

CHAPTER 6

FIRE EXTINGUISHERS

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6.1 General

6.1.1 The general requirements for fire extinguishers are contained in the relevant regulations which are now superseded when approval under the Marine Equipment Directive (MED) is required. The MED standard for portable fire extinguishers is EN 3-7. Note that SOLAS and the EU Domestic Passenger Ships Directive 98/18/EC require ships built after 2003 to have extinguishers which are provided with devices which indicate whether they have been used, however, this is not an explicit requirement of the FSS Code or MSN 1665.

6.1.2 Portable extinguishers approved under the MED should comply with the minimum capacities required by the Fire Safety Systems (FSS) Code:

Water	9 litres
Foam	9 litres
Powder	5 kg
CO ₂	5 kg

MSN 1665 Sch 8 suggests that the minimum size for CO₂ is 3 kg and powder 4.5 kg however the need for MED approval will render these minimums redundant. In practice, for dry powder extinguishers, 5 kg is not an industry standard, therefore a 6 kg size would be the minimum capacity. Note that the maximum weight of a 'portable' extinguisher is set at 23 kg by the FSS Code or a 13.5 litre liquid capacity in MSN 1665.

6.1.3 Where the owners wish to supply extinguishers, extra to regulation requirement, which are smaller than this, then these may be accepted provided that they constitute no hazard to the crew, in particular:

- the extinguishers are made to a recognised national standard,
- the extinguishers are maintained in good condition with servicing in accordance with the manufacturers recommendations, see MGN 79 'Safety Equipment and Pollution Prevention Equipment Carried in Excess of Statutory Requirements',
- the extinguishers contain no substances that may be toxic, e.g. carbon tetrachloride, etc. or asphyxiate, e.g. CO₂ in confined spaces,
- the extinguishers are marked on the fire plan.
- Halon replacement clean agents, such as FM 200 and Novec 1230, contain fluoride whose main decomposition product is hydrogen fluoride (HF), which is generated by breakdown of the agent in the presence of very high amounts of heat, and may be hazardous in small, poorly ventilated spaces. Hydrogen fluoride is toxic and may be fatal if inhaled or swallowed, and may cause severe burns in contact with skin.

6.1.4 In view of the ability of aluminium to produce **incendive** smears on steel, aluminium fire extinguishers should not be provided for use on tankers and ships carrying similar flammable cargoes, or which carry vehicles with

petrol in their tanks and will no longer be accepted on ships to which the regulations apply.

6.1.5 Extinguishers are classified according to the type of extinguishing medium they contain. At present the types of extinguishers and the uses for which they are recommended are as follows:

Extinguishing medium	Recommended for use on fires involving
Water Water with additives	Wood, paper, textiles and similar materials
Foam	Wood, paper, textiles and flammable liquids
Dry powder/dry chemical (standard/Classes B, C)	Flammable liquids, electrical equipment and flammable gases
Dry powder/dry chemical (multiple or general purpose/classes A, B, C)	Wood, paper, textiles, flammable electrical equipment and flammable gases
Dry powder/dry chemical (metal)	Combustible metals
Carbon dioxide	Flammable liquids and electrical equipment
Wet chemical for Class F or K	Cooking grease, fats or oil fires
Clean agents ¹	

IMO Resolution A.951(23)

For clean agents referred to in footnote ¹, extinguishers meeting EN 3-7 can be used as an equivalent ISO 7165:2009.

6.1.6 SOLAS Ch II-2 Reg 10.3.2 leaves the types and numbers of extinguishers, where not otherwise specified, to the satisfaction of the administration. On SOLAS ships built after 1 January 2009 extinguisher provision and distribution should be as set out by MSC Circular 1275, as interpreted in the tables 1 & 2 below. Note that the class of extinguishers used in MSC Circular 1275 is that used by the National Fire Protection Association (NFPA) and not the ISO classification.

