INTERNATIONAL MARITIME ORGANIZATION

IMO

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SUB-COMMITTEE ON FIRE PROTECTION
49th session
Agenda item 17

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REPORT TO THE MARITIME SAFETY COMMITTEE

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LIST OF ANNEXES

1 GENERAL

1.1 The Sub-Committee held its forty-ninth session from 24 to 28 January 2005 under the chairmanship of Mr. J.C. Cubisino (Argentina). The Vice-Chairman, Mr. C. Abbate (Italy), was also present.

1.2 The session was attended by delegations from the following Member Governments:

ALGERIA
ARGENTINA
AUSTRALIA
BAHAMAS
BELGIUM
BRAZIL
CANADA
CHILE
CHINA
COLOMBIA
CROATIA
CUBA
CYPRUS
DEMOCRATIC REPUBLIC OF THE CONGO
DENMARK
ECUADOR
EGYPT
FINLAND
FRANCE
GERMANY
GREECE
ICELAND
INDONESIA
IRAN (ISLAMIC REPUBLIC OF)
ITALY
JAPAN
LATVIA
LIBERIA
MARSHALL ISLANDS
MEXICO
MOROCCO
NETHERLANDS
NIGERIA
NORWAY
PANAMA
PERU
PHILIPPINES
POLAND
REPUBLIC OF KOREA
ROMANIA
RUSSIAN FEDERATION
SAUDI ARABIA
SINGAPORE
SPAIN
SWEDEN
TURKEY
TUVALU
UKRAINE
UNITED KINGDOM
UNITED STATES
URUGUAY
VENEZUELA

and by the following Associate Member of IMO:

HONG KONG, CHINA

1.3 The session was also attended by representatives from the following United Nations specialized agency:

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)

1.4 The session was also attended by observers from the following non-governmental organizations:

INTERNATIONAL CHAMBER OF SHIPPING (ICS)
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)
INTERNATIONAL CONFEDERATION OF FREE TRADE UNIONS (ICFTU)
INTERNATIONAL RADIO MARITIME COMMITTEE (CIRM)

INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)
INTERNATIONAL FEDERATION OF SHIPMASTERS' ASSOCIATION (IFSMA)
INTERNATIONAL ASSOCIATION OF INDEPENDENT TANKER OWNERS (INTERTANKO)
INTERNATIONAL COUNCIL OF CRUISE LINES (ICCL)
INTERNATIONAL ASSOCIATION OF DRY CARGO SHIPOWNERS (INTERCARGO)
THE INSTITUTE OF MARINE ENGINEERING, SCIENCE AND TECHNOLOGY (IMarEST)

Secretary-General's opening address

1.5 In welcoming the participants, the Secretary-General referred to the image of shipping and expressed the view that the contribution shipping made to the global economy and the community as a whole was being overlooked, even though shipping was largely safe, secure, efficient and environmentally friendly. He called on all who cared about shipping to work together to reverse this wrong perception and to endorse the theme for this year's World Maritime Day 2005: "**International Shipping – Carrier of World Trade**", which had been chosen to highlight the role of shipping today and the progress that had been made by shipping in terms of safety and the environment.

Referring to the approval by MSC 78 of the Unified interpretations of SOLAS chapter II-2, the Fire Safety System Code, the Fire Test Procedure Code and related fire test procedures and the adoption of proposed amendments to that Code, the Secretary-General considered these to be important achievements in IMO's endeavours to provide up-to-date fire safety standards for both passenger and cargo ships and provide useful advice to ship owners, operators and designers.

Recalling that, in the context of its work on passenger ship safety, the MSC had approved casualty threshold criteria for return to port, including a time to remain habitable for evacuation and a time to recover, the Secretary-General emphasized that these criteria were of key importance as they will guide the Sub-Committee and the other IMO bodies involved in this work to develop, from their own perspective, relevant requirements for passenger ships to enable them to maintain their essential systems and return safely to a port. He highlighted that the Organization's decision to ensure that the safety standards applicable to passenger ships adequately served their purpose which had been widely supported and he recognized that the sub-committees' contributions to the Committee's work in this area was of the utmost importance. He, therefore, urged the Sub-Committee to work hard to provide the Committee with its expert advice on these vital aspects of the issue that fall within its competence, to enable the Committee to complete its consideration of this issue in a timely manner.

Referring to the Sub-Committee's work on the comprehensive review of the performance testing and approval standards for fire safety systems, the Secretary-General emphasized that the completion of this work was essential to ensure the smooth implementation of the revised SOLAS chapter II-2 and expressed the hope that the Sub-Committee would complete the short-term tasks identified on this subject at this session.

In his concluding remarks, referring to the tsunami disaster in south Asia, the Secretary-General recalled that, from the outset, IMO had joined the rest of the world in expressing the shock and sadness at those dreadful events and he took the opportunity, once again, to convey the Organization's deepest compassion to all those caught up in this tragedy. The Secretary-General

informed the Sub-Committee that a Tsunami Maritime Relief Fund, through which the financial contributions of the Organization and the shipping industry as a whole could be channelled to the UN relief and reconstruction effort, had been established and that, as of 24 January 2005, £22,089.42 had been collected, for which he thanked the donors, including the staff and interpreters, for their generosity.

The Secretary-General also informed the Sub-Committee that, subsequent to the above activities, IMO had developed a joint plan for future actions to be undertaken together with the International Association of Marine Aids to Navigation and Lighthouse Authorities and the International Hydrographic Organization, focusing on the integrity of the maritime navigational infrastructure to ensure the safe navigation of ships, including those carrying urgently needed relief supplies. He also noted that IMO had agreed to a request from the United Nations Environment Programme to send two IMO experts to help set up an environmental crisis centre in Indonesia – and that IMO stood ready to play a role in the development of an early tsunami warning system in the Indian Ocean, similar to that which exists for the Pacific Ocean.

