery space so protected, including the casing;provided that—
 - (c) the percentages referred to in rules 42B.21(3)(a) and 42B.21(3)(b) may be reduced to 35 percent and 30 percent respectively for any ship of under 2,000 tons gross tonnage, not being a passenger ship; and
 - (d) if two or more machinery spaces are not entirely separate, they must be considered to form one space.
- (4) The volume of free carbon dioxide must be calculated at 0.56 cubic metres per kilogramme.
- (5) If carbon dioxide is used as the fire-extinguishing medium in machinery spaces, the fixed piping system must enable 85 percent of the gas to be discharged into the space within 3 minutes.

- (6) A carbon dioxide system installed on or after 1 October 1994 must comply with the following requirements:
- (a) two separate controls must be provided for releasing carbon dioxide into a protected space and to ensure the activation of the alarm. One control must be used to discharge the gas from its storage containers. A second control must be used for opening the valve of the piping that conveys the gas into the protected space; and
 - (b) the two controls must be located inside a release box clearly identified for the particular space. If the box containing the controls is to be locked, a key to the box must be in a conspicuous breakglass-type enclosure adjacent to the box.
- (7) If a fixed fire extinguishing system is required to be fitted in an enclosed space containing a propelling engine or fuel tank using petrol or any other fuel having a flash point below 60°C, a fixed installation discharging carbon dioxide must have a capacity of at least—
- | Net volume of space (m ³) | Mass of CO ₂ |
|---------------------------------------|--|
| 0 to 5 | 1.0 kg CO ₂ per 0.87 m ³ |
| 5 to 15 | 1.0 kg CO ₂ per 0.93 m ³ |
| 15 to 45 | 1.0 kg CO ₂ per 1.00 m ³ |

42B.22 Other or equivalent gas systems

- (1) If gas other than carbon dioxide is produced on a ship and is used as a fire-extinguishing medium, it must be a gaseous product of fuel combustion in which the oxygen content, the carbon monoxide content, the corrosive elements and any solid combustible elements have been reduced to a practicable minimum.
- (2) If such gas is used as the fire-extinguishing medium in a fixed fire-extinguishing system for the protection of machinery spaces and cargo pump rooms, it must give protection equivalent to that provided by a fixed system using carbon dioxide as the medium. The equivalent fixed gas fire-extinguishing system must comply with the requirements of the International Maritime Organization's Maritime Safety Committee circular MSC/Circ.848 *Revised Guidelines for the Approval of Equivalent Fixed Gas Fire-Extinguishing Systems, as referred to in SOLAS 74, for Machinery Spaces and Cargo Pump-Rooms*.
- (3) If such gas is used as a fire-extinguishing medium for the protection of cargo spaces, except cargo oil tanks, a sufficient quantity of such gas must be available to supply hourly, for a period of 72 hours, a volume of free gas at least equal to 25 percent of the gross volume of the largest space protected in this way.

Fixed water-based systems for machinery spaces

42B.23 General

- (1) A fixed water mist system for use in machinery spaces and cargo pump rooms must comply with the requirements of the Annex to the International Maritime Organization's Maritime Safety Committee circular MSC/Circ.668 *Alternative Arrangements for Halon Fire-Extinguishing Systems in Machinery Spaces and Pump Rooms*.
- (2) Any fixed pressure water spraying fire-extinguishing system for use in machinery spaces and cargo pump rooms must comply with rules 42B.23(3), 42B.23(4), and 42B.24 to 42B.26 inclusive.
- (3) A fixed pressure water spraying system must be provided with a pump, piping system, control valves and spraying nozzles. The pump provided for machinery space protection must not be used for any other purpose, except that the Director or a surveyor may permit the pump to be used for supplying cargo pump room or cargo space water spraying systems. For cargo pump room protection, the water supply may be from the ship's main fire pumps, provided such pumps comply with the requirements of rule 42B.26.

- (4) No part of a fixed pressure water spraying system is to be situated forward of the collision bulkhead in any passenger ship.

42B.24 Spraying nozzles for fixed pressure water spraying systems

- (1) The spraying nozzles for a fixed pressure water spraying system must be of such a type, sufficient in number and so arranged as to ensure an effective average distribution of water in accordance with the following table.

Protected Area	Application rate Litres per square metre/minute
Boiler fronts or roof firing areas, oil fuel units, centrifugal separators (not oily water separators), oil fuel purifiers and clarifiers	20
Hot oil fuel pipes near exhaust pipes or similar heated surfaces or main or auxiliary diesel engines	10
Tank top areas and oil tanks not forming part of the ship's structure	5
Cargo pump rooms	10

- (2) Spraying nozzles must be fitted above bilges, tank tops and other areas over which oil fuel is liable to spread and above other main fire hazards in the spaces to be protected.
- (3) Means must be provided to prevent—
- nozzles from becoming clogged by impurities in the water; and
 - corrosion of piping, nozzles, valves and pumps.

42B.25 Systems distribution and control for fixed pressure water spraying systems

If a water spraying system is divided into sections, the sections must be controlled from distribution manifolds—

- the valves of which must be capable of being operated from easily accessible positions outside the spaces to be protected; and
- access to which cannot be readily cut off by an outbreak of fire within the protected space.

42B.26 Pumps and piping for fixed pressure water spraying systems

- The water spraying system must be kept charged at the pressure required to achieve the application rates required by rule 42B.24(1). The pump supplying the water for the system must be automatically put into action by a pressure drop in the system.
- If the pump is dependent upon power being supplied from the emergency generator fitted in compliance with Part 40B, that generator must start automatically in the event of a main power failure, so that power for the pump is immediately available. If the pump is driven by independent internal combustion type machinery, it must be so situated that a fire in the protected space will not affect the air supply to the machinery and the pump compartment.
- The pump must be capable of supplying water at the necessary pressure simultaneously to all sections of the water spraying system in any one compartment to be protected. The pump and its controls must be installed outside the space or spaces to be protected. It must not be possible for a fire in the space or spaces protected by the system to put the system out of action.

Fixed pressure water spraying systems for cargo spaces

42B.27 General

A fixed pressure water spraying system must—

- (a) include a pump, piping system, control valves and spraying nozzles; and
- (b) comply with rules 42B.28 to 42B.30.

42B.28 Spraying nozzles

- (1) The spraying nozzles must be of a full bore type and must be arranged so as to secure an effective distribution of water in the spaces that are to be protected.
- (2) The system must provide water application at a rate of at least—
 - (a) 3.5 litres per square metre per minute for spaces with a deck height not greater than 2.5 metres; and
 - (b) 5 litres per square metre per minute for spaces with a deck height greater than 2.5 metres.
- (3) Precautions must be taken to prevent—
 - (a) nozzles from becoming clogged by impurities in the water; and
 - (b) corrosion of piping, nozzles, valves, and pumps.

42B.29 Systems distribution and control

- (1) The water spraying system must cover the full breadth of the protected space, except that in ships where the protected space is subdivided with longitudinal A Class divisions, the breadth of the sections may be reduced accordingly. In ships of 75 metres or more in length or where the length of the enclosed part of the protected space is 50 metres or more, the system may be divided into sections, provided that each section is at least 20 metres in length. In all other ships, the length of a section may be less than 20 metres but not less than 10 metres, provided that the capacity of the pumps is capable of supplying the two largest adjacent sections simultaneously at the application rate required by rule 42B.28(2).
- (2) The distribution valves for the system must be situated in a position—
 - (a) which is easily accessible; and
 - (b) which is adjacent to, but outside, the space to be protected; and
 - (c) access to which will not be readily cut off by an outbreak of fire within the protected space.