Table 1

International Organization for Standardization (ISO standard 3941) ²	National Fire Protection Association (NFPA 10)
Class A: Fires involving solid materials, usually of an organic nature, in which combustion normally takes place with the formation of glowing embers.	Class A: Fires in ordinary combustible materials such as wood, cloth, paper, rubber and many plastics.
Class B: Fires involving liquids or liquefiable solids.	Class B: Fires in flammable liquids, oils, greases, tars, oil base paints, lacquers and flammable gases.
Class C: Fires involving gases.	Class C: Fires, which involve energized electrical equipment where the electrical non-conductivity of the extinguishing medium is of importance. (When electrical equipment is de-energized, extinguishers for Class A or B fires may be used safely.)
Class D: Fires involving metals.	Class D: Fires in combustible metals such as magnesium, titanium, zirconium, sodium, lithium and potassium.
Class F: Fires involving cooking oils.	Class K: Fires involving cooking grease, fats and oils.

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¹ Refer to the recommendations by the International Organization for Standardization, in particular Publication ISO 7165:2009, *Fire-fighting - Portable fire extinguishers - Performance and construction*

² Comité Européen de Normalisation (CEN standard EN2) closely follows ISO standard 3941

6.1.7 On SOLAS ships built before 1 January 2009 and non SOLAS ships the minimum number of extinguishers is laid down by the regulations but it is recommended that the principles of MSC Circular 1275 are applied in the selection of types of extinguishers supplied.

6.1.8 Portable fire extinguishers provided should have, so far as practicable, a uniform method of operation, and operating instructions should be in the working language of the ship. If the language is not English, a translation into English shall be included. Extinguishers should be coloured in accordance with EN 3-7.

6.1.9 All extinguishers capable of extinguishing Class A and B fires carry a Fire Rating which is indicated by a number and letter, e.g. 13A, 55B. The number is the size of fire it can extinguish under test conditions, the larger the number, the larger the fire it can extinguish. The letter indicates the fire classification. Some extinguishers, such as dry powder, carry both a Class A and Class B rating because of the properties of the extinguishing medium.

6.1.10 All portable extinguishers must be marked in accordance with the requirements of EN 3-7 which, as a minimum, shows:-

- the type of extinguishing medium, nominal charge and fire rating;
- clear instructions on how to operate and the type of fire it can or cannot be used on;
- information relating to any restrictions or dangers of use, in particular in relation to toxicity and electrical risk;
- refilling instructions
- manufacturer's details and year of manufacture

The label must be in such a position that it can be clearly read when the extinguisher is on its mounting bracket.

Council Directive 92/58/EEC on minimum requirements for the provision of safety and/or health signs at work, Annex IV requires that fire-fighting equipment must be identified by using a specific colour for the equipment and placing a location signboard, and/or by using a specific colour for the places where such equipment is kept, or their access points.

The colour for identifying this equipment is red.

If the location of the extinguisher is not easily visible or 'hidden', then it is advisable to increase the visibility of the extinguisher by highlighting the area around the extinguisher with the approved red colour coding, or an additional sign should be displayed showing the location of the extinguisher.

The guidance given in MSN 1763, clause 3 provides that 'signs are a "last resort" measure to control risks', and this should be taken into account when deciding if additional signage is required.

6.1.11 Flag-in of vessels where 100% dry powder portable extinguishers are provided in accommodation spaces, service spaces or machinery spaces can be accepted on the basis that as, and when, extinguishers are replaced in any of these spaces, the maximum 50% UK recommended mix is adopted, as per [6.2.1](#).

Table 2

MSC.1/Circ.1275 - Table – Minimum numbers and distribution of portable fire extinguishers in the various types of spaces on board ships			
Type of spaces		Minimum number of extinguishers	Class(es) of extinguisher(s)
Accommodation spaces	Public spaces	1 per 250 m ² of deck area or fraction thereof	A
	Corridors	Travel distance to extinguishers should not exceed 25 m within each deck and main vertical zone	A
	Stairway	0	
	Lavatories, cabins, offices, pantries containing no cooking appliances	0	
	Hospital	1	A
Service spaces	Laundry drying rooms, pantries containing cooking appliances	1 ²	A or B
	Lockers and store rooms (having a deck area of 4 m ² or more), mail and baggage rooms, specie rooms, workshops (not part of machinery spaces, galleys)	1 ²	B
	Galleys	1 Class B and 1 additional Class F or K for galleys with deep fat fryers	B, F or K
	Lockers and store rooms (deck area is less than 4 m ²)	0	
	Other spaces in which flammable liquids are stowed	In accordance with SOLAS regulation II 2/10.6.3	
Control stations	Control stations (other than wheelhouse)	1	A or C
	Wheelhouse	2, if the wheelhouse is less than 50 m ² only 1 extinguisher is required ³	A or C