Chairman's remark

1.6 In responding, the Chairman thanked the Secretary-General for his words and advice and stated that the Secretary-General's advice and requests would be given every consideration in the deliberation of the Sub-Committee and its working groups.

Adoption of the agenda

1.7 The Sub-Committee adopted the agenda (FP 49/1) and agreed, in general, to be guided in its work by the annotations contained in document FP 49/1/1. The agenda, as adopted, with the list of documents considered under each agenda item, is set out in document FP 49/INF.11.

2 DECISIONS OF OTHER IMO BODIES

2.1 The Sub-Committee noted the decisions and comments pertaining to its work made by STW 35, COMSAR 8, DE 47, FSI 12, MEPC 51, MSC 78, C 92, NAV 50, SLF 47, DSC 9, MEPC 52, C 93 and MSC 79, as reported in documents FP 49/2 and FP 49/2/1, and the outcome of STW 36 as orally presented by the Secretariat, and took them into account in its deliberations when dealing with relevant agenda items.

Method of work related to new work programme items

2.2 As reported in paragraph 5 of document FP 49/2, the Sub-Committee noted that MSC 78 had agreed that a decision to include a new item in a sub-committee's work programme did not mean that the Committee had agreed with the technical aspects of the proposal. Therefore, if the Committee decided to include the item in the sub-committee's work programme, detailed consideration of the technical aspects of the proposal and the development of appropriate requirements and recommendations would be left to the sub-committee concerned.

Trial reporting systems

2.3 With respect to the new reporting system, the Sub-Committee noted that MSC 79, taking into account the views of MEPC 52 and their endorsement by C 93, had decided to halt the trial of the new reporting procedure and re-establish the previous reporting procedure with immediate effect.

Outcome of C 92

2.4 The Sub-Committee noted that C 92 had:

.1 approved Guidelines for media access to meetings of Committees and their subsidiary bodies;

.2 instructed IMO bodies to follow the above Guidelines when applying their Rules of Procedure on requests from the news media to attend their meetings;

.3 noted that an accreditation system would be established to allow automatic access to IMO meetings to representatives of the specialist maritime media; and requested the Secretary-General, when proceeding with the establishment of such a system, to take into account similar systems applying elsewhere (e.g., in the United Nations);

.4 decided that the distribution of hard copies of meeting documents to IMO Member States be limited to one copy per delegation, as from 1 July 2004, subject to some flexibility in recognition of the fact that some Member States may have difficulties in accessing the documents on the IMODOCS website; and

.5 decided that non-governmental organizations would not receive meeting documents in hard copy as from 1 July 2004.

3 PASSENGER SHIP SAFETY

General

3.1 The Sub-Committee recalled that, at FP 48, it had agreed to develop functional requirements, fire scenarios and performance standards based on the definition of "safe area", taking into account the outcome of MSC 78, and, having re-established the Correspondence Group on Large Passenger Ship Safety with the terms of reference set out in paragraph 4.4.8 of document FP 48/19, had instructed it to submit a report to FP 49.

3.2 The Sub-Committee noted that MSC 78 (FP 49/3), in considering the outcome of the Working Group on Large Passenger Ship Safety (MSC 78/WP.14), had, *inter alia*, agreed:

.1 to casualty thresholds for fire and flooding to stipulate the amount of damage a ship must be able to withstand and still safely return to port under its own power;

.2 that, if a casualty threshold is exceeded, a ship should remain habitable for a minimum time of 3 hours to allow for safe and orderly abandonment;

.3 that casualty thresholds and timeframes should be used to develop relevant standards for passenger ships to maintain their essential systems and return to port;

.4 to a revised definition of the term "safe area(s)" referred to in paragraph 15 of document FP 49/3; and

.5 endorsed the decision of FP 48 to develop functional requirements, fire scenarios and performance standards in support of the "safe area" concept, taking into account that the functional requirements would include guidance on the term "basic services".

3.3 The Sub-Committee noted that MSC 79 (FP 49/3/1), having agreed to delete the word "large" from the title of this work programme item, bearing in mind that a "one size fits all approach" should be avoided since each area of safety (i.e., fire, machinery, stability, lifesaving, search and rescue, etc.) has different concerns, had agreed to the revised guiding philosophy, strategic goals and work plan, as set in annexes 1 and 2, respectively, to document FP 49/3/2, and extended the target completion date for this item to 2006.

Report of the correspondence group

3.4 Having considered the report of the Correspondence Group on Large Passenger Ship Safety (FP 49/3/1), the Sub-Committee approved it in general, and took action as indicated hereunder.

3.5 The Sub-Committee, in considering the fire thresholds and timeframes approved at MSC 78, agreed that the working group should not prepare any new fire scenarios or timeframes, but instead focus its efforts on the development of functional requirements and performance standards in support of the "safe area" concept and the maintaining of essential systems and services.

3.6 Having considered the concern expressed by the delegation of Italy that several of the fire prevention-related tasks prepared at FP 48 were eliminated by MSC 78, the Sub-Committee agreed to instruct the working group to look into the matter with a view to preparing recommendations for MSC 80, bearing in mind that the tasks prepared by FP 48 (FP 48/19, annex 3) may still be considered in the course of the Sub-Committee's deliberations, as stated in the revised work plan approved at MSC 79 (MSC 79/WP.13).