Direct access to the distribution valves from the protected spaces and from outside the spaces must be provided. Adequate ventilation must be fitted in the space containing the distribution valves.

42B.30 Pumps and piping

- (1) The water supply to the system must be provided by one or more pumps, other than the ship's required fire pumps. The pump or pumps must be connected to the system by a lockable non-return valve that will prevent a back flow from the system into the fire main.
- (2) The pump or pumps must at all times be capable of supplying simultaneously, to all nozzles in the protected space, or to all nozzles in at least two adjacent sections within the protected space, the pressure and quantity of water required to satisfy rules 42B.28(1) and 42B.28(2).
- (3) Each main fire pump must be capable of being brought into operation by remote control, which may be manually activated, from the position at which the distribution valves are situated.
- (4) In ships of 75 metres or more in length, or where the length of the enclosed space is 50 metres or more, each main fire pump must be situated in a position that is reasonably

remote from the protected space and from machinery space of Category A. In other ships, each main fire pump must be situated outside the protected space.⁷

- (5) In ships of 75 metres or more in length, or where the length of the enclosed space is 50 metres or more, any electrically driven main fire pump must have two sources of power, one of which must be the emergency generator. In other ships, there must be two sources of power, which may be two of the ship's auxiliary generators, provided that they are independently driven. If a main fire pump is driven by independent internal combustion machinery, it must be so situated that a fire in the protected space will not affect the air supply to the machinery and the pump compartment.
- (6) The sea suction of each pump must be so arranged that, when the ship is afloat, it will not be necessary to shut off the supply of sea water to the pump for any purpose other than the inspection or repair of the pump.
- (7) The pump suction and discharge valves and any other valves required to be operated to bring the pump into operation must be locked open or be operable from any control position of the system.
- (8) A waste valve with a short open-ended pipe must be fitted between the pump discharge and section control valves for testing purposes.
- (9) The pipes of the system must be solid drawn or welded steel or equivalent and they must be—
 - (a) hydraulically tested by the manufacturers to twice the working pressure but not less than 20 bar (2N/mm²); and
 - (b) galvanized internally to prevent corrosion.
- (10) Fittings such as self-aligning swivel joints and flexible pipes situated within the protected spaces must not be readily rendered ineffective by heat. Where such fittings are used, at least one spare of each type fitted must be carried.

Fixed foam fire-extinguishing systems

42B.31 Fixed high-expansion foam system in machinery spaces

- (1) A fixed high-expansion foam system⁸ in machinery spaces must be capable of rapidly discharging through fixed discharge outlets a quantity of foam sufficient to fill the greatest space to be protected at a rate of at least 1 metre in depth per minute. The quantity of foam-forming liquid available must be sufficient to produce a volume of foam equal to five times the volume of the largest space to be protected. The expansion ratio of the foam must not exceed 1,000 to 1.
- (2) The Director or a surveyor may permit alternative arrangements and discharge rates to those stated in rule 42B.31(1), provided that he or she is satisfied that equivalent protection is achieved.
- (3) Supply ducts for delivering foam, air intakes to the foam generator and the number of foam-producing units must provide effective foam production and distribution to the satisfaction of the Director or a surveyor.
- (4) The arrangement of the foam generator delivery ducting must be such that a fire in the protected space will not affect the foam generating equipment.
- (5) The foam generator, its sources of power supply, foam-forming liquid, and means of controlling the system must be—
 - (a) readily accessible; and

⁷ The main fire pump may, however, be situated within any machinery space.

⁸ High expansion foam concentrates should comply with the performance and test requirements of the International Maritime Organization's Maritime Safety Committee circular MSC/Circ.670 'Guidelines for the Performance and Testing Criteria and Surveys of High Expansion Foam Concentrates for Fixed Fire-Extinguishing Systems'.

- (b) simple to operate; and
- (c) grouped in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

42B.32 Fixed low-expansion foam system in machinery spaces

- (1) Where in any machinery space a fixed low-expansion foam fire-extinguishing system is fitted in addition to other required fire-extinguishing arrangements in that space, the system must be capable of discharging through fixed discharge outlets in not more than 5 minutes, a quantity of foam sufficient to cover to a depth of 150 millimetres, the largest single area over which oil fuel is likely to spread.
- (2) The system must be capable of generating foam that is suitable for extinguishing oil fires. Means must be provided for—
 - (a) effective distribution of the foam through a permanent system of piping and control valves or cocks to discharge outlets to the satisfaction of a surveyor; and
 - (b) the foam to be effectively directed by fixed sprayers on other main fire hazards in the protected space. The expansion ratio of the foam must not exceed 12 to 1.
- (3) The means of control of the system must be readily accessible and simple to operate and must be grouped together in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

Inert gas systems

42B.33 General

- (1) An inert gas system must be capable of—
 - (a) inerting empty cargo tanks and slop tanks by reducing the oxygen content of the atmosphere in each tank to a level at which combustion cannot be supported; and
 - (b) maintaining—
 - (i) the atmosphere in any part of any cargo tank or slop tank at an oxygen content not exceeding 8 percent by volume; and
 - (ii) a positive pressure at all times in port and at sea, except when it is necessary for such a tank to be gas-free; and
 - (c) eliminating the need for air to enter a tank during normal operations, except when it is necessary for such a tank to be gas-free; and
 - (d) purging empty cargo tanks and slop tanks of hydrocarbon gas, so that subsequent gas-freeing operations will at no time create a flammable atmosphere within the tank.
- (2) An inert gas system must comply with rules 42B.34 to 42B.51.

42B.34 Inert gas delivery rate and content

The inert gas system must be capable of delivering inert gas—

- (a) to the cargo tanks and slop tanks at a rate of at least 125 percent of the maximum rate of discharge capacity of the ship expressed as a volume; and
- (b) with an oxygen content of not more than 5 percent by volume in the inert gas supply main to the cargo tanks and slop tanks at any required rate.

42B.35 Inert gas supply

The inert gas supply may be treated flue gas from the main or auxiliary boilers, from one or more separate gas generators or other sources or from any combination of sources. The Director or a surveyor may accept systems using inert gases other than flue gas, provided that the Director or surveyor is satisfied that an equivalent standard of safety is

achieved. Systems using stored carbon dioxide are not permitted unless the Director or a surveyor is satisfied that the risk of ignition from generation of static electricity by the system is acceptable.

42B.36 Isolating valves

Flue gas isolating valves must be fitted in the inert gas supply mains between the boiler uptakes and the flue gas scrubber. These valves must be provided with indicators to show whether they are open or shut, and precautions must be taken to maintain them gastight and keep the seating clear of soot. Arrangements must be made so that the boiler soot blowers cannot be operated when the corresponding flue gas valve is open.

42B.37 Inert gas scrubbers and filters

- (1) A flue gas scrubber must be fitted which will—
 - (a) effectively cool the volume of gas specified in rule 42B.34; and
 - (b) remove solids and sulphur combustion products.

The cooling water arrangements must be such that an adequate supply of water will always be available without interfering with any essential services on the ship. Provision must also be made for an alternative supply of cooling water.

- (2) Filters or equivalent devices must be fitted to minimise the amount of water carried over to the inert gas blowers.
- (3) The flue gas scrubber must be located aft of all cargo tanks, slop tanks, cargo pump rooms, and cofferdams separating these spaces from machinery spaces of Category A.