	Type of spaces	Minimum number of extinguishers	Class(es) of extinguisher(s)
Machinery spaces of category A	Central control station for propulsion machinery	1, and 1 additional extinguisher suitable for electrical fires when main switchboards are arranged in central control station	A and/or C
	Vicinity of the main switchboards	2	C
	Workshops	1	A or B
	Enclosed space with oil-fired inert gas generators, incinerators and waste disposal units	2	B
	Separately enclosed room with fuel oil purifiers	0	
	Periodically unattended Machinery spaces of category A	1 at each entrance ¹	B
Other spaces	Workshops forming part of machinery spaces and other machinery spaces (auxiliary spaces, electrical equipment spaces, auto – telephone exchange rooms, air conditioning spaces and other similar spaces)	1	B or C
	Weather deck	0 ⁴	B
	Ro-ro spaces and vehicle spaces	No point if space is more than 20 m walking distance from an extinguisher at each deck level ^{4, 5}	B
	Cargo spaces	0 ⁴	B
	Cargo pump-room	2	B
	Helidecks	In accordance with SOLAS regulation II-2/18.5.1	B

NOTES:

- ¹ A portable fire extinguisher required for a small space may be located outside and near the entrance to that space.
- ² For service spaces, a portable fire extinguisher required for that small space placed outside or near the entrance to that space may also be considered as part of the requirement for the space in which it is located.
- ³ If the wheelhouse is adjacent with the chartroom and has a door giving direct access to chartroom, no additional fire extinguisher is required in the chart room. The same applies to safety centres if they are within the boundaries of the wheelhouse in passenger ships.

⁴ Two portable fire extinguishers, each having a capacity of not less than 6 kg of dry powder or equivalent, should be provided when dangerous goods are carried on the weather deck, in open ro-ro spaces and vehicle spaces, and in cargo spaces as appropriate. Two portable fire extinguishers, each having a suitable capacity, should be provided on weather deck for tankers.

⁵ No portable fire extinguisher needs to be provided in cargo holds of containerships if motor vehicles with fuel in their tank for their own propulsion are carried in open or closed containers.

6.2 Portable extinguishers in accommodation spaces

6.2.1 The portable extinguishers provided in passenger and crew spaces should be suitable for the types of fires expected in the area, as indicated in MSC Circular 1275. The cooling effect of water type extinguishers is considered preferable for dealing with Class A fires, although dry powder extinguishers may be provided, to the extent of one half of the total number of extinguishers, where a risk of electrical fire also exists. Carbon dioxide and halon replacement clean agent (e.g. FM-200; Novec 1230; FE-13; FE-36) extinguishers can be used in accommodation spaces where there is a risk of electrical fire, except where the user or occupants may be affected by their use or leakage. This does not forbid extinguishers containing only a small propellant cartridge of CO₂.

6.2.3 Note that the EU Passenger Ships Directive 98/18/EC specifies maximum distances between extinguishers which are less than those recommended by MSC Circular 1275 and has extra requirements for protection of electrical switchgear.

6.3 Portable extinguishers in service spaces

6.3.1 In galleys which are fitted with oil-fired or electric cooking appliances foam, CO₂, halon replacement clean agents (e.g. FM-200; Novec 1230; FE-13; FE-36) or dry powder are acceptable for Class B risks. Where gas-fired appliances are fitted dry powder is recommended. A fire blanket is recommended for oil pan fires by the Code of Safe Working Practices and should be provided in every galley.

6.3.2 Note that the EU Passenger Ships Directive 98/18/EC specifies a maximum distance between extinguishers in galleys unlike MSC Circular 1275.

6.4 Portable extinguishers in machinery spaces

6.4.1 The primary hazard in machinery spaces is oil (Class B) fires, although electrical equipment is likely to be common and widely dispersed. Areas such as workshops may contain carbonaceous materials (Class A).

6.4.2 MSC Circular 1275 provides guidance on the number and arrangement of portable fire extinguishers in machinery spaces of category A. For SOLAS ships built after 1 January 2009 it is considered that the minimum

number of Class B extinguishers for a machinery space of category A should be two. In manned machinery spaces it is recommended that extinguishers are placed so that no position within the space is more than 10 metres walk from an extinguisher. For other ships, the regulations make specific requirements as to minimum numbers and spacing of extinguishers.