Establishment of the working group

3.7 Recognizing the necessity to make progress on this item and recalling its relevant decision at FP 48, the Sub-Committee established the Working Group on Passenger Ship Safety and, taking into account the comments made and decisions taken in plenary, instructed it to:

.1 develop functional requirements and performance standards in support of the "safe area" concept, taking into account the definition for the term "safe area(s)", the casualty scenarios approved at MSC 78 and documents FP 49/3, FP 49/3/1 and FP 49/3/2;

.2 develop requirements and performance standards to maintain essential systems and services based on the fire casualty threshold and timeframes approved at MSC 78 , taking into account documents FP 49/3, FP 49/3/1 and FP 49/3/2;

.3 develop quick response strategies for fire-fighting, taking into account equipment such as locally audible alarms and addressable detectors, fire-fighting training and industry best practices, such as fast response capabilities;

.4 develop requirements applicable to on-board safety centres, based on the annex to document MSC 77/4/1, with a view to determining which systems should be controlled and monitored from such centres and/or the bridge;

.5 consider the tasks assigned by MSC 79 on matters related to escape, muster and evacuation issues (FP 49/3/2, annex 2, objective 3) and make recommendations as appropriate;

.6 further consider issues related to the development of the performance-based standards for evacuation systems, taking into account annex 6 to document FP 49/3/1 and make recommendations, as appropriate;

.7 consider whether any new tasks should be established for fire prevention issues, taking into account annexes 3 and 4 to document FP 48/WP.7/Rev.1, and provide recommendations as appropriate; and

.8 consider whether it is necessary to re-establish the correspondence group and, if so, prepare the draft terms of reference for the group, for consideration by the Sub-Committee.

Report of the working group

3.8 Having received the report of the working group (FP 49/WP.1), the Sub-Committee approved it in general and took action as outlined hereunder.

Functional requirements in support of safe area concept

3.9 The Sub-Committee, in considering the draft consolidated list of functional requirements contained in document FP 49/3/1, agreed that the functional requirement relating to size and location of a safe area should be as follows:

"The safe area should generally be an internal space, however, the use of an external space as a safe area may be allowed by an Administration taking into account any restriction to the area of operation and relevant expected environmental conditions."

3.10 The Sub-Committee agreed to the following functional requirement for possible inclusion in SOLAS chapter II-2:

"The safe area(s) should provide all occupants with the following basic services to ensure that the health of the passengers and crew is maintained:

.1 sanitation;

.2 water;

.3 food;

.4 alternate space for medical care;

.5 shelter from the weather in case of a safe area utilizing an open deck;

.6 means preventing heat stress and hypothermia;

.7 light;

.8 ventilation;

.9 internal communications, such as a public address systems, internal phones, radiocommunications and battery powered voice amplifiers; and

.10 adequate rest facilities."

3.11 The Sub-Committee recognized that subitems related to sanitation, water, food and light did not fall within its remit and instructed the Secretariat to inform the COMSAR, NAV, DE, SLF and STW Sub-Committees accordingly for further consideration and action as appropriate.

3.12 The Sub-Committee agreed that the Committee should be informed that some performance standards on these systems can be found in the SPHERE project, launched in 1997 by a group of humanitarian NGOs, the Red Cross and the Red Crescent movement (www.sphereproject.org).

3.13 Having agreed that the requirement specifying that the safe area(s) should keep the occupants safe from hazard was too vague, the Sub-Committee agreed to the following text:

"The amount of smoke and hot gases reaching the safe area should be limited through the use of ventilation design, smoke barriers, etc.".

3.14 With regard to a damaged ship's return to port, the Sub-Committee decided that this performance requirement should not be included as it did not fall within its remit.

3.15 In the event of abandoning a ship, the availability of, and access to, all possible means of escape should be ensured and the Sub-Committee decided to replace the existing functional requirement by the following:

"Adequate means of egress/escape to life-saving appliances should be provided from each area identified or used as a safe area, taking into account that a main vertical zone may not be available for internal transit."

Performance standards in support of safe area concept

3.16 The Sub-Committee considered the draft consolidated list of performance standards contained in document FP 49/3/1 and decided to delete the text in paragraphs 9.2 and 9.3 of document FP 49/3/1 in square brackets, relating to the allocation of space for displaced passengers and crew members in the safe area(s) and quantities and composition of smoke in safe areas, since it was covered by the functional requirements and the definition of "safe area".

3.17 With regard to the medical care that should be available for supporting the safe area concept, the Sub-Committee agreed that in the event of the primary medical centre being involved in the fire scenario, the alternative space for medical care should provide basic services rather than having a second infirmary or an additional set of medical spaces and agreed on the following text:

"Alternate space for medical care should conform to a standard acceptable to the Administration or published by an internationally recognized organization.[*]"

3.18 The 3-hour timeframe for the time to remain habitable may be reduced by the Administration, on the basis of the total abandon ship time, which is made up of the travelling time resulting from an appropriate evacuation analysis and the time required for the operation of the life-saving appliances (launching of embarkations).

3.19 The Sub-Committee agreed that the following systems should remain operational during the 3-hour timeframe:

.1 fire main;

.2 ventilation system in assembly stations;

.3 internal communications; and

.4 emergency lighting.

3.20 Noting that there were apparent discrepancies between MSC 78/WP.14 (annex 1) and MSC 79/WP.13 (paragraph 30) in the starting point for calculating the 3-hour timeframe, the Sub-Committee decided to refer this matter, which affects the future required performance of several systems, to the Committee for clarification. In particular, the Sub-Committee invited MSC 80 to clarify the starting point for the 3-hour time to remain habitable.

3.21 On the basis of the above decisions, the Sub-Committee endorsed the possible draft amendments to SOLAS chapter II-2, as set out in document FP 49/WP.1, and took into account that these matters would be finalized at FP 50.

