

**INTERNATIONAL MARITIME ORGANIZATION**

**INTERNATIONAL CODE  
FOR FIRE SAFETY SYSTEMS**

by

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RESOLUTION MSC.98(73)(adopted on 5 December 2000)

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## **RESOLUTION MSC.98(73)**

(adopted on 5 December 2000)

### **ADOPTION OF THE INTERNATIONAL CODE FOR FIRE SAFETY SYSTEMS**

**THE MARITIME SAFETY COMMITTEE,**

**RECALLING** Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

**NOTING** the revision of chapter II - 2 of the International Convention for the Safety of Life at Sea (SOLAS), 1974 (hereinafter referred to as "the Convention"),

**RECOGNIZING** the need to continue the mandatory application of the fire safety systems required by the revised chapter II - 2 of the Convention,

**NOTING** resolution MSC.99(73) by which it adopted, inter alia, the revised chapter II - 2 of the Convention to make the provisions of the International Code for Fire Safety Systems (FSS Code) mandatory under the Convention,

**HAVING CONSIDERED**, at its seventy-third session, the text of the proposed FSS Code,

1. **ADOPTS** the International Code for Fire Safety Systems (FSS Code), the text of which is set out in the Annex to the present resolution;
2. **INVITES** Contracting Governments to the Convention to note that the FSS Code will take effect on 1 July 2002 upon the entry into force of the revised chapter II - 2 of the Convention;
3. **REQUESTS** the Secretary-General to transmit certified copies of this resolution and the text of the FSS Code contained in the Annex to all Contracting Governments to the Convention;
4. **FURTHER REQUESTS** the Secretary-General to transmit copies of this resolution and the Annex to all Members of the Organization which are not Contracting Governments to the Convention.

# ANNEX

## INTERNATIONAL CODE FOR FIRE SAFETY SYSTEMS

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# **THE INTERNATIONAL CODE FOR FIRE SAFETY SYSTEMS**

(Fire Safety Systems Code)

## **PREAMBLE**

1 The purpose of this Code is to provide international standards of specific engineering specifications for fire safety systems required by chapter II - 2 of the International Convention for the Safety of Life at Sea, 1974, as amended.

2 On or after 1 July 2002, this Code will be mandatory for fire safety systems required by the International Convention for the Safety of Life at Sea, 1974, as amended. Any future amendment to the Code must be adopted and brought into force in accordance with the procedure laid down in Article VIII of the Convention.

## **CHAPTER 1 GENERAL**

### **1 Application**

1.1 This code is applicable to fire safety systems as referred to in chapter II – 2 of the International Convention for the Safety of Life at Sea, 1974, as amended.

1.2 Unless expressly provided otherwise, this Code is applicable for the fire safety systems of ships the keels of which are laid or which are at a similar stage of construction on or after 1 July 2002.

### **2 Definitions**

2.1 Administration means the Government of the State whose flag the ship is entitled to fly.

2.2 Convention means the International Convention for the Safety of Life at Sea, 1974, as amended.

2.3 Fire Safety Systems Code means the International Code for Fire Safety Systems as defined in chapter II – 2 of the International Convention for the Safety of Life at Sea, 1974, as amended.

2.4 For the purpose of this Code, definitions provided in chapter II – 2 of the Convention also apply.

### **3 Use of equivalents and modern technology**

In order to allow modern technology and development of fire safety systems, the Administrations may approve fire safety systems which are not specified in this Code if the requirements of Part F of chapter II – 2 of the Convention are fulfilled.

### **4 Use of toxic extinguishing media**

The use of a fire-extinguishing medium which, in the opinion of the Administration, either by itself or under expected conditions of use gives off toxic gases, liquids and other substances in such quantities as to endanger persons shall not be permitted.

## CHAPTER 2 INTERNATIONAL SHORE CONNECTIONS

### 1 Application

This chapter details the specifications for international shore connections as required by chapter II - 2 of the Convention.

### 2 Engineering specifications

#### 2.1 Standard dimensions

Standard dimensions of flanges for the international shore connection shall be in accordance with the following table:

**Table 2.1 - Standard dimensions for international shore connections**

Description	Dimension
Outside diameter	178 mm
Inside diameter	64 mm
Bolt circle diameter	132 mm
Slots in flange	4 holes 19 mm in diameter spaced equidistantly on a bolt circle of the above diameter, slotted to the flange periphery
Flange thickness	14.5 mm minimum
Bolts and nuts	4, each of 16 mm diameter, 50 mm in length

#### 2.2 Materials and accessories

International shore connections shall be of steel or other equivalent material and shall be designed for 1.0 N/mm<sup>2</sup> services. The flange shall have a flat face on one side and, on the other side, it shall be permanently attached to a coupling that will fit the ship's hydrant and hose. The connection shall be kept aboard the ship together with a gasket of any material suitable for 1.0 N/mm<sup>2</sup> services, together with four bolts of 16 mm diameter and 50 mm in length, four 16 mm nuts, and eight washers.