6.4.3 In periodically unattended machinery spaces, and machinery spaces other than those of category A, an extinguisher should be sited at, or adjacent to, the entrance to such spaces having regard to the possible need to attack a fire from outside the space as well as from inside. Where the machinery space is small the extinguisher may be located outside the door rather than inside.

6.4.4 Foam extinguishers are considered superior for dealing with Class B fires, however, suitable dry powder extinguishers may be accepted where there is also risk of electrical fire. CO₂ extinguishers should not be supplied if their complete discharge would result in vapour release of more than 5 % of the net volume of the space. The volume of CO₂ shall be calculated at 0.56 m³/kg. For control rooms, where Class A and C fire risks exist, then dry powder may be preferable to water and CO₂.

6.4.5 Where oil fired auxiliary boilers, or other oil fired appliances such as inert gas generators or incinerators, are contained within the main machinery space of motor ships, 2 portable extinguishers suitable for Class B fires should be located near to the firing platform. It is recommended that two Class B extinguishers be available near to any oil fuel units, however, these need not be additional to similar extinguishers already provided in the combined spaces to meet other regulations.

6.4.6 Where oil fired auxiliary heating boilers or other oil fired appliances are located inside a space which is outside the main category A machinery space, that space becomes a machinery space of category A.

6.4.7 Where separately enclosed purifier rooms are not fitted with a fixed fire extinguishing system consideration should be given to the availability of a Class B extinguisher near the door.

6.4.8 Sufficient extinguishers suitable for use in high voltage areas, e.g. CO₂ or dry powder, shall be located inside and at the access to all spaces containing high voltage (up to 12kV) equipment.

6.4.9 Manual CO₂ injection ports may be fitted to high voltage switchboards however, they must include a CO₂ diffuser and a robust means of preventing arc products from escaping through the port. They must also be located to provide the most effective protection of the equipment including low voltage sub-systems. Manual CO₂ injection ports providing direct access to live high voltage equipment must be clearly marked: "NOT TO BE USED UNTIL HIGH VOLTAGE DISCONNECTION IS CONFIRMED". Manual CO₂ injection ports fitted to the low voltage side of high voltage equipment should be clearly marked: "MAY BE USED WHEN LIVE".

6.5 Portable extinguishers in cargo holds loaded with vehicles with fuel in their tanks (SOLAS Reg II-2/20.6.2)

Cargo holds, loaded with vehicles with fuel in their tanks and stowed in open or closed containers, need not to be provided with the portable fire extinguishers, water fog applicators and foam applicator unit.

(IACS Unified Interpretation SC205)

6.6 Non-portable extinguishers in machinery spaces

6.6.1 'Non-portable' extinguishers are those which exceed the maximum mass of a portable extinguisher, i.e. are more than 23 kg. In general these are expected to be 'transportable', i.e. fitted with wheels, however fixed extinguishers may be accepted where space is limited provided the remainder of this section can be complied with.

135 litre extinguishers are not required for spaces in cargo ships wherein all boilers contained therein are for domestic services and are less than 175 kW.

(IACS Unified Interpretation SC30)

6.6.2 Positioning:

45 litre foam extinguishers may be arranged outside of the space concerned for smaller spaces of cargo ships.

(IACS Unified Interpretation SC30 - Interpretation of Chapter II-2, Regulation 10.5.1 and 10.5.2)

In case of machinery spaces containing both boilers and internal combustion engines (case not explicitly considered in Reg. 10.5) Reg. 10.5.1 and 10.5.2 apply, with the exception that one of the foam fire-extinguishers of at least 45 l capacity or equivalent (required by Reg. 10.5.2.2.2) may be omitted on the condition that the 135 l extinguisher (required by Reg. 10.5.1.2.2) can protect efficiently and readily the area covered by the 45 l extinguisher.

(IACS Unified Interpretation SC30)

Except in cases where non-portable extinguishers are provided for a particular fire hazard, the discharge from the extinguisher hoses should be capable of reaching every part of the boiler room where there is a fire hazard, and the oil fuel installation in ships fitted with oil-fired boilers, and every part of the engine room where there is appreciable risk of fire in motor ships.