Functional requirements to maintain essential systems and services based on the fire casualty threshold and habitability timeframe

3.22 In relation to the functional requirements and performance standards supporting the return to port concept, the Sub-Committee decided that, when applying the fire scenario indicated in document MSC 78/WP.14, paragraph 16, the following systems should remain operational in the remaining part of the ship not affected by fire:

.1 propulsion;

.2 steering gear;

.3 source of electrical power;

.4 fixed fire-extinguishing systems;

.5 systems intended to support the "safe area" concept;

.6 minimum navigation equipment;

[*] Refer, e.g., to the Guidance on the establishment of medical and sanitation related programmes for passenger ships (MSC/Circ.1129) and the Guidelines of the American College of Emergency Physicians, the United States Centres for Disease Control and Prevention, etc.

.7 communication (internal and external);

.8 fire detection; and

.9 bilge system.

3.23 Since most of the above matters did not fall within the Sub-Committee's remit, the Sub-Committee decided that these issues, along with issues identified under paragraph 3.19, should be referred to the appropriate sub-committees for consideration and instructed the Secretariat to inform the COMSAR, DE and NAV Sub-Committees accordingly.

Performance standards to maintain essential systems and services based on the fire casualty threshold and habitability timeframe

3.24 The Sub-Committee agreed with the group's recommendations that:

.1 there should be no reduction in the required performances of the systems required to support the safe area concept;

.2 the fixed fire-fighting system protecting machinery spaces of category A, cargo spaces, ro-ro spaces, and special category spaces should be designed in such a way that they provide the same level of protection to those spaces not affected by fire. For machinery spaces of category A, this is considered as achieved by the combination of the fixed fire-extinguishing system and the local application fire-extinguishing system; and

.3 fixed fire-fighting systems: sprinkler and equivalent systems should be designed in such a way that the part of the system protecting the main vertical zones not affected by fire will be able to maintain the same performance level.

3.25 As a result of the discussions outlined above, the Sub-Committee endorsed the possible draft amendments to the SOLAS chapter II-2, as set out in document FP 49/WP.1, annex 1, and took into account that these matters would be finalized at FP 50.

Quick response strategies for fire-fighting

Locally audible alarms and addressable detectors

3.26 Having noted the discussion within the group on these issues, as reflected in paragraphs 36 to 40 of document FP 49/WP.1, the Sub-Committee endorsed the possible draft amendments to SOLAS regulation II-2/7 and chapter 9 of the FSS Code, as set out in document FP 49/WP.1, annex 1, regarding locally audible alarms and addressable detectors in relation to quick response strategies for fire-fighting and took into account that these matters will be finalized at FP 50.

Fire-fighting training

3.27 The Sub-Committee, having agreed that a refresher fire-fighting course should be a mandatory requirement within the provisions of the STCW Code, invited STW 37 to consider the above recommendation and take action as deemed appropriate.

3.28 The Sub-Committee agreed to reconsider document MSC 73/4/1 (ICCL), which had called for a broader review of training requirements, in light of the revision of the title of this agenda item, the introduction of the requirements of the safe area concept and the consideration of a fast response strategy, and to take action, if deemed appropriate, at FP 50.

On-board safety centres

3.29 The Sub-Committee noted that the following systems are already required to be controlled and/or monitored from the navigation bridge and/or from a continuously manned control station:

.1 power ventilation system;

.2 fire doors;

.3 machinery spaces fire doors;

.4 general emergency alarm system;

.5 public address system;

.6 evacuation guidance systems;

.7 watertight and semi-watertight doors;

.8 indicators for shell doors, loading doors and other closing appliances;

.9 water leakage of inner outer bow doors, stern doors and any other shell door;

.10 television surveillance system;

.11 fire detection alarm system;

.12 fixed local application system;

.13 sprinkler system;

.14 water based systems for machinery spaces and pump-rooms;

.15 equivalent sprinkler systems; and

.16 alarm to summon the crew.

3.30 The Sub-Committee also noted that the following systems may be controlled and/or monitored (as appropriate) from the safety centre:

.1 ventilation system for closed vehicle spaces, closed ro-ro spaces and special category spaces;

.2 fire dampers, where a centralized control is foreseen;

.3 activation of fixed fire extinguishing systems in general;

.4 engine room ventilation fans;

.5 bilge system;

.6 doors to restricted areas (ISPS Code); and

.7 atrium smoke extractor systems.

3.31 The Sub-Committee further noted that other safety-related issues were required to be controlled from outside the served spaces:

.1 opening and closure of skylights, closure of openings in funnels which normally allow exhaust ventilation and closure of ventilator dampers;

.2 forced and induced draught fans, oil fuel transfer pumps, oil fuel units pumps, lubricating oil service pumps, thermal oil circulating pumps and oil separators;

.3 means of control for permitting the release of smoke in machinery spaces.

3.32 Having agreed that some of the above systems (e.g. watertight doors) fall under the remit of other appropriate IMO bodies, the Sub-Committee decided that the systems listed above, along with the possible draft amendments to SOLAS chapter II-2 and chapter 9 of the FSS Code, as set out in annex 1 of document FP 49/WP.1, should be conveyed to other bodies for consideration as appropriate.

Matters related to escape, muster and evacuation issues

3.33 In view of the fact that it had established an intersessional correspondence group to review the Interim Guidelines for a simplified evacuation analysis for new and existing passenger ships (MSC/Circ.1033), the Sub-Committee agreed that the outcome of the group's discussions should be forwarded to the newly established correspondence group for its further guidance.

3.34 The ICFTU observer, in noting the decisions taken on matters related to the revision of MSC/Circ.1033, stated that the Interim Guidelines only provide benchmarks for evacuation time and that there was a need to determine realistic criteria on such issues and that the evacuation times from other IMO instruments should be addressed. The Sub-Committee agreed that the correspondence group established under agenda item 10 should take the above view into account in the course of its work (see paragraph 10.3.2).