42B.38 Inert gas blowers and generator

- (1) At least two inert gas blowers must be fitted that together are capable of delivering to the cargo tanks and slop tanks at least the volume of gas specified in rule 42B.34. In a system provided with a gas generator, the Director or a surveyor may permit only one blower if the system is capable of delivering the total volume of gas required by rule 42B.34 to the protected cargo tanks and slop tanks, provided that sufficient spares for the blower and its prime mover are carried on board to enable any failure of the blower and its prime mover to be rectified by the ship's crew.
- (2) Two fuel oil pumps must be fitted to the inert gas generator, provided that the Director or a surveyor may permit only one fuel oil pump to be fitted if sufficient spares for the fuel oil pump and its prime mover are carried on board to enable any failure of the fuel oil pump and its prime mover to be rectified by the ship's crew.
- (3) The inert gas system must be so designed that the maximum pressure which it can exert on any cargo tank or slop tank will not exceed the test pressure of any cargo tank or slop tank. Shut-off arrangements must be provided on the suction and discharge connections for each blower. Arrangements must be made to enable the functioning of the inert gas plant to be stabilised before commencing cargo discharge. If the blowers are to be used for gas-freeing, their air inlets must be provided with blanking arrangements.
- (4) The blowers must be located aft of all cargo tanks, slop tanks, cargo pump rooms, and cofferdams separating these spaces from machinery spaces of Category A.

42B.39 Prevention of inert gas leakage

- (1) The design and location of the scrubber and blowers and their piping and fittings must be such as to prevent flue gas leakages into enclosed spaces.
- (2) To permit safe maintenance, an additional water seal or other effective means of preventing flue gas leakage must be fitted between the flue gas isolating valves and scrubber, or incorporated in the gas entry to the scrubber.

42B.40 Regulation of inert gas

- (1) A gas regulating valve must be fitted in the inert gas supply main. This valve must be automatically controlled to close as required in rules 42B.50(3) and 42B.50(4). It must also be capable of automatically regulating the flow of inert gas to the cargo tanks and slop tanks unless means are provided to automatically control the speed of the inert gas blowers required by rule 42B.38.
- (2) The gas regulating valve must be located at the forward bulkhead of the most forward gas-safe space through which the inert gas supply main passes.

42B.41 Non-return devices

- (1) At least two non-return devices, one of which must be a water seal, must be fitted in the inert gas supply main to prevent the return of hydrocarbon vapour to the machinery space uptakes or to any gas-safe spaces under normal conditions of trim, list and motion of the ship. These devices must be located between the gas regulating valve required by rule 42B.40 and the aftermost connection to any cargo tank, slop tank, or cargo pipeline. The non-return devices must be located on the cargo area on deck.
- (2) The water seal required by rule 42B.41(1) must be capable of being supplied by two separate pumps, each of which must be capable of maintaining an adequate supply at all times.
- (3) The arrangement of the seal and its associated fittings must be such that it will prevent back-flow of hydrocarbon vapours and will ensure the proper functioning of the seal under normal operating conditions.
- (4) Provision must be made to ensure that the water seal is protected against freezing, in such a way that the integrity of the seal is not impaired by overheating.
- (5) A water loop or other arrangement approved by the Director or a surveyor must be fitted to all associated water supply piping, dry piping and all venting or pressure sensing piping leading to gas-safe spaces. Means must be provided to prevent such loops from being emptied by vacuum.
- (6) The deck water seal and all loop arrangements must be capable of preventing the return of hydrocarbon vapours at a pressure equal to the test pressure of the cargo tanks.
- (7) The second non-return device must be a non-return valve or equivalent that—
 - (a) is capable of preventing the return of vapours or liquids or both; and
 - (b) is fitted forward of the deck water seal required by rule 42B.41(1); and
 - (c) has—
 - (i) positive means of closure; or
 - (ii) an additional valve with positive means of closure that is located forward of the non-return device to isolate the deck water seal from the inert gas main to the cargo tanks and slop tanks.
- (8) As an additional safeguard against the possible leakage of hydrocarbon liquids or vapours back from the deck main, means must be provided to permit the section of the line between—
 - (a) the valve having positive means of closure required by rule 42B.41(7); and
 - (b) the gas regulating valve required by rule 42B.40(1),to be vented in a safe manner when the first of those valves is closed.

42B.42 Piping and distribution arrangements

- (1) The inert gas main may only be divided into two or more branches forward of the non-return devices required by rule 42B.41.
- (2) The inert gas supply main must be fitted with branch piping leading to each cargo tank and slop tank. Branch piping for inert gas must be fitted with either stop valves or

equivalent means of control for isolating each tank. Where stop valves are fitted, they must be provided with locking arrangements that are under the control of a responsible ship's officer.

- (3) In combination carriers, the arrangement to isolate the slop tanks containing oil or oil residues from other tanks must consist of blank flanges which will remain in position at all times when cargoes other than oil are being carried, except as provided for in the *Revised Guidelines for Inert Gas Systems* adopted by the Maritime Safety Committee of the International Maritime Organization at its forty-eight session in June 1983 (MSC/Circ.353).
- (4) Means must be provided to protect cargo tanks and slop tanks against the effect of overpressure or vacuum caused by thermal variations when such tanks are isolated from the inert gas main.
- (5) Piping systems must be so designed as to prevent the accumulation of cargo or water in the pipelines under all normal conditions.
- (6) Arrangements must be provided to enable the inert gas main to be connected to an external supply of inert gas.

42B.43 Ventilation of vapours displaced from cargo tanks

The arrangements made for the venting of all vapours displaced from cargo tanks during loading or ballasting must—

- (a) comply with the provisions of Part 40B; and
- (b) consist of one or more mast risers or high velocity vents.⁹

42B.44 Arrangements for purging or gas-freeing of empty tanks

The arrangements for inerting, purging, or gas-freeing of empty tanks as required in rule 42B.33 must be approved by the Director or a surveyor and must be such that—

- (a) the accumulation of hydrocarbon vapours in pockets formed by the internal structural members in a tank is minimised; and
- (b) on individual cargo tanks and slop tanks, the gas outlet pipe, if fitted, is positioned as far as practicable from the inert gas/air inlet and in accordance with the requirements of Part 40B. The inlet of such outlet pipes must be located either at deck level or at not more than 1 metre above the bottom of the tank; and
- (c) the cross sectional area of the gas outlet pipe referred to in rule 42B.44(b) is such that an exit velocity of at least 20 metres per second can be maintained when any three tanks are being simultaneously supplied with inert gas. The outlets of such tanks must extend at least 2 metres above deck level; and
- (d) each gas outlet referred to in rule 42B.44(c) is fitted with blanking arrangements; and
- (e) if a connection is fitted between the inert gas supply mains and the cargo piping system, there is an effective isolation between the two systems. The arrangements must—
 - (i) consist of two shut-off valves with an arrangement to vent the space between the valves in a safe manner or an arrangement consisting of a spool-piece with associated blanks; and
 - (ii) take into account any pressure difference that may exist between the systems; and
- (f) the valve separating the inert gas supply main from the cargo main on the cargo main side is a non-return valve with a positive means of closure.

⁹ The inert gas supply main may be used for such venting.

42B.45 Pressure relief and vacuum-breaking devices

- (1) One or more pressure relief or vacuum-breaking devices must be provided to prevent cargo tanks from being subject to—
 - (a) a positive pressure in excess of the test pressure of the cargo tank, if the cargo were to be loaded at the maximum rated capacity and all other outlets were left shut; and
 - (b) a negative pressure in excess of 700 millimetres water gauge, if cargo were to be discharged at the maximum rated capacity of the cargo pumps and the inert gas blower were to fail.
- (2) The devices must be installed on the inert gas main unless they are installed in the venting system required by Part 40B or on individual cargo tanks.
- (3) The location and design of the devices must be in accordance with the requirements of Part 40B.