6.6.3 The length of hose on these extinguishers should not exceed that provided by the **manufacturer**. Non-portable dry powder extinguishers are not acceptable as the equivalents of non-portable carbon dioxide or foam extinguishers required by regulation. No objection need be raised to their acceptance as additional equipment. When used in conjunction with foam equipment, the powder used should be of a foam compatible type.

6.7 Stowage

6.7.1 All fire fighting equipment must be maintained in good order and be kept available for immediate use at all times. Portable and transportable extinguishers should be secured by a means not liable to seize and capable of ready release without the use of tools.

6.7.2 Older mechanical foam making liquids may be subject to deterioration at temperatures of 38°C or over, and while modern AFFF types may be unaffected at higher temperatures, foam fire extinguishers should be kept in as cool a place as possible. Additionally, foam and water based types should not be stowed in a position where the ambient temperature is liable to fall below 0°C. Dry powder and CO₂ extinguishers are generally considered suitable for use at temperatures down to -30°C, but the latter type should not be exposed to corrosive conditions or to a temperature exceeding 60°C.

6.7.3 Where MSC Circular 1275 is being followed, extinguishers for “small”, considered to be those spaces with a deck area less than 16m², lockers and store rooms which do not hold flammable liquids, may be stowed outside the space. Provided they are effective against the necessary classes of fires, these extinguishers may be counted towards the requirements for the corridor they are located in, and for any other small lockers and store rooms with doors within a 5m radius.

6.8 Charges

6.8.1 All portable and non-portable fire extinguishers should be maintained by a “Competent Person” in accordance with MGN 276. The charges of extinguishers, other than those referred to below, should be renewed if, on checking, there is any indication of deterioration and in any case at intervals not exceeding the manufacturer’s recommended life.

6.8.2 The number of spare charges carried onboard shall be in accordance with SOLAS Ch II-2 Reg 10.3.3, taking into account charges will be required to refill extinguishers used for training purposes.

Spare charges shall be provided for 100% of the first ten extinguishers and 50% of the remaining fire extinguishers capable of being recharged on board. Not more than sixty total spare charges are required. Instructions for recharging shall be carried on board.

For fire extinguishers which cannot be recharged on board, additional portable fire extinguishers of the same quantity, type, capacity and number as determined in paragraph 3.3.1 above shall be provided in lieu of spare charges.

(SOLAS Ch II-2 Reg 10.3.3)

The number of spare charges for vessels operating on short sea routes may be reduced where arrangements have been made for the ready availability of spare extinguishers or charges. Equivalence may be granted only while the

vessel is in service on the designated route, an arrangement is made with an identified reputable supplier and the arrangements for supply of spares can be verified.

6.8.3 Carbon dioxide extinguishers, and gas expellant cartridges of other extinguishers, should be recharged or renewed if the loss of gas by weight exceeds 10 per cent of the original charge, as stamped on the bottle or cartridge, and the reason for the loss investigated. Spare charges should have the manufacturer's instructions for charging the extinguishers clearly shown and, where the chemicals are liable to deteriorate, the containers should be marked with the date of packing and the date before which renewal is necessary. These spare charges should be supplied either by the manufacturer's of the extinguishers, or by a company having an agreement with the manufacturer guaranteeing to supply charges to the original specification.

6.8.4 Dry powder extinguishers may suffer from compaction when subject to vibration. It is recommended that at least one should be discharged annually and the retention of contents checked. Where the retention is found to be in excess of 15 per cent of the initial charge, further extinguishers should be discharged.

6.9 Re-survey

6.9.1 Extinguishers should be subject to periodical inspections in accordance with the manufacturer's instructions and serviced at intervals not exceeding one year. MGN 276 and IMO Resolution A.951(23) provide further guidance on servicing requirements.

6.9.2 Extinguishers should be in locations set out on the fire plan, in good condition and ready for use. The type or class of fire for which the extinguishers are suitable should be clearly marked on the body.

6.9.3 The spares required by the regulations should be sighted and checked for deterioration or expiration.

6.10 Maintenance

The following documents provide guidance for the maintenance of portable fire extinguishers:-

- MGN 276 - Maintenance of portable fire extinguishers.
- MGN 374 – Periodic inspection and testing of seamless steel pressurised gas cylinders.
- IMO Res.A.951(23) – Improved guidelines for marine portable fire extinguishers.