3.35 The Sub-Committee agreed that the guidelines for abandonment of ship alongside port should be addressed in the context of the ISM Code, specifically the Safety Management System for the ship, and invited MSC 80 to consider this matter when revising the work plan (MSC 79/WP.13, annex 4).

New tasks to be established for fire prevention issues

3.36 The Sub-Committee agreed to the modifications to its work plan on passenger ship safety, as set out in annex 1, for consideration at MSC 80.

Re-establishment of the Correspondence Group

3.37 As recommended by the group, the Sub-Committee agreed to re-establish the Correspondence Group on Passenger Ship Safety, under the co-ordination of Germany*, with the following terms of reference:

.1 to review the possible draft amendments to SOLAS chapter II-2 and the FSS Code relevant to the "on-board safety centres" with the view of ensuring the proper inclusion of this new concept (FP 49/WP.1, paragraphs 45 to 53 and annex 1) in the whole body of chapter II-2 and make recommendations as appropriate;

.2 to review the possible draft amendments to SOLAS chapter II-2 and the FSS Code, set out in annex 1 to document FP 49/WP.1, and make recommendations as appropriate;

.3 to review the list of new tasks relevant to the prevention of fire (FP 49/WP.1, paragraph 61 and annex 2) and make recommendations as appropriate; and

.4 to submit a report to FP 50.

4 PERFORMANCE TESTING AND APPROVAL STANDARDS FOR FIRE SAFETY

4.1 The Sub-Committee recalled that FP 48 had agreed, in principle, to proposed amendments to MSC/Circ.668/728, MSC/Circ.913 and MSC/Circ.848 aimed at harmonizing the various fire testing and approval standards adopted by the Organization and had invited Members to submit to FP 49 their views on prohibiting carbon dioxide systems in occupied spaces.

4.2 The Sub-Committee also recalled that FP 48 had established a Correspondence Group on Performance Testing and Approval Standards for Fire Safety Systems and approved terms of reference, as set out in paragraph 5.5 of document FP 48/19, and instructed the group to submit a report to FP 49.

4.3 The Sub-Committee had for its consideration under this agenda item documents submitted by Japan (FP 49/4/2, FP 49/13 and FP 49/INF.9), the Republic of Korea (FP 49/4/3 and FP 49/4/4), the Russian Federation (FP 49/4/5), Sweden (FP 49/4/1) and the United States (FP 49/4 and FP 49/INF.5).

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Report of the correspondence group

4.4 The Sub-Committee considered the report of the Correspondence Group on Performance Testing and Approval Standards for Fire Safety Systems (FP 49/4) and, having approved it in general, agreed:

.1 that the *ad hoc* working group should give priority to the further development of a revised fire test protocol for large engine-rooms;

.2 that the working group should further consider whether the functional objectives for all engine-room fire-extinguishing systems should be harmonized in regard to the need for redundant water supply pumps or quantities of extinguishing agent to provide an equivalent level of reliability;

.3 that paragraph 2.1.2 of the FSS Code contained a typographical error, having noted that the correct wording for this paragraph should be "Sprinkler systems equivalent to those specified in paragraphs 2.2 to 2.5.", and invited MSC 80 to instruct the Secretariat to issue a note verbale of rectification;

.4 after having made several modifications (FP 49/WP.6), to the draft amendment to SOLAS regulation II-2/9.4.1.3.3, as set out in annex 2, for submission to MSC 80 for approval and subsequent adoption; and

.5 to instruct the working group to further consider the proposed amendments set out in annexes 1 to 6 to document FP 49/4.

Fixed water-based fire-extinguishing systems for machinery spaces and pump-rooms

4.5 The Sub-Committee considered document FP 49/4/1 (Sweden) proposing revised fire test procedures for classes 1 and 2 machinery spaces, as defined in MSC/Circ.668/728, and agreed that the working group should further consider the above document in detail within the context of its deliberation on fixed water-based fire-extinguishing systems for machinery spaces and pump-rooms.

Fixed water-based local application water-based fire-extinguishing systems for category A machinery spaces

4.6 The Sub-Committee considered document FP 49/4/5 (Russian Federation) containing comments on document FP 49/4/1 (Sweden) and proposing modifications to the FSS Code and MSC/Circ.913, and agreed that the working group should further consider the matter in detail within the context of its deliberations on fixed water-based local application water-based fire-extinguishing systems for category A machinery spaces.

4.7 Having noted that IACS Unified Interpretation 176, as contained in annex 3 to document FP 49/13/1, also deals with the technical provisions of MSC/Circ.913, the Sub-Committee agreed to forward the aforementioned IACS unified interpretation to the working group for consideration with a view to advising the Sub-Committee on whether MSC/Circ.913 should be revised or a separate interpretations should be issued.

Fixed high-expansion foam fire-extinguishing systems

4.8 The Sub-Committee considered documents FP 49/4/2 and FP 49/INF.4 (Japan) proposing draft Guidelines for the approval of fixed high-expansion foam fire-extinguishing systems providing foam generators inside the protected space, and FP 49/4/4 (Republic of Korea) containing comments on document FP 49/4/2, and agreed that the working group should further consider the above documents in details within the context of its deliberation on fixed water-based fire-extinguishing systems for machinery spaces and pump-rooms.

Fixed gas fire-extinguishing systems

4.9 The Sub-Committee considered documents FP 49/4/3 (Republic of Korea) proposing an amendment to chapter 5 of the FSS Code with regard to the extinguishing capability of carbon dioxide fire-extinguishing system, and FP 49/INF.5 (United States) providing information on recent activities in the United States concerning the personnel safety risks of carbon dioxide total flooding systems, and agreed that the working group should further consider the above documents in details within the context of its deliberation on fixed gas fire-extinguishing systems.