42B.46 Temperature measurement

Means must be provided for continuously indicating the temperature and pressure of the inert gas at the discharge side of the gas blowers whenever those gas blowers are operating.

42B.47 Instrumentation (permanent)

- (1) Instrumentation must be fitted for continuously indicating and permanently recording the following when the inert gas is being supplied—
 - (a) the pressure of the inert gas supply main forward of the non-return devices required by rule 42B.41; and
 - (b) the oxygen content of the inert gas in the inert gas main on the discharge side of the gas blowers.
- (2) The instruments required by rule 42B.47(1) must be placed in the cargo control room, provided that if there is no cargo control room on the ship, the instruments must be placed in a position easily accessible to the officer in charge of cargo operations.
- (3) In addition, meters must be fitted—
 - (a) in the navigating bridge to indicate at all times—
 - (i) the pressure referred to in rule 42B.47(1)(a); and
 - (ii) the pressure in the slop tanks of combination carriers, whenever those tanks are isolated from the inert gas supply main; and
 - (b) in the machinery control room or in the machinery space to indicate the oxygen content referred to in rule 42B.47(1)(b).

42B.48 Instrumentation (portable)

Portable instruments for measuring oxygen and flammable vapour concentration must be provided. In addition, arrangements must be made on each cargo tank and slop tank so that the condition of the tank atmosphere can be determined using those portable instruments.

42B.49 Calibration

Means must be provided for the zero and span calibration of both fixed and portable gas concentration instruments required by rules 42B.47 and 42B.48.

42B.50 Alarms

- (1) For inert gas systems of both the flue gas type and the inert gas generator type, audible and visual alarms must be provided to indicate—

- (a) low water pressure or low water flow rate to the flue gas scrubber required by rule 42B.37(1); and
 - (b) high water level in the flue gas scrubber required by rule 42B.37(1); and
 - (c) high gas temperature, measured by the temperature indicators required by rule 42B.46; and
 - (d) failure of the inert gas blowers required by rule 42B.38; and
 - (e) oxygen content in excess of 8 percent by volume measured by the instrumentation required by rule 42B.47(1)(b); and
 - (f) failure of the power supply to the automatic control system for the gas regulating valve and to the indicating devices required by rule 42B.40 and rule 42B.47(1) respectively; and
 - (g) low water level in the water seal required by rule 42B.41(1); and
 - (h) gas pressure less than 100 millimetres water gauge, measured by the instrumentation required by rule 42B.47(1)(a). The alarm arrangement must ensure that the pressure in the slop tanks in combination carriers can be monitored at all times; and
 - (i) high gas pressure as referred to in rule 42B.47(1)(a).
- (2) For inert gas systems of the inert gas generator type, additional audible and visual alarms must be provided to indicate—
- (a) insufficient fuel oil supply; and
 - (b) failure of the power supply to the generator; and
 - (c) failure of the power supply to the automatic control system for the generator.
- (3) The gas regulating valve and inert gas blowers must shut down automatically when the predetermined limits for the alarms required by rules 42B.50(1)(a), 42B.50(1)(b) and 42B.50(1)(c) are reached.
- (4) The gas regulating valve must shut down automatically on failure of the inert gas blowers.
- (5) In relation to rule 42B.50(1)(e), when the oxygen content of the inert gas exceeds 8 percent by volume,—
- (a) immediate action must be taken to improve the gas quality; and
 - (b) if the quality of the gas does not improve,—
 - (i) all cargo tank operations must be suspended so as to avoid air being drawn into the tanks; and
 - (ii) the non-return device referred to in 42B.41(7) must be closed.
- (6) The alarms required in rules 42B.50(1)(e), 42B.50(1)(f), and 42B.50(1)(h) must be fitted—
- (a) in the machinery space and cargo control room, where provided; and
 - (b) in each case in such a position that they are immediately received by responsible members of the crew.
- (7) In relation to rule 42B.50(1)(g), the Director or a surveyor must be satisfied as to—
- (a) the maintenance of an adequate reserve of water at all times; and
 - (b) the integrity of the arrangements to permit the automatic formation of the water seal when the gas flow ceases.

The audible and visual alarm on the low level of water in the water seal must operate when the inert gas is not being supplied.

- (8) An audible alarm system independent of that required in rule 42B.50(1)(h) or automatic shutdown of cargo pumps must be provided to operate when a predetermined limit of low pressure in the inert gas main is reached.
- (9) Detailed instruction manuals must be provided on board covering the operations, safety, and maintenance requirements and occupational health hazards relevant to the inert gas system and its application to the cargo tank system. The manuals must include guidance on procedures to be followed in the event of a fault or failure of the inert gas system.

42B.51 Tankers constructed before 1 September 1984

Any tanker constructed before 1 September 1984 that is required to have an inert gas system need not meet the following requirements:

- (a) in the case of a system fitted before 1 June 1981, rules 42B.34(b); 42B.37(3); 42B.38(4); 42B.39; 42B.40(2); 42B.41(1) in respect of the requirement that non-return devices be located on the cargo area on deck; 42B.41(6); 42B.41(8); 42B.42(4); 42B.42(5); 42B.43; 42B.44(a); 42B.44(b); 42B.44(e); 42B.45(3); and 42B.50(8); and
- (b) in the case of a system fitted on or after 1 June 1981, rules 42B.34(b); 42B.37(3); 42B.38(4); 42B.43; 42B.44(a); 42B.44(b); and 42B.45(3).

Fixed deck foam systems

42B.52 Fixed deck foam systems

- (1) A fixed deck foam system must be able to deliver foam to—
 - (a) the entire cargo tanks deck area; and
 - (b) any cargo tank, the deck of which has been ruptured.
- (2) The fixed deck foam system must be capable of simple and rapid operation. The main control station for the system must be—
 - (a) located outside the cargo area; and
 - (b) adjacent to the accommodation spaces; and
 - (c) readily accessible and operable in the event of fire in the areas protected.
- (3) The rate of supply of foam solution (that is, the mixture of foam concentrate and water before expansion) must be at least the following, whichever is the greatest:
 - (a) 0.6 litres per minute per square metre of cargo tanks deck area, where cargo tanks deck area means the maximum breadth of the ship multiplied by the total longitudinal extent of the cargo tank spaces; or
 - (b) 6 litres per minute per square metre of the horizontal sectional area of the single tank having the largest such area; or
 - (c) 3 litres per minute per square metre of the area protected by the largest monitor, such area being entirely forward of the monitor, but not less than 1,250 litres per minute.
- (4)
 - (a) Sufficient foam concentrate must be supplied to ensure at least 20 minutes of foam generation in tankers fitted with an inert gas installation or 30 minutes of foam generation in tankers not fitted with an inert gas installation when using solution rates stipulated in rules 42B.52(3)(a), 42B.52(3)(b) or 42B.52(3)(c), whichever is the greatest solution rate.
 - (b) The foam expansion ratio (that is, the ratio of the volume of foam produced to the volume of the mixture of water and foam-making concentrate before expansion) must not exceed 12 to 1.