## **CHAPTER 3 PERSONNEL PROTECTION**

### **1 Application**

This chapter details the specifications for personnel protection as required by chapter II - 2 of the Convention.

### **2 Engineering specifications**

#### **2.1 Fire-fighter's outfit**

A fire-fighter's outfit shall consist of a set of personal equipment and a breathing apparatus.

##### **2.1.1 Personal equipment**

Personal equipment shall consist of the following:

- .1 protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding by steam. The outer surface shall be water-resistant;
- .2 boots of rubber or other electrically non-conducting material;
- .3 rigid helmet providing effective protection against impact;
- .4 electric safety lamp (hand lantern) of an approved type with a minimum burning period of 3 h. Electric safety lamps on tankers and those intended to be used in hazardous areas shall be of an explosion-proof type; and
- .5 axe with a handle provided with high-voltage insulation.

##### **2.1.2 Breathing apparatus**

Breathing apparatus shall be a self-contained compressed air-operated breathing apparatus for which the volume of air contained in the cylinders shall be at least 1,200 l, or other self-contained breathing apparatus which shall be capable of functioning for at least 30 min. All air cylinders for breathing apparatus shall be interchangeable.

##### **2.1.3 Lifeline**

For each breathing apparatus a fireproof lifeline of at least 30 m in length shall be provided. The lifeline shall successfully pass an approval test by statical load of 3.5 kN for 5 min without failure. The lifeline shall be capable of being attached by means of a snap-hook to the harness of the apparatus or to a separate belt in order to prevent the breathing apparatus becoming detached when the lifeline is operated.

### **2.2 Emergency escape breathing devices (EEBD)**

#### **2.2.1 General**

2.2.1.1 An EEBD is a supplied air or oxygen device only used for escape from a compartment that has a hazardous atmosphere and shall be of an approved type.



2.2.1.2 EEBDs shall not be used for fighting fires, entering oxygen deficient voids or tanks, or worn by fire-fighters. In these events, a self-contained breathing apparatus, which is specifically suited for such applications, shall be used.

## 2.2.2 Definitions

2.2.2.1 Face piece means a face covering that is designed to form a complete seal around the eyes, nose and mouth which is secured in position by a suitable means.

2.2.2.2 Hood means a head covering which completely covers the head, neck, and may cover portions of the shoulders.

2.2.2.3 Hazardous atmosphere means any atmosphere that is immediately dangerous to life or health.

## 2.2.3 Particulars

2.2.3.1 The EEBD shall have a service duration of at least 10 min.

2.2.3.2 The EEBD shall include a hood or full face piece, as appropriate, to protect the eyes, nose and mouth during escape. Hoods and face pieces shall be constructed of flame resistant materials and include a clear window for viewing.

2.2.3.3 An inactivated EEBD shall be capable of being carried hands-free.

2.2.3.4 An EEBD, when stored, shall be suitably protected from the environment.

2.2.3.5 Brief instructions or diagrams clearly illustrating their use shall be clearly printed on the EEBD. The donning procedures shall be quick and easy to allow for situations where there is little time to seek safety from a hazardous atmosphere.

## 2.2.4 Markings

Maintenance requirements, manufacturer's trademark and serial number, shelf life with accompanying manufacture date and name of approving authority shall be printed on each EEBD. All EEBD training units shall be clearly marked.

## **CHAPTER 4**

### **FIRE EXTINGUISHERS**

#### **1 Application**

This chapter details the specifications for fire extinguishers as required by chapter II - 2 of the Convention.

#### **1.2 Type approval**

All fire extinguishers shall be of approved types and designs based on the guidelines developed by the Organization.<sup>①</sup>

#### **2 Engineering specifications**

##### **2.1 Fire extinguisher**

###### **2.1.1 Quantity of medium**

2.1.1.1 Each powder or carbon dioxide extinguisher shall have a capacity of at least 5 kg and each foam extinguisher shall have a capacity of at least 9 l . The mass of all portable fire extinguishers shall not exceed 23 kg and they shall have a fire-extinguishing capability at least equivalent to that of a 9 l fluid extinguisher.