Establishment of the working group

4.10 Recalling its relevant decision at FP 48 regarding a working group, the Sub-Committee, recognizing the necessity to make progress on this item, established the Working Group on Performance Testing and Approval Standards and, taking into account the comments made and decisions taken in plenary, instructed it to:

.1 as a high priority, finalize the revised fire test protocol for machinery space water-based fire extinguishing systems, taking into account documents FP 49/4 (annex 1) and FP 49/4/1, and make recommendations as appropriate;

.2 further consider matters related to fixed gas and aerosol fire-extinguishing systems, taking into account documents FP 49/4 (annexes 3, 4 and 5), FP 49/4/3 and FP 49/INF.5, and make recommendations as appropriate;

.3 further consider matters related to water-mist fire-extinguishing systems for accommodation, service and control spaces, taking into account document FP 49/4 (annex 6);

.4 as a low priority, consider matters related to fixed high-expansion foam systems, taking into account documents FP 49/4/2, FP 49/4/4 and FP 49/INF.4, and make recommendations as appropriate;

.5 consider whether it is necessary to include in the revised MSC/Circ.913 (FP 48/WP.4, annex 2) the proposed modifications and interpretations, as contained in documents FP 49/4/5 and FP 49/13/1 (annex 3), respectively, and make recommendations as appropriate;

.6 review the Preliminary plan for the harmonization of performance testing and approval standards for fire safety systems, as contained in annex 2 to document FP 47/WP.9, taking into account the progress made to date, and prepare a revised action plan identifying the priorities, timeframes and objectives for each task; and

.7 consider whether there is a need to re-establish the correspondence group and, if so, prepare the draft terms of reference for the group, for consideration by the Sub-Committee.

Report of the working group

4.11 Having received the report of the working group (FP 49/WP.2), the Sub-Committee approved it in general and took action as outlined hereunder.

Revised fire test protocol for machinery space water-based fire-extinguishing systems (MSC/Circ.668/728)

4.12 In considering the improvements to the test protocol for water-mist systems for the protection of machinery spaces of category A and cargo pump-rooms, the Sub-Committee noted that the group used as basis of its discussion the proposed amendments to MSC/Circ.668/728, as contained in annex 1 to document FP 49/4, and also took into account a proposal for a new test method put forward by Sweden in document FP 49/4/1.

4.13 After extensive discussion, the Sub-Committee could not agree on the technical criteria that should be included for a zoned type system, mainly for the reason that more tests and experience were needed in this regard. As a practical measure for the time being, the Sub-Committee agreed to combine the fire test elements of existing MSC/Circ.668/728 with the thermal management tests proposed in document FP 49/4/1 (Sweden), and to delete all references to the categorization of three classes of engine-rooms. In this connection, due to the high importance of this matter and noting that the amended test protocol was much expected by the maritime industry, the Sub-Committee, notwithstanding the relevant decision taken at FP 47 (*i.e.* a single MSC resolution to be issued for all performance testing and approved standards), agreed to the draft MSC circular on the revised guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms, set out in annex 3, for submission to MSC 80 for approval.

4.14 Regarding the actual size of the engine-room space that could be ultimately protected by the water-mist system, as contained in annex 3, the Sub-Committee agreed that, while normally such spaces should not be larger than that having passed the test in accordance with the proposed new test protocol, the former could be extrapolated from (*i.e.* larger than) the tested volume based on scientific methods on scaling from the maximum tested volume to a larger shipboard protected volume, which could be developed by the Organization. Member Governments were invited to submit information in this respect, to facilitate the development of such scientific methods, to the intersessional correspondence group (see paragraph 4.26).

4.15 Notwithstanding the above, the Sub-Committee also noted that the group was of the opinion that work on a new test protocol for zoned type systems for large engine-rooms (3,000 m^3) should continue and that ongoing research is vital to improving the understanding of the extinguishing mechanisms involved with water-mist systems in large engine-room spaces.

Matters related to fixed gas and aerosol fire-extinguishing systems

Draft amendments to chapter 5 of the FSS Code

4.16 The Sub-Committee noted the discussion on this issue by the group as reflected in paragraphs 12 to 14 in document FP 49/WP.2, and agreed to the draft amendments to chapter 5

of the International Code for Fire Safety Systems, as set out in annex 4, for submission to MSC 80 for approval and subsequent adoption.

Proposed draft inspection and maintenance guidance for fixed carbon dioxide systems

4.17 The Sub-Committee, having noted that the group had considered annex 4 to document FP 49/4, which contained proposed draft inspection and maintenance guidance for fixed carbon dioxide systems and that corresponding amendments had been prepared to address ICCL's concerns over the restrictive interval of certain inspections, agreed that the draft guidelines set out in annex 3 to document FP 49/WP.2 should be further considered by the correspondence group (see paragraph 4.26.9).

4.18 In this regard, the delegation of China proposed that the weighing test of CO_2 high pressure cylinders and the blow-off test of piping and nozzles should be carried out in conjunction with the ship's periodical or renewal survey so as to harmonize the inspection interval of CO_2 high pressure cylinders, discharging piping and nozzles with the ship's mandatory survey interval as prescribed by the Harmonized System of Survey Certification (HSSC), otherwise, the ship schedule, especially the schedule of most of containerships, could be seriously affected. Similarly, the delegation of Japan proposed that the intervals of the tests, such as the weighing tests of CO_2, should be harmonized with the provisions of resolution A.948(23) and that the draft Guidelines should be sent to the FSI Sub-Committee for its review. However the majority of the group was of the opinion that the relevant tests and inspections as proposed in the draft guidance were for technical maintenance and inspection purposes, and did not support the proposals.