- (c) Where systems produce low-expansion foam but an expansion ratio slightly in excess of 12 to 1, the quantity of foam solution available must be calculated as for 12 to 1 expansion ratio systems.
- (d) Where medium-expansion ratio foam (between 50 to 1 and 150 to 1 expansion ratio) is employed, the application rate of the foam and the capacity of a monitor installation must be to the satisfaction of the Director or a surveyor.
- (5) Foam from the fixed foam system must be supplied by means of monitors and foam applicators. At least 50 percent of the foam solution supply rate required in rules 42B.52(3)(a) and 42B.52(3)(b) must be delivered from each monitor. On tankers of less than 4,000 tonnes deadweight, applicators may be substituted for an installation of monitors. In such a case, the capacity of each applicator must be at least 25 percent of the foam solution supply rate required in rules 42B.52(3)(a) or 42B.52(3)(b).
- (6) The number and position of monitors must comply with rule 42B.52(1). The capacity of any monitor must be—
 - (a) at least 3 litres per minute of foam solution per square metre of deck area protected by that monitor, such area being entirely forward of the monitor; and
 - (b) at least 1,250 litres per minute.
- (7) The distance from the monitor to the farthest extremity of the protected area forward of that monitor must not be more than 75 percent of the monitor throw in still air conditions.
- (8) A monitor and hose connection for a foam applicator must be situated both port and starboard at the front of the poop or accommodation spaces facing the cargo tanks deck. On tankers of less than 4,000 tonnes deadweight not fitted with monitors, a hose connection for a foam applicator must be situated both port and starboard at the front of the poop or accommodation spaces facing the cargo tanks deck.
- (9) Applicators must be provided to ensure flexibility of action during fire-fighting operations and to cover areas screened from the monitors. The capacity of any applicator must be at least 400 litres per minute and the applicator throw in still air conditions must be at least 15 metres. The number of foam applicators provided in accordance with rule 42B.52(5) must be at least four. The number and disposition of foam main outlets must be such that foam from at least two applicators can be directed on to any part of the cargo tanks deck area.
- (10) Valves must be provided in the foam main, and in the fire main when this is an integral part of the deck foam system, immediately forward of any monitor position to isolate damaged sections of those mains.
- (11) Operation of a deck foam system at its required output must permit the simultaneous use of the minimum required number of jets of water at the required pressure from the fire main.

Non-portable fire extinguishers

42B.53 Non-portable foam fire extinguishers

A non-portable foam fire extinguisher must comply with the manufacture and performance requirements of Australian standard AS 4265 – 1995 *Wheeled fire extinguishers*. A non-portable foam fire extinguisher must also carry the markings and instructions of that standard.

42B.54 Non-portable carbon dioxide fire extinguishers

A non-portable carbon dioxide fire extinguisher must comply with the manufacture and performance requirements of Australian standard AS 4265 – 1995 *Wheeled fire extinguishers*. A non-portable carbon dioxide fire extinguisher must also carry the markings and instructions of that standard.

42B.55 Non-portable dry powder fire extinguishers

A non-portable dry powder fire extinguisher must comply with the manufacture and performance requirements of Australian standard AS 4265 – 1995 *Wheeled fire extinguishers*. A non-portable dry powder fire extinguisher must also carry the markings and instructions of that standard.

Portable foam applicator units**42B.56 Portable foam applicator units**

- (1) A portable foam applicator unit must be provided with—
 - (a) an induction type of air-foam nozzle capable of being connected to the fire main by means of a fire hose; and
 - (b) a portable tank containing at least 20 litres of foam concentrate from which the nozzle specified in rule 42B.56(1)(a) can induce the contents; and
 - (c) a spare tank identical to that specified in rule 42B.56(1)(b).
- (2) The nozzle must be capable of producing foam that is effective for extinguishing an oil fire, at the rate of at least 1.5 cubic metres per minute, when being supplied at the minimum hydrant pressure on the ship permitted by rule 42B.63(3).
- (3) The ratio of volume of foam produced to the volume of foam solution must not exceed 12 to 1.

Portable fire extinguishers**42B.57 Portable fire extinguishers**

- (1) Portable fire extinguishers must have the following minimum size and classification and rating determined in accordance with the *Joint Australian/ New Zealand standard AS/NZS 1850:1997 Portable fire extinguishers – Classification, rating and performance testing*:

Fire Type	Ships of 24 Metres or more in length overall		Ships of 12 or more but less than 24 metres length overall		Ships of more than 6 but less than 12 metres length overall		Ships of less than 6 metres length overall	
	Minimum size	Class/ Rating	Minimum size	Class/ Rating	Minimum size	Class/ Rating	Minimum size	Class/ Rating
For fires involving wood, cloth, paper, rubber and plastics ¹⁰	4.5 kg or 4.5 litres	3A	4.5 kg or 4.5 litres	2A	2.5 kg or 4.5 litres	2A	2 kg or 4.5 litres	2A
For fires involving flammable and combustible liquids ¹¹	9 kg or 9 litres	powder: 80B; foam: 20B	4.5 kg or 9 litres	powder: 60B; foam: 20B	2.5 kg or 4 litres	powder: 40B; foam: 20B	2 kg or 4 litres	powder: 30B; foam: 20B
For fires involving combustible gases	4.5 kg	C	4.5 kg	C	4.5 kg	C	2 kg	C
For fires involving electricity ¹²	3.5 kg	E	3.5 kg	E	2 kg	E	1.5 kg	E

- (2) In areas where the hazards include cooking oils or fats in a vat, the portable fire extinguishers required must have the following minimum classification rating, determined

¹⁰ For example, fires in accommodation spaces in general.

¹¹ For example, fires in a machinery space.

¹² For example, fires in a switchboard space.

in accordance with the *Joint Australian/ New Zealand standard AS/NZS 1850:1997 Portable fire extinguishers – Classification, rating and performance testing, and minimum size in relation to the volume of oil/fat.*

Maximum volume of oil/fat (litre)	Minimum size of extinguisher	Minimum Class/Rating of extinguisher
3.5	2 litres	1F
10.5	2 litres	2F
17.5	2 litres	3F
52.5	2 litres	4F
Above 52.5	7 litres	4F

- (3) Portable fire extinguishers for use in accommodation or service spaces must, so far as practicable, have a uniform method of operation.
- (4) Subject to subrule (5), where portable dry powder fire extinguishers are provided, either in accommodation and service spaces, or in machinery spaces, their number must not exceed one half of the total number of extinguishers provided in either of those spaces.
- (5) Where only one portable fire extinguisher is required in an accommodation, service or machinery space, that extinguisher may be a dry powder extinguisher.
- (6) Subject to subrule (7), ships to which Part 40B applies must carry on board—
 - (a) spare charges for portable fire extinguishers that are capable of being recharged, together with instructions for recharging the extinguishers; and
 - (b) replacement extinguishers for those that cannot be recharged on board.
- (7) A ship to which Part 40B applies, must carry a spare charge or replacement extinguisher, as the case may be, for—
 - (a) each of the first 10 of its portable fire extinguishers; and
 - (b) half of its remaining portable fire extinguishers;
 but is not required to carry more than 60 spare charges and/or replacement extinguishers.
- (8) A portable fire extinguisher must be kept fully charged at all times.
- (9) Fire extinguishers containing an extinguishing medium that, in the opinion of the Director or a surveyor, either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons must not be used in a ship.
- (10) Carbon dioxide fire extinguishers must not be located in or adjacent to sleeping accommodation.
- (11) One of the portable fire extinguishers intended for use in any space must be stowed near an entrance to that space.
- (12) Specifications relating to scope, contents, operation, construction, and marking of portable fire extinguishers manufactured—
 - (a) in New Zealand, must comply with Parts 1 to 6 of Australian/New Zealand Standards AS/NZS 1841:1997 Portable fire extinguishers; and
 - (b) outside of New Zealand, must comply with Parts 1 to 6 of British Standards Institution BS EN 3:1996.
- (13) A portable fire extinguisher must be—
 - (a) tested and maintained by a competent person in accordance with the five year schedule of New Zealand standard 4503:2005 Hand Operated Fire-Fighting Equipment; and
 - (b) inspected at a frequency specified in the maintenance plan by a person designated by the owner, operator, or master of the ship.