2.1.1.2 The Administration shall determine the equivalents of fire extinguishers.

###### **2.1.2 Recharging**

Only refills approved for the fire extinguisher in question shall be used for recharging.

##### **2.2 Portable foam applicators**

A portable foam applicator unit shall consist of a foam nozzle of an inductor type capable of being connected to the fire main by a fire hose, together with a portable tank containing at least 20 l of foam-making liquid and one spare tank of foam making liquid. The nozzle shall be capable of producing effective foam suitable for extinguishing an oil fire, at the rate of at least 1.5 m<sup>3</sup>/min.

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<sup>①</sup> Refer to the Guidelines for marine portable fire extinguishers adopted by the Organization by resolution A.602(15).

## **CHAPTER 5**

### **FIXED GAS FIRE-EXTINGUISHING SYSTEMS**

#### **1 Application**

This chapter details the specifications for fixed gas fire-extinguishing systems as required by chapter II - 2 of the Convention.

#### **2 Engineering specifications**

##### **2.1 General**

###### **2.1.1 Fire-extinguishing medium**

2.1.1.1 Where the quantity of the fire-extinguishing medium is required to protect more than one space, the quantity of medium available need not be more than the largest quantity required for any one space so protected.

2.1.1.2 The volume of starting air receivers, converted to free air volume, shall be added to the gross volume of the machinery space when calculating the necessary quantity of the fire-extinguishing medium. Alternatively, a discharge pipe from the safety valves may be fitted and led directly to the open air.

2.1.1.3 Means shall be provided for the crew to safely check the quantity of the fire-extinguishing medium in the containers.

2.1.1.4 Containers for the storage of fire-extinguishing medium and associated pressure components shall be designed to pressure codes of practice to the satisfaction of the Administration having regard to their locations and maximum ambient temperatures expected in service.

###### **2.1.2 Installation requirements**

2.1.2.1 The piping for the distribution of fire-extinguishing medium shall be arranged and discharge nozzles so positioned that a uniform distribution of the medium is obtained.

2.1.2.2 Except as otherwise permitted by the Administration, pressure containers required for the storage of fire-extinguishing medium, other than steam, shall be located outside the protected spaces in accordance with regulation II - 2/10.4.3 of the Convention.

2.1.2.3 Spare parts for the system shall be stored on board and be to the satisfaction of the Administration.

###### **2.1.3 System control requirements**

2.1.3.1 The necessary pipes for conveying fire-extinguishing medium into the protected spaces shall be provided with control valves so marked as to indicate clearly the spaces to which the pipes are led. Suitable provision shall be made to prevent inadvertent release of the medium into the space. Where a cargo space fitted with a gas fire-extinguishing system is used as a passenger space, the gas connection shall be blanked during such use. The pipes may pass through accommodations providing that they are of substantial thickness and that their tightness is verified with a pressure test, after their installation, at a pressure head not less than 5 N/mm<sup>2</sup>. In addition, pipes passing through accommodation areas shall be joined only by welding and shall not be fitted with drains or other openings within such spaces. The pipes

shall not pass through refrigerated spaces.

2.1.3.2 Means shall be provided for automatically giving audible warning of the release of fire-extinguishing medium into any ro-ro spaces and other spaces in which personnel normally work or to which they have access. The pre-discharge alarm shall be automatically activated (e.g., by opening of the release cabinet door). The alarm shall operate for the length of time needed to evacuate the space, but in no case less than 20 s before the medium is released. Conventional cargo spaces and small spaces (such as compressor rooms, paint lockers, etc.) with only a local release need not be provided with such an alarm.

2.1.3.3 The means of control of any fixed gas fire-extinguishing system shall be readily accessible, simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. At each location there shall be clear instructions relating to the operation of the system having regard to the safety of personnel.

2.1.3.4 Automatic release of fire-extinguishing medium shall not be permitted, except as permitted by the Administration.

## 2.2 Carbon dioxide systems

### 2.2.1 Quantity of fire extinguishing medium

2.2.1.1 For cargo spaces the quantity of carbon dioxide available shall, unless otherwise provided, be sufficient to give a minimum volume of free gas equal to 30% of the gross volume of the largest cargo space to be protected in the ship.

2.2.1.2 For machinery spaces the quantity of carbon dioxide carried shall be sufficient to give a minimum volume of free gas equal to the larger of the following volumes, either:

- .1 40% of the gross volume of the largest machinery space so protected, the volume to exclude that part of the casing above the level at which the horizontal area of the casing is 40% or less of the horizontal area of the space concerned taken midway between the tank top and the lowest part of the casing; or
- .2 35% of the gross volume of the largest machinery space protected, including the casing.