Proposed 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 (annex to MSC/Circ.848)

4.19 The Sub-Committee noted that, in considering the proposal contained in annex 5 to document FP 49/4 removing the lowest-observed-adverse-effect-level (LOAEL) limit and using the safe exposure limits specified by the Physiologically-based pharmacokinetic (PBPK) model, the group had not reached consensus. Some delegations felt that the proposal should be accepted since it represented the most recent agreement of the National Fire Protection Association (NFPA) 2001 Committee on revising the personnel safety requirements to accurately reflect the use of the PBPK model. Other delegations felt that the revised requirements allowed the application of halocarbon fire-extinguishing systems at concentrations that could be harmful to crewmembers in the engine-room who might not be able to immediately escape via the ladders. The Sub-Committee, therefore, decided to keep this item under review for further consideration (see paragraph 4.26).

4.20 With regard to the factor of safety for the calculated extinguishing concentration of Halon replacement agents, as noted in paragraph 11 of document FP 49/4, the Sub-Committee noted that the most recent edition of NFPA 2001 had increased the factor of safety from 20% to 30% of the laboratory cupburner value and agreed, in principle, to the following amendments to MSC/Circ.848:

.1 the reference to "20%" in paragraph 3 is replaced with "30%"; and

.2 the reference to "83%" in paragraph 3.4.2.2 of annex 1 is replaced with "77%".

4.21 The Sub-Committee noted also the group's discussion on amending MSC/Circ.848 relating to halocarbon agents and agreed that this matter should be further considered by an intersessional correspondence group.

Use of total flooding carbon dioxide extinguishing systems

4.22 After considering information provided by Members on the prohibition on the continued use of total flooding carbon dioxide extinguishing systems in normally occupied areas, the Sub-Committee agreed that the continued use of such systems was necessary. Being aware of the ongoing consideration of this issue by various governmental agencies, the Sub-Committee decided to include this matter in the terms of reference for an intersessional correspondence group (see paragraph 4.26).

Further amendments to MSC/Circ.913

4.23 Noting that the group had considered the proposed modifications and interpretations contained in documents FP 49/4/5 and FP 49/13/1 (annex 3) and had agreed to include them in the proposed revised MSC/Circ.913 (FP 48/WP.4, annex 2), the Sub-Committee agreed, in principle, to the proposed amendments to MSC/Circ.913, which is set out in annex 4 of document FP 49/WP.2, for consideration at FP 50.

Matters dealing with high-expansion foam

4.24 The Sub-Committee noted that the group, having considered documents FP 49/4/2, FP 49/4/4 and FP 49/INF.4 and having had a preliminary discussion of the development of a test protocol for high-expansion foam systems using inside air, was unable, due to the time available, to make substantial progress and agreed that further consideration of this matter should be given by an intersessional correspondence group.

Revision of plan for the harmonization, or new development of, performance testing and approval standards for fire safety systems

4.25 The Sub-Committee, taking into account the progress made to date, and in view of the heavy workload, approved the revised work plan which is set out in annex 5 of document FP 49/WP.2.

Establishment of a correspondence group

4.26 Taking into account progress being made during this session, the Sub-Committee decided to re-establish a correspondence group, under the co-ordination of the United States*, to progress the work on this issue and agreed to the following terms of reference:

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Taking into account the relevant information contained in documents FP 49/4, FP 49/4/2, FP 49/4/4 and FP 49/INF.4 and the outcome of discussion outlined in document FP 49/WP.2, the group is instructed to:

.1 further consider matters related to water-mist fire-extinguishing systems for accommodation, service and control spaces, taking into account document FP 49/4 (annex 6);

.2 consider matters related to fixed high-expansion foam systems using inside air, taking into account documents FP 49/4/2, FP 49/4/4 and FP 49/INF.4 and make recommendations as appropriate;

.3 prepare relevant amendments for the following short-term priority category of topics relating to the following machinery space and cargo pump-room fire-extinguishing arrangements:

.1 fixed pressure water-spraying systems;

.2 fixed low-expansion foam fire-extinguishing systems; and

.3 portable foam applicator units;

.4 prepare relevant amendments for water-mist fire-extinguishing systems and fixed pressure water-spraying fire-extinguishing systems for vehicle space, ro-ro space and special category space extinguishing systems;

.5 consider further matters related to the revision of MSC/Circ.848;

.6 continue consideration of the use of total flooding carbon dioxide fire-extinguishing systems in normally occupied areas in response to actions taken by various governmental agencies;

.7 consider matters related to the revision of the proposed functional objectives and requirements for class III engine-room water-mist fire protection protocol, as set out in annex 2 to document FP 49/4, and make recommendations as appropriate;

.8 consider matters related to the development of the scientific methods on scaling of the test volume to a larger shipboard protected volume and make recommendations as appropriate;

.9 further consider the draft guidelines for inspection and maintenance of fixed carbon dioxide systems, as set out in annex 3 to document FP 49/WP.2; and

.10 submit a report to FP 50.

5 REVIEW OF THE 2000 HSC CODE AND AMENDMENTS TO THE DSC CODE AND THE 1994 HSC CODE

General

5.1 The Sub-Committee recalled that, at FP 48, in considering document FP 48/10 (Australia) containing a proposal on how best to proceed on this matter, it had agreed that the review of the

2000 HSC Code should include integrating the existing fire protection interpretations contained in MSC/Circ.1102, provisions of the Interim Guidelines for a simplified evacuation analysis of high-speed passenger craft (MSC/Circ.1001) and provisions related to the use of asbestos.

5.2 The Sub-Committee also recalled that FP 48 had established a Correspondence Group on Review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code and approved terms of reference, as set out in paragraph 10.2 of document FP 48/19, and instructed the group to submit a report to FP 49.

Report of the correspondence group

5.3 Having considered the report of the aforementioned correspondence group (FP 49/5), the Sub-Committee approved it in general and took action as indicated hereunder.