- (14) Records of—
 - (a) any test or maintenance carried out under subrule (13)(a) or inspection under subrule (13)(b) must be maintained on board, showing the date of the test; and
 - (b) Any test or maintenance carried out under subrule (13)(a) must include whether a pressure test was performed.
- (15) Manufacturers' instructions for recharging extinguishers must be available for use on board.

Breathing apparatus

42B.58 Smoke helmet and smoke mask

- (1) A smoke helmet or smoke mask must be provided with—
 - (a) a hose of a non-collapsing type, for the supply of air from the outside atmosphere; and
 - (b) an air pump or bellows that is suitable for pumping air through the hose; and
 - (c) efficient couplings to permit two or more lengths of hose to be joined.
- (2) The air inlet to the pump or bellows must be protected to ensure that the supply of air cannot be obstructed.
- (3) A smoke helmet or smoke mask and its associated equipment must be checked at least annually to ensure that they perform as intended.

42B.59 Self-contained breathing apparatus

- (1) Any self-contained breathing apparatus must be—
 - (a) an open circuit compressed air type; and
 - (b) a positive pressure type.
- (2) The total storage capacity of the compressed air cylinder or cylinders attached to the apparatus and carried by the wearer must be at least 1,200 litres of free air.
- (3) Means must be provided for the automatic regulation of the air supply to the wearer of the apparatus in accordance with his or her breathing requirements when breathing any volume of free air up to 85 litres per minute at any time when the pressure in the supply cylinder or cylinders is above 1,000 kPa. Means must be provided for overriding the automatic air supply valve.
- (4) A pressure gauge with an anti-bursting orifice must be incorporated in the high-pressure air-supply system to enable the wearer to read directly and easily the air pressure of air in the cylinder or cylinders.
- (5) Means must be provided for warning the wearer audibly when 80 percent of the usable capacity of the apparatus has been expended.
- (6) The maximum weight of any such apparatus must not exceed 16 kilogrammes, excluding—
 - (a) any lifeline; and
 - (b) any safety bolt or harness, that does not form an integral part of the apparatus.
- (7) Any self-contained breathing apparatus must be constructed of materials which have adequate mechanical strength, durability, and resistance to deterioration by heat or by contact with water, and such materials must—
 - (a) be resistant to fire; and
 - (b) not allow the breathing circuit to be penetrated by smoke or chemical fumes likely to be encountered in service.

The fabric used in the construction of any harness provided with such apparatus must be resistant to shrinkage. Exposed metal parts of the apparatus, harness and fittings must be of materials that so far as practicable are resistant to frictional sparking.

- (8) The following equipment must be provided for use with each set of breathing apparatus—
- (a) a fireproof life and signalling line at least three metres longer than is required to reach from the open deck in clean air, well clear of any hatch or doorway, to any part of the accommodation, service, cargo, or machinery spaces. The line must be—
 - (i) made of copper or galvanised steel wire rope having a breaking strain of a least 500 kilogrammes; and
 - (ii) overlaid up to at least 10 millimetres in diameter by hemp or other covering to provide a surface which can be firmly gripped when wet; and
 - (b) an adjustable safety belt or harness to which that line must be capable of being securely attached and detached by the wearer by means of a snap-hook; and
 - (c) means for protecting the eyes and face of the wearer against smoke; and
 - (d) two plates of non-flammable material bearing a clearly legible code of signals to be used between the wearer and his or her attendant. One plate must be attached to the safety belt or harness and the other plate must be attached to the free end of the life-line; and
 - (e) a lightweight safety helmet with lining and adjustable headband, in any apparatus other than an apparatus for which a smoke helmet or fireman's helmet must be carried.
- (9) Any breathing apparatus must be clearly marked with the name of the maker or vendor and the year of manufacture. Operating instructions in clear and permanent lettering must be affixed to such apparatus.
- (10) Any self-contained breathing apparatus must be provided with fully charged spare cylinders that have a total storage capacity of at least 2,400 litres of free air, except that:
- (a) if the ship is carrying five sets or more of such apparatus, the total storage capacity of free air in the spare cylinders is not required to exceed 9,600 litres; and
 - (b) if the ship is equipped with the means for recharging the air cylinders to full pressure with air free from contamination, the spare storage capacity of the fully charged spare cylinders of each apparatus must be at least 1,200 litres of free air, and the total spare storage capacity of free air provided in the ship is not required to exceed 4,800 litres.
- (11) A servicing and instruction manual containing detailed instructions must be kept with each apparatus.
- (12) Each set of self-contained breathing apparatus must be tested, serviced and maintained in accordance with the servicing and instruction manual. A clearly marked label must be attached to the apparatus showing the date of any servicing and service agent responsible.

International shore connection

42B.60 International shore connection

- (1) A ship of 500 tons gross tonnage or more must carry on board one international shore connection complying with the requirements of rule 42B.60(2), (3) and (4).
- (2) The dimensions of the flanges for the connection must comply with the following table:

Description	Dimension
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Outside diameter	178 mm
Inside diameter	64 mm
Bolt circle diameter	132 mm
Slots in flange	Four holes 19 mm in diameter spaced equidistantly on a bolt circle of the above diameter, slotted in the flange periphery
Flange thickness	14.5 mm minimum
Bolts and nuts	Four bolts, each of 16 mm diameter and 50 mm in length, and four 16 mm nuts
Flange surface	Rat face gasket: any suited to 1035 kPa service

- (3) The connection must—
- be constructed of steel or other material acceptable to the Director or a surveyor; and
 - be designed for 1035 kPa services; and
 - have a flange with a flat face on one side and, on the opposite side, be permanently attached to a coupling that will fit the ship's hydrant and hose; and
 - be kept aboard the ship together with a gasket of any material acceptable to the Director or a surveyor for 1035 kPa services, together with four bolts that are 16 mm in diameter and 50 mm in length, four nuts, and eight washers.
- (4) Facilities must be available to enable the connection to be used on either side of the ship.

Miscellaneous fire appliances

42B.61 Fire pumps

- In any passenger ship that is required by Part 40A or Part 40B to be provided with power operated fire pumps, such fire pumps (other than any emergency fire pump) must be capable of delivering for fire-fighting purposes a quantity of water—
 - under the conditions and at the pressure specified in rule 42B.63; and
 - of at least two thirds of the quantity required to be dealt with by the bilge pumps provided in that ship to meet the requirements of Part 40A or Part 40B, whichever is applicable.
- In any non-passenger ship that is required by Parts 40B or 40C to be provided with power operated fire pumps, such fire pumps (other than any emergency fire pump) must be capable of delivering for fire-fighting purposes a quantity of water—
 - under the conditions and at the pressure specified in rule 42B.63; and
 - of at least four thirds of the quantity required under Parts 40B or 40C to be dealt with by each of the independent bilge pumps in a passenger ship of the same dimension when employed in bilge pumping, provided that in a non-passenger ship, the total required capacity of the fire pumps is not required to exceed 180 cubic metres per hour.
- In any fishing ship that is required by Part 40D to be provided with power operated fire pumps, such fire pumps (other than any emergency fire pump) must be capable of delivering for fire-fighting purposes a quantity of water (Q) not less than that obtained from the following formula:

$$Q = (0.15\sqrt{L(B + D)} + 2.25)^2 \text{ m}^3/\text{hour}$$

Where L, B and D are the length, moulded breadth and moulded depth of the ship in metres, respectively. However, the total required capacity of the fire pumps is not required to exceed 180 cubic metres per hour.

