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**AMENDMENTS TO 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)**

1 The Committee, at its eighty-fourth session (7 to 16 May 2008), approved amendments to the Revised Guidelines for approval of equivalent fixed gas fire-extinguishing systems, as referred to in SOLAS 74, for machinery spaces and cargo pump-rooms (MSC/Circ.848), set out in the annex.

2 Member Governments are invited to apply the amendments to the Revised Guidelines when approving equivalent fixed gas fire-extinguishing systems, as referred to in SOLAS 74, for machinery spaces and cargo pump-rooms and bring them to the attention of ship designers, ship owners, equipment manufacturers, test laboratories and other parties concerned.

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## ANNEX

**AMENDMENTS 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)**

1 In paragraph 1, the references “SOLAS regulation II-2/7 and II-2/63” are replaced by the references “SOLAS regulation II-2/10.4 and II-2/10.9” and the reference “SOLAS regulation II-2/5” is replaced by the reference “the FSS Code, chapter 5”.

2 In paragraph 2, the references “SOLAS regulation II-2/5.1, 5.3.1, 5.3.2 to 5.3.3” are replaced by the reference “the FSS Code, chapter 5, regulation 2.1”.

3 In paragraph 3, the percentage of the design concentration “20%” is replaced by the percentage of the design concentration “30%”.

4 The existing paragraph 6 is replaced by the following:

“6 All systems should be designed to allow evacuation of the protected spaces prior to discharge. Means should also be provided for automatically giving audible and visual warning of the release of fire-extinguishing medium into any space in which personnel normally work or to which they have access. The alarm should operate for the period of time necessary to evacuate the space, but not less than 20 s before the medium is released. Unnecessary exposure, even at concentrations below an adverse effect level, should be avoided.

6.1 Even at concentrations below an adverse effect level, exposure to gaseous fire extinguishing agents should not exceed 5 min. Halocarbon agents may be used up to the No Observed Adverse Effect Level (NOAEL) calculated on the net volume of the protected space at the maximum expected ambient temperature without additional safety measures. If a halocarbon agent is to be used above its NOAEL, means should be provided to limit exposure to no longer than the time specified according to a scientifically accepted physiologically based pharmacokinetic\* (PBPK) model or its equivalent which clearly establishes safe exposure limits both in terms of extinguishing media concentration and human exposure time.

6.2 For inert gas systems, means should be provided to limit exposure to no longer than 5 min for inert gas systems designed to concentrations below 43% (corresponding to an oxygen concentration of 12%, sea level equivalent of oxygen) or to limit exposure to no longer than 3 min for inert gas systems designed to concentrations between 43% and 52% (corresponding to between 12% and 10% oxygen, sea level equivalent of oxygen) calculated on the net volume of the protected space at the maximum expected ambient temperature.

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\* Refer to document FP 44/INF.2 – Physiologically based pharmacokinetic model to establish safe exposure criteria for halocarbon fire extinguishing agents.

6.3 In no case should a halocarbon agent be used at concentrations above the Lowest Observed Adverse Effect Level (LOAEL) nor the Approximate Lethal Concentration (ALC) nor should an inert gas be used at gas concentrations above 52% calculated on the net volume of the protected space at the maximum expected ambient temperature.”

5 The existing paragraphs 10 and 11 are replaced by the following:

“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 in the event of a fire. In particular, hydrogen fluoride (HF) vapour can be produced in fires as a breakdown product of the fluorocarbon fire extinguishing agents and cause health effects such as upper respiratory tract and eye irritation to the point of impairing escape. 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 Where agent containers are stored within a protected space, the containers should be evenly distributed throughout the space and meet the following provisions:

- .1 a manually initiated power release, located outside the protected space, should be provided. Duplicate sources of power should be provided for this release and should be located outside the protected space, and be immediately available;
- .2 electric power circuits connecting the containers should be monitored for fault conditions and loss of power. Visual and audible alarms should be provided to indicate this;
- .3 pneumatic, electric or hydraulic power circuits connecting the containers should be duplicated and widely separated. The sources of pneumatic or hydraulic pressure should be monitored for loss of pressure. Visual and audible alarms should be provided to indicate this;
- .4 within the protected space, electrical circuits essential for the release of the system should be fire resistant according to standard IEC 60331 or other equivalent standards. Piping systems essential for the release of systems designed to be operated hydraulically or pneumatically should be of steel or other equivalent heat-resisting material to the satisfaction of the Administration;
- .5 each pressure container should be fitted with an automatic overpressure release device which, in the event of the container being exposed to the effects of fire and the system not being operated, will safely vent the contents of the container into the protected space;
- .6 the arrangement of containers and the 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 or container valve through mechanical damage,

fire or explosion in a protected space, i.e. a single fault concept, at least the amount of agent needed to achieve the minimum extinguishing concentration can still be discharged having regard to the requirement for uniform distribution of medium throughout the space; and

- .7 the containers should be monitored for decrease in pressure due to leakage and discharge. Visual and audible alarms in the protected area and on the navigation bridge or in the space where the fire control equipment is centralized should be provided to indicate this condition.”

- 6 The existing paragraph 14 is replaced by the following:

“14 For all ships, the fire-extinguishing system design manual should address recommended procedures for the control of products of agent decomposition, including HF vapour generated from fluorocarbon extinguishing agents which could impair escape. Clearly, longer exposure of the agent to high temperatures would produce greater concentrations of these types of gases. The type and sensitivity of detection, coupled with the rate of discharge, should be selected to minimize the exposure time of the agent to the elevated temperature. The performance of fire-extinguishing arrangements on passenger ships should not present health hazards from decomposed extinguishing agents, for example on passenger ships, the decomposition products should not be discharged in the vicinity of muster (assembly) stations. Other mitigating steps include evacuation, and donning masks.”

- 7 In the appendix, section 3 (Method of test), paragraph 3.4.2.2, the percentage of the manufacturer’s recommended design concentration “83%” is replaced by the percentage of the manufacturer’s recommended design concentration “77%”.

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