5.4 In considering the proposed amendments to the fire protection-related provisions of the 2000 HSC Code, as set out in annex 1 to document FP 49/5, the Sub-Committee agreed that the working group, referred to in paragraph 5.7 below, should finalize the aforementioned proposed amendments prepared by the correspondence group, taking into account comments made in plenary.

5.5 The Sub-Committee considered the group's work related to the evacuation time for high-speed passenger craft set out in annex 2 to document FP 49/5, taking into account document FP 49/INF.7 (Australia), and instructed the working group to consider the views expressed by the delegations of France, Germany and Norway that evacuation times should be determined by practical demonstration and not simply by calculation using the Interim Guidelines for a simplified evacuation analysis of high-speed passenger craft (MSC/Circ.1001).

5.6 Having agreed, in principle, to the draft amendments to the 2000 HSC Code for matters related to the use of asbestos, the Sub-Committee decided that provisions for the use of asbestos should also be prepared for inclusion in the 1994 HSC Codes and in the DSC Code, bearing in mind that the aforementioned Codes apply to existing craft.

Establishment of the working group

5.7 Having recalled its relevant decision at FP 48, the Sub-Committee established the Working Group on Review of the 2000 HSC Code and Amendments to the DSC Code and the 1994 HSC Code and, taking into account the comments made and decisions taken in plenary, instructed it to:

.1 finalize the proposed amendments to the 2000 HSC Code for the Sub-Committee to consider with a view towards submission to DE 48 for co-ordination purposes;

.2 further consider the report of the correspondence group (FP 49/5) for matters related to evacuation time, taking into account document FP 49/INF.7, with a view to making appropriate recommendations; and

.3 further consider the report of the correspondence group (FP 49/5) regarding matters related to the use of asbestos on high-speed craft with a view to including relevant provisions in the 2000 and 1994 HSC Codes and in the DSC Code.

Report of the working group

5.8 Having received the report of the working group (FP 49/WP.3), the Sub-Committee approved it in general and took action as outlined hereunder.

Proposed amendments to the 2000 HSC Code

5.9 The Sub-Committee agreed to a set of proposed amendments to the 2000 HSC Code, as set out in annex 5, for referral to DE 48 for co-ordination purposes.

Matters related to the use of asbestos

5.10 The Sub-Committee considered matters related to the use of asbestos on high-speed craft and agreed to the draft amendments to the 2000 and 1994 HSC Codes and the DSC Code, as set out in annexes 5, 6 and 7, respectively, for referral to DE 48 for co-ordination purposes.

Matters related to evacuation time

Guidelines for a simplified evacuation analysis for high-speed passenger craft

5.11 The Sub-Committee, having agreed to the amendments to the Interim Guidelines for a simplified evacuation analysis for high-speed passenger craft (MSC/Circ.1001) prepared by the group, and having decided that the Interim Guidelines, as amended, should become definitive, agreed to a draft MSC circular on Guidelines for a simplified evacuation analysis for high-speed passenger craft, as set out in annex 8, superseding MSC/Circ.1001, for submission to MSC 80 for approval. The Sub-Committee further agreed that the Guidelines should be referenced in section 4.8 of the 2000 HSC Code by means of a footnote and instructed the Secretariat to inform the DE Sub-Committee accordingly.

Consideration of amendments to the 2000 HSC Code regarding the determination of evacuation time

5.12 In considering a proposal to revise the Code's provisions for determination of actual evacuation time (FP 49/5), the Sub-Committee noted that this matter would also be considered by DE 48. The Sub-Committee agreed to retain the present requirements of section 4.8, including use of evacuation trials to determine evacuation time, as a proven means of demonstrating compliance with the requirements of the Code, noting that a full scale test could reveal problems that may be difficult to foresee in a theoretical approach. The Sub-Committee noted that it was the lead sub-committee on matters related to evacuation time.

Matters related to the transport of dangerous goods on high-speed craft

5.13 Taking into account comments made in plenary with regard to amendments to the 2000 HSC Code concerning inclusion of provisions of the IMDG Code, the Sub-Committee agreed on the inclusion of relevant proposed amendments to section 7.17 (Requirements for craft and cargo spaces intended for the carriage of dangerous goods) of the 2000 HSC Code (see annex 5).

5.14 The Sub-Committee further agreed that the term "x" in the open ro-ro spaces column of table 7.17-1, row 7.17.3.2, seems incorrect and should be re-examined by DSC 10 in conjunction with corresponding SOLAS requirements and that, since the provisions for carrying harmful

substances in package form are covered under MARPOL Annex III, they do not need to be referenced in the 2000 HSC Code.

5.15 Subsequently, the Sub-Committee agreed that section 7.17 and the proposed amendments thereto should be referred to DSC 10 for consideration, subject to the concurrence of MSC 80, with a view to referring the outcome of that consideration directly to DE 49 which is expected to finalize the complete set of amendments to the 2000 and 1994 HSC Codes and the DSC Code.

6 AMENDMENTS TO RESOLUTION A.653(16) RELATING TO THE PREPARATION OF SPECIMENS FOR SEALANTS AND MASTICS

6.1 The Sub-Committee recalled that, at FP 48, it had considered document FP 48/15 (France) proposing to develop amendments to the procedure for preparing specimens of sealants and mastics, when they are visibly present, for surface flammability testing specified in resolution A.653(16), and, following a detailed discussion of the issues, agreed to further consider the matter at this session.

6.2 The Sub-Committee considered document FP 49/6 (France) proposing amendments to the procedure for the preparation of specimens of sealants and mastics for the surface flammability tests specified in resolution A.653(16) and noted the views of some delegations that approvals for sealants and mastics are normally left to the discretion of the Administration.

6.3 Notwithstanding the above views, the Sub-