- (3A) In any sailing ship that is required by Part 40E to be provided with power operating fire pumps, such fire pumps (other than any emergency fire pump) must be capable of delivering for fire-fighting purposes a quantity of water—
- (a) under the conditions and at the pressure specified in rule 42B.63; and
 - (b) of at least two thirds of the quantity required to be dealt with by the bilge pumps provided in that ship to meet the requirements of Part 40E; and
- (4) Each of the fire pumps (other than any emergency pump) referred to:
- (a) in rules 42B.61(1) and 42B.61(2) must have a capacity of at least 80 percent of the total required capacity divided by the minimum number of required pumps, but in any case not less than 25 cubic metres per hour; and
 - (b) in rule 42B.61(3) must have a capacity at least 40 percent of the total required capacity.

Where more than two pumps are installed, the capacity of such additional pumps must be to the satisfaction of the Director or a surveyor.

- (5) Every fire pump operated by power must be operated by a means other than the ship's main engines. Sanitary, ballast, bilge or general service pumps may be accepted as fire pumps, provided that they are not normally used for pumping oil. If pumps are occasionally used for the transfer or pumping of oil fuel, change-over arrangements that are acceptable to the Director or a surveyor must be fitted and operating instructions must be conspicuously displayed at the change-over position.
- (6) Any power driven emergency fire pump required by Parts 40B or 40D must meet the following requirements:
- (a) the pump must be capable of delivering at least one jet of water simultaneously from each of any two hydrants, hoses or nozzles provided in the ship while maintaining a pressure of at least 200 kPa at any other hydrant in the ship; and
 - (b) the capacity of the pump must be—
 - (i) at least 40 percent of the total fire pump capacity required by rules 42B.61(1) or 42B.61(2); and
 - (ii) at least 25 cubic metres per hour; and
 - (c) any diesel driven power source for the pump must be capable of being readily started by hand cranking in its cold condition down to a temperature of 0°C. If meeting this requirement is impracticable, or if lower temperatures are likely to be encountered, the Director or a surveyor may require the provision and maintenance of heating arrangements, acceptable to the Director or a surveyor, so that ready starting will be assured. If hand (manual) starting is impracticable, the Director or a surveyor may permit other means of starting. These means must be such as to enable the diesel driven power source to be started at least—
 - (i) six times within a period of 30 minutes; and
 - (ii) twice within the first 10 minutes; and
 - (d) any service fuel tank must contain sufficient fuel to enable the pump to run on full load for at least three hours. In addition, sufficient reserves of fuel must be available outside the main machinery space to enable the pump to be run on full load for an additional 15 hours; and
 - (e) the total suction head and the net positive suction head of the pump must be such that the requirements of rules 42B.61(6)(a) and 42B.61(6)(b) and of this rule are satisfied under all conditions of list, trim, roll and pitch that are likely to be encountered in service; and

- (f) the boundaries of the space containing the fire pump must be insulated to a standard of structural fire protection equivalent to that required for a control station in Part 40B; and
- (g) no direct access is permitted between the machinery space and the space containing the emergency fire pump and its source of power. When this is impracticable, the Director or a surveyor may accept an arrangement where the access is by means of an airlock, each of the two doors being self-closing, or through a watertight door that is capable of being operated from a space that is—
 - (i) remote from the machinery space and the space containing the emergency fire pump; and
 - (ii) in the opinion of the Director or a surveyor, unlikely to be cut off in the event of fire in those spaces.

In cases where the space is likely to be cut off in the event of fire, a second means of access to the space containing the emergency fire pump and its source of power must be provided; and
- (h) ventilation arrangements to the space containing the independent source of power for the emergency fire pump must be such as to preclude, as far as practicable, the possibility of smoke from a machinery space fire entering or being drawn into that space; and
 - (i) the pump must be located aft of the ship's collision bulkhead.
- (8) Any ship to which rule 42B.61(6) applies that is constructed on or after 1 October 1994 must, in place of the requirements of rule 42B.61(6)(f), meet the following requirement:

The space containing the emergency fire pump must not be contiguous to the boundaries of machinery spaces of Category A or those spaces containing main fire pumps. Where this is not practicable, the common bulkhead between the two spaces must be insulated to a standard of structural fire protection equivalent to that required for a control station in Part 40B.
- (9) Any power driven emergency fire pump required by Parts 40A, 40C, 40D or Part 40E must meet the following requirements—
 - (a) the pump must be an independently driven self-contained pump—
 - (i) with its own diesel engine prime mover and fuel supply fitted in an accessible position outside the compartment that contains the main fire pumps; or
 - (ii) driven by a self-contained generator of sufficient capacity that is in a safe place outside the engine room;¹³ and
 - (b) the pump must be capable of operating for a period of at least three hours; and
 - (c) the pump must be capable of delivering at least one jet of water simultaneously from each of any two hydrants provided in the ship while maintaining a pressure of at least 200 kPa at any other hydrant in the ship, except that in the case of fishing ships, restricted coastal limit ships of less than 45 metres in length and restricted limit ships, one jet from any one hydrant provided in the ship while maintaining a pressure of at least 200 kPa at any other hydrant in the ship is sufficient.
- (10) A manually operated fire pump, whether or not it is an emergency pump, together with its sea suction valves and other necessary valves, must be—
 - (a) operable from outside compartments containing propulsion machinery; and
 - (b) in a position not likely to be cut off by a fire in those compartments; and
 - (c) located aft of the ship's collision bulkhead.

¹³ It is preferable to locate the generator above the freeboard deck.

- (11) Relief valves must be provided in conjunction with any required fire pumps if the pumps are capable of developing a pressure exceeding the design pressure of the water service pipes, hydrants and hoses. Any relief valves so provided must be placed and adjusted to prevent pressure exceeding the design pressure of the water service pipes, hydrants and hoses.
- (12) Every centrifugal pump that is connected to the fire main must be fitted with a non-return valve.

42B.62 Fire buckets

A fire bucket required by Parts 40A, 40C, 40D or Part 40E must be—

- (a) red in colour; and
- (b) clearly marked with the word "Fire"; and
- (c) have a capacity of at least 8 litres; and
- (d) be fitted with a lanyard.

42B.63 Fire main, water service pipes and hydrants

- (1) In any ship required by Parts 40A, 40B, 40C, 40D or Part 40E to be provided with power operated fire pumps, the diameter of the fire main and the water-service pipes connecting the hydrants to the pumps must be sufficient for the effective distribution of the maximum discharge required by rule 42B.61(1), 42B.61(2), or 42B.61(3). Except as provided for in rule 42B.63(2), that discharge must be achieved—
 - (a) where only 1 pump is required, by that pump; or
 - (b) where 2 such pumps are required, by both pumps operating simultaneously; or
 - (c) where more than 2 such pumps are required, by the largest 2 of those pumps operating simultaneously.
- (2) In any ship that is not a passenger ship, the diameter of the fire main and the water-service pipes need only be sufficient for the discharge of 140 cubic metres per hour.
- (3) When fire pumps are discharging the quantities of water referred to in rule 42B.63(1) and rule 42B.63(2) through adjacent hydrants in any part of the ship from nozzles specified in rule 42B.65, the following minimum pressures must be maintained at any such hydrant:

Any passenger ship constructed before 1 October 1994

4,000 tons gross tonnage and above	310 kPa
1,000 tons gross tonnage and above but less than 4,000 tons gross tonnage	270 kPa
Under 1,000 tons gross tonnage	200 kPa