2.2.1.3 The percentages specified in paragraph 2.2.1.2 above may be reduced to 35% and 30%, respectively, for cargo ships of less than 2,000 gross tonnage where two or more machinery spaces, which are not entirely separate, are considered as forming one space.

2.2.1.4 For the purpose of this paragraph the volume of free carbon dioxide shall be calculated at  $0.56\text{m}^3/\text{kg}$ .

2.2.1.5 For machinery spaces the fixed piping system shall be such that 85% of the gas can be discharged into the space within 2 min.

### 2.2.2 Controls

Carbon dioxide systems shall comply with the following requirements:

- .1 two separate controls shall be provided for releasing carbon dioxide into a protected space and to ensure the activation of the alarm. One control shall be used for opening the valve

of the piping which conveys the gas into the protected space and a second control shall be used to discharge the gas from its storage containers; and

- .2 the two controls shall 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 shall be in a break-glass-type enclosure conspicuously located adjacent to the box.

### **2.3 Requirements of steam systems**

The boiler or boilers available for supplying steam shall have an evaporation of at least 1 kg of steam per hour for each 0.75 m<sup>3</sup> of the gross volume of the largest space so protected. In addition to complying with the foregoing requirements the systems in all respects shall be as determined by, and to the satisfaction of, the Administration.

### **2.4 Systems using gaseous products of fuel combustion**

#### **2.4.1 General**

Where gas other than carbon dioxide or steam, as permitted by paragraph 2.3, is produced on the ship and is used as a fire-extinguishing medium, the system shall comply with the requirements in paragraph 2.4.2.

#### **2.4.2 Requirements of the systems**

##### **2.4.2.1 Gaseous products**

Gas shall be a gaseous product of fuel combustion in which the oxygen content, the carbon monoxide content, the corrosive elements and any solid combustible elements in a gaseous product shall have been reduced to a permissible minimum.

##### **2.4.2.2 Capacity of fire-extinguishing systems**

2.4.2.2.1 Where such gas is used as the fire-extinguishing medium in a fixed fire-extinguishing system for the protection of machinery spaces, it shall afford protection equivalent to that provided by a fixed system using carbon dioxide as the medium.

2.4.2.2.2 Where such gas is used as the fire-extinguishing medium in a fixed fire-extinguishing system for the protection of cargo spaces, a sufficient quantity of such gas shall be available to supply hourly a volume of free gas at least equal to 25 % of the gross volume of the largest space protected in this way for a period of 72 h.

### **2.5 Equivalent fixed gas fire-extinguishing systems for machinery spaces and cargo pump rooms**

Fixed gas fire-extinguishing systems equivalent to those specified in paragraphs 2.2 to 2.4 shall be approved by the Administration based on the guidelines developed by the Organization.<sup>①</sup>

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① Refer to the 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 (MSC/Circ. 848).

## CHAPTER 6 FIXED FOAM FIRE-EXTINGUISHING SYSTEMS

### 1 Application

This chapter details the specifications for fixed foam fire-extinguishing systems as required by chapter II - 2 of the Convention.

### 2 Engineering specifications

#### 2.1 General

Fixed foam fire-extinguishing systems shall be capable of generating foam suitable for extinguishing oil fires.

#### 2.2 Fixed high-expansion foam fire-extinguishing systems

##### 2.2.1 Quantity and performance of foam concentrates

2.2.1.1 The foam concentrates of high-expansion foam fire-extinguishing systems shall be approved by the Administration based on the guideline developed by the Organization.<sup>①</sup>

2.2.1.2 Any required fixed high-expansion foam system in machinery spaces shall 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 m in depth per minute. The quantity of foam-forming liquid available shall 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 shall not exceed 1,000 to 1.

2.2.1.3 The Administration may permit alternative arrangements and discharge rates provided that it is satisfied that equivalent protection is achieved.

##### 2.2.2 Installation requirements

2.2.2.1 Supply ducts for delivering foam, air intakes to the foam generator and the number of foam-producing units shall in the opinion of the Administration be such as will provide effective foam production and distribution.

2.2.2.2 The arrangement of the foam generator delivery ducting shall be such that a fire in the protected space will not affect the foam generating equipment. If the foam generators are located adjacent to the protected space, foam delivery ducts shall be installed to allow at least 450 mm of separation between the generators and the protected space. The foam delivery ducts shall be constructed of steel having a thickness of not less than 5 mm. In addition, stainless steel dampers (single or multi-bladed) with a thickness of not less than 3 mm shall be installed at the openings in the boundary bulkheads or decks between the foam generators and the protected space. The dampers shall be automatically operated (electrically, pneumatically or hydraulically) by means of remote control of the foam generator related to them.

2.2.2.3 The foam generator, its sources of power supply, foam-forming liquid and means of controlling

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<sup>①</sup> Refer to the Guidelines for performance and testing criteria and surveys of high expansion foam concentrates for fire-extinguishing systems (MSC/Circ. 670).

the system shall be readily accessible and simple to operate and shall be grouped in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

### **2.3 Fixed low-expansion foam fire-extinguishing systems**

#### **2.3.1 Quantity and foam concentrates**

2.3.1.1 The foam concentrates of low-expansion foam fire-extinguishing systems shall be approved by the Administration based on the guidelines developed by the Organization. <sup>①</sup>

2.3.1.2 The system shall be capable of discharging through fixed discharge outlets in not more than 5 min a quantity of foam sufficient to cover to a depth of 150 mm the largest single area over which oil fuel is liable to spread. The expansion ratio of the foam shall not exceed 12 to 1.

#### **2.3.2 Installation requirements**

2.3.2.1 Means shall be provided for the effective distribution of the foam through a permanent system of piping and control valves or cocks to suitable discharge outlets, and for the foam to be effectively directed by fixed sprayers on other main fire hazards in the protected space. The means for effective distribution of the foam shall be proven acceptable to the Administration through calculation or by testing.

2.3.2.2 The means of control of any such systems shall be readily accessible and simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

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<sup>①</sup> Refer to the Guidelines for performance and testing criteria and surveys of low expansion foam concentrates for fire-extinguishing systems (MSC/Circ.582 and Corr.1).

**CHAPTER 7**  
**FIXED PRESSURE WATER-SPRAYING**  
**AND WATER-MIST FIRE-EXTINGUISHING SYSTEMS**

**1 Application**

This chapter details the specifications for fixed pressure water-spraying and water-mist fire-extinguishing systems as required by chapter II - 2 of the Convention.

**2 Engineering specifications**

**2.1 Fixed pressure water-spraying fire-extinguishing systems**

**2.1.1 Nozzles and pumps**

2.1.1.1 Any required fixed pressure water-spraying fire-extinguishing system in machinery spaces shall be provided with spraying nozzles of an approved type.

2.1.1.2 The number and arrangement of the nozzles shall be to the satisfaction of the Administration and shall be such as to ensure an effective average distribution of water of at least  $5 \text{ l/m}^2/\text{min}$  in the spaces to be protected. Where increased application rates are considered necessary, these shall be to the satisfaction of the Administration.

2.1.1.3 Precautions shall be taken to prevent the nozzles from becoming clogged by impurities in the water or corrosion of piping, nozzles, valves and pump.

2.1.1.4 The pump shall be capable of simultaneously supplying at the necessary pressure all sections of the system in any one compartment to be protected.

2.1.1.5 The pump may be driven by an independent internal combustion machinery, but, if it is dependent upon power being supplied from the emergency generator fitted in compliance with the provisions of regulation II - 1/42 or regulation II - 1/43 of the Convention, as appropriate, that generator shall be so arranged as to start automatically in case of main power failure so that power for the pump required by paragraph 2.1.1.4 is immediately available. The independent internal combustion machinery for driving the pump shall be so situated that a fire in the protected space or spaces will not affect the air supply to the machinery.

**2.1.2 Installation requirements**

2.1.2.1 Nozzles shall be fitted above bilges, tank tops and other areas over which oil fuel is liable to spread and also above other specific fire hazards in the machinery spaces.

2.1.2.2 The system may be divided into sections, the distribution valves of which shall be operated from easily accessible positions outside the spaces to be protected so as not to be readily cut off by a fire in the protected space.

2.1.2.3 The pump and its controls shall be installed outside the space or spaces to be protected. It shall not be possible for a fire in the space or spaces protected by the water-spraying system to put the system out of action.

**2.1.3 System control requirements**



The system shall be kept charged at the necessary pressure and the pump supplying the water for the system shall be put automatically into action by a pressure drop in the system.

## 2.2 Equivalent water-mist fire-extinguishing systems

Water-mist fire-extinguishing systems for machinery spaces and cargo pump-rooms shall be approved by the Administration based on the guidelines developed by the Organization. <sup>①</sup>

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<sup>①</sup> Refer to the Alternative arrangements for halon fire-extinguishing systems in machinery spaces and pump-rooms (MSC/Circ.668) and the Revised test method for equivalent water-based fire-extinguishing systems for machinery spaces of category A and cargo pump-rooms (MSC/Circ.728).