



Ref. T4/4.03

MSC/Circ.848  
8 June 1998

**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**

- 1 The Maritime Safety Committee, at its sixty-seventh session (2 to 6 December 1996), approved Guidelines for the approval of equivalent fixed gas fire-extinguishing systems, as referred to in SOLAS 74, for machinery spaces and cargo pump-rooms, as MSC/Circ.776.
- 2 The Sub-Committee on Fire Protection, at its forty-second session (8 to 12 December 1997), recognized the need of technical improvement to the Guidelines contained in MSC/Circ.776 to assist in their proper implementation and, to that effect, prepared amendments to the Guidelines.
- 3 The Committee, at its sixty-ninth session (11 to 20 May 1998), approved 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, as set out in the annex, to supersede the Guidelines attached to MSC/Circ.776.
- 4 Member Governments are invited to apply the annexed Guidelines when approving equivalent fixed gas fire-extinguishing systems for use in machinery spaces of category A and cargo pump-rooms.

\*\*\*

**ANNEX****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****General**

1 Fixed gas fire-extinguishing systems for use in machinery spaces of category A and cargo pump-rooms equivalent to fire-extinguishing systems required by SOLAS regulations II-2/7 and II-2/63 should prove that they have the same reliability which has been identified as significant for the performance of fixed gas fire-extinguishing systems approved under the requirements of SOLAS regulation II-2/5. In addition, the system should be shown by test to have the capability of extinguishing a variety of fires that can occur in a ship's engine-room.

**Principal requirements**

2 All requirements of SOLAS regulations II-2/5.1, 5.3.1, 5.3.2 to 5.3.3, except as modified by these guidelines, should apply.

3 The minimum extinguishing concentration should be determined by a cup burner test acceptable to the Administration. The design concentration should be at least 20% above the minimum extinguishing concentration. These concentrations should be verified by full-scale testing described in the test method, as set out in the appendix.

4 For systems using halocarbon clean agents, 95% of the design concentration should be discharged in 10 s or less. For inert gas systems, the discharge time should not exceed 120 s for 85% of the design concentration.

5 The quantity of extinguishing agent for the protected space should be calculated at the minimum expected ambient temperature using the design concentration based on the net volume of the protected space, including the casing.

5.1 The net volume of a protected space is that part of the gross volume of the space which is accessible to the free extinguishing agent gas.

5.2 When calculating the net volume of a protected space, the net volume should include the volume of the bilge, the volume of the casing and the volume of free air contained in air receivers that in the event of a fire is released into the protected space.

5.3 The objects that occupy volume in the protected space should be subtracted from the gross volume of the space. They include, but are not necessarily limited to:

- auxiliary machinery;
- boilers;
- condensers;
- evaporators;
- main engines;
- reduction gears;

- tanks; and
- trunks.

5.4 Subsequent modifications to the protected space that alter the net volume of the space shall require the quantity of extinguishing agent to be adjusted to meet the requirements of this paragraph and paragraph 6.

6 No fire suppression agent should be used which is carcinogenic, mutagenic, or teratogenic at concentrations expected during use. No agent should be used in concentrations greater than the cardiac sensitization NOAEL (No Observed Adverse Effect Level), without the use of controls as provided in SOLAS regulations II-2/5.2.5.1 and 5.2.5.2. In no case should an agent be used above its LOAEL (Lowest Observed Adverse Effects Level) nor ALC (Approximate Lethal Concentration) calculated on the net volume of the protected space at the maximum expected ambient temperature.

7 The system and its components should be suitably designed to withstand ambient temperature changes, vibration, humidity, shock, impact, clogging, and corrosion normally encountered in machinery spaces or cargo pump-rooms in ships.

8 The system and its components should be designed and installed in accordance with international standards acceptable to the Organization<sup>1</sup> and manufactured and tested to the satisfaction of the Administration. As a minimum, the design and installation standards should cover the following elements:

- .1 safety:
  - toxicity;
  - noise, nozzle discharge; and
  - decomposition products;
- .2 storage container design and arrangement:
  - strength requirements;
  - maximum/minimum fill density, operating temperature range;
  - pressure and weight indication;
  - pressure relief; and
  - agent identification and lethal requirements;
- .3 agent supply, quantity, quality standards;
- .4 pipe and fittings:
  - strength, material, properties, fire resistance; and
  - cleaning requirements;

---

<sup>1</sup>Until international standards are developed, national standards acceptable to the Administration should be used. Available national standards include, e.g., Standards of Australia, the United Kingdom and NFPA 2001.

- .5 valves:
  - testing requirements;
  - corrosion resistance; and
  - elastomer compatibility;
- .6 nozzles:
  - height and area testing requirements; and
  - corrosion and elevated temperature resistance;
- .7 actuation and control systems:
  - testing requirements; and
  - backup power requirements;
- .8 alarms and indicators:
  - predischARGE alarm, agent discharge alarms as time delays;
  - abort switches;
  - supervisory circuit requirements; and
  - warning signs and audible and visual alarms should be located outside each entry to the relevant space as appropriate;
- .9 agent flow calculation:
  - approval and testing of design calculation method; and
  - fitting losses and/or equivalent length;
- .10 enclosure integrity and leakage requirements:
  - enclosure leakage;
  - openings; and
  - mechanical ventilation interlocks;
- .11 design concentration requirements, total flooding quantity;
- .12 discharge time; and
- .13 inspection, maintenance, and testing requirements.

9 The nozzle type, maximum nozzle spacing, maximum height and minimum nozzle pressure should be within limits tested to provide fire extinction per the proposed test method.

10 Provisions should be made to ensure that escape routes which are exposed to leakage from the protected space are not rendered hazardous during or after discharge of the agent. Control stations and other locations that require manning during a fire situation should have provisions to keep HF and HCl below 5 ppm at that location. The concentrations of other products should be kept below concentrations considered hazardous for the required duration of exposure.

11 Agent containers may be stored within a protected machinery space if the containers are distributed throughout the space and the provisions of SOLAS regulation II-2/5.3.3 are met. The arrangement of containers and electrical circuits and piping essential for the release of any system should be such that in the event of damage to any one power release line through fire or explosion in the protected space, i.e. a single fault concept, at least five-sixths of the fire-extinguishing charge as required by paragraph 5 of this annex can still be discharged having regard to the requirement for uniform distribution of medium throughout the space. The arrangements in respect of systems for spaces requiring less than 6 containers should be to the satisfaction of the Administration.

12 A minimum agent hold time of 15 min should be provided.

13 The release of an extinguishing agent may produce significant over and under pressurization in the protected space. Measures to limit the induced pressures to acceptable limits should be provided.

14 For all ships, the fire-extinguishing system design manual should address recommended procedures for the control of products of agent decomposition. The performance of fire-extinguishing arrangements on passenger ships should not present health hazards from decomposed extinguishing agents, e.g., on passenger ships, the decomposition products should not be discharged in the vicinity of muster (assembly) stations.