Any passenger ship constructed on or after 1 October 1994

4,000 tons gross tonnage and above	400 kPa
Less than 4,000 tons gross tonnage	300 kPa

Any non-passenger ship

6,000 tons gross tonnage and above	270 kPa
1,000 tons gross tonnage and above but less than 6,000 tons gross tonnage	250 kPa
Under 1,000 tons gross tonnage	200 kPa

Any fishing ship

45 metres in length and above	250 kPa
Less than 45 metres in length	200 kPa

- (4) The maximum pressure at any hydrant must not exceed that at which the fire hose can be effectively controlled.
- (5) The fire main must have no connections other than those necessary for fire fighting and washing down, including anchor washing.
- (6) Materials readily rendered ineffective by heat must not be used for fire mains and hydrants unless adequately protected. The pipes and hydrants must be so placed that the fire hoses may be easily coupled to them and operated without kinking.
- (7) In ships which may carry deck cargo—
 - (a) the hydrants must be placed so that they are always readily accessible; and
 - (b) the pipes must be arranged so far as practicable to avoid the risk of damage by deck cargo.
- (8) Valves of the screw-lift type or cocks must be fitted in such positions on the pipes that any of the fire hoses may be removed while the fire pumps are at work.
- (9) The water pipes must not be made of cast iron, and if made of iron or steel must be galvanised.
- (10) Where wash deck lines are not self-draining, drain cocks acceptable to the Director or a surveyor must be fitted to avoid damage by frost.
- (11) In any tanker, isolation valves must be fitted in the fire main at poop front in a protected position and on the tank deck at intervals of not more than 40 metres to preserve the integrity of the fire main system in case of fire or explosion.
- (12) In any ship to which Part 40B applies—
 - (a) isolating valves must be fitted in an easily accessible position outside the machinery spaces 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; and
 - (b) the fire main must be so arranged that when the isolating valves are shut all the hydrants on the ship, except those in the machinery space referred to above, can be supplied with water by a fire pump not located in that machinery space through pipes which do not enter that space; and
 - (c) the Director or a surveyor may permit short lengths of the emergency fire pump suction and discharge piping to penetrate the machinery space if it is impracticable to route it externally, provided that the integrity of the fire main is maintained by the enclosure of the piping in a substantial steel casing.

42B.64 Fire hoses

- (1) Fire hoses must be made of closely woven flax-canvas and rubber, or synthetic material approved by a surveyor, and must be provided with couplings, branch pipes, nozzles and other necessary fittings that comply with New Zealand Standard NZS 4505:1977. *Specification for Fire-Fighting Waterway Equipment* or British Standard BS 336:1989 *Specification for fire hose couplings and ancillary equipment*.
- (2) Fittings must be of gunmetal to prevent corrosion and seizing.

42B.65 Fire nozzles

- (1) Nozzle diameter must be 12 millimetres, 16 millimetres, or 19 millimetres, or as near to these measurements as possible. Jet/spray nozzles must be capable of producing alternatively, as required, either—
 - (a) a water spray that is suitable for extinguishing oil fires; or
 - (b) a plain water jet; andmust incorporate a shut off facility.

- (2) Nozzles for portable air foam applicator units must be capable of producing effective foam, suitable for extinguishing an oil fire, at the rate of at least 1.5 cubic metres per minute.
- (3) For machinery spaces and exterior locations of ships to which Part 40B applies, the size of the nozzles used must allow the maximum discharge possible from two jets at the minimum pressure required by rule 42B.63(3) from the smallest pump, provided that a nozzle size greater than 19 mm need not be used.¹⁴

42B.66 Fire crew outfits

A fire crew outfit¹⁵ must comprise personal safety equipment as follows:

- (a) protective clothing of material that protects the skin, including the neck, from the heat radiating from the fire and from burns and scalding by steam. Where the clothing is of aluminised material a suitable lining must be provided to protect the skin from heat transfer. The outer surface must be water resistant:
- (b) boots, with heels and toecaps and gloves of rubber or other electrically non-conducting material:
- (c) a rigid helmet that provides effective protection against impact and that is suitable for wearing with breathing apparatus:
- (d) an electric safety lamp (hand lantern) that a surveyor is satisfied—
 - (i) is intrinsically safe in a dust or fuel environment; and
 - (ii) has a minimum operating time of 3 hours:
- (e) spare batteries for the safety lamp:
- (f) a fire crew axe with an electrically non-conducting handle and heat treated head.

42B.67 Fire blankets

Fire blankets to be provided in the galleys of ships must meet Australian/New Zealand Standard AS/NZS 3504:1995 *Fire blankets*.

Other

42B.68 Fire control plans

- (1) In all ships required to be provided with a fire control plan, a general arrangement plan of the ship must be permanently exhibited for the guidance of the ship's officers. That plan must show clearly for each deck—
 - (a) the control stations; and
 - (b) the various fire sections enclosed by A Class divisions; and
 - (c) the sections enclosed by B Class divisions; and
 - (d) particulars of the fire detection and fire alarm systems; and
 - (e) the sprinkler installation; and
 - (f) the fire extinguishing appliances; and
 - (g) means of access to different compartments and decks; and

¹⁴ For accommodation and service spaces a nozzle size of 12 mm is sufficient.

¹⁵ It is recommended that fire crew outfit items comply with the following standards—

- (a) for protective clothing, BS EN Publication BS EN 469:1995:
- (b) for boots, BS EN Publication BS EN 345:
- (c) for gloves, BS EN Publication BS EN 659:1996
- (d) for helmets, Australian standard AS 4067-1994
- (e) for axes, British standard BS 3054:1959(1998)

- (h) the ventilating system, including particulars of the fan control positions, the position of dampers, and identification numbers of the ventilating fans serving each section.
- (2) Any fire control plan on a ship must be in the English language and graphical symbols used on the plan must be in accordance with resolution A.654(16) *Graphical Symbols for Fire Control Plans* adopted by the International Maritime Organization's Assembly on 19 October 1989.
- (3) Fire control plans on ships must be—
 - (a) approved by a surveyor; and
 - (b) kept up to date.Any alterations to a fire control plan must be recorded on the plan as soon as possible.
- (4) Every new ship of 45 metres or more in length that proceeds beyond restricted limits and every SOLAS ship must be provided with a duplicate copy of the approved fire control plan, that must be stored in a prominently marked weathertight enclosure situated in a position, outside the deckhouse, where it is readily available to shoreside fire fighting personnel.

42B.69 Signage

- (1) In all ships required to be provided with a fire control plan, signs identifying fire fighting appliances and their location must be consistent with the graphical symbols for fire control plans referred to in rule 42B.68(2).
- (2) In all ships not required to be provided with a fire control plan, all signs identifying fire fighting appliances and their location must be consistent with the signage requirements of New Zealand standard NZS 4503:1993 *Code of Practice for the distribution, installation and maintenance of hand operated fire fighting equipment for use in buildings*.

42B.70 Maintenance and operational instructions

For a ship engaged on an international voyage, instructions concerning the maintenance and operation of all the equipment and installations for fighting and containment of fire must be kept in one location on board, and be readily available in an accessible position.

42B.71 Standards

The Director may determine that a fire appliance meets a standard prescribed by Part 42B, if the Director is satisfied that the appliance—

- (a) complies with a national or international standard different to that prescribed in Part 42B; and
- (b) substantially complies with the standard prescribed in Part 42B.

42B.72 Consequential amendments

For Clause 3(e) of Appendix 1 of Part 80 is substituted the following—

“(e) Portable fire extinguishers must be manufactured and maintained in accordance with Rule 42B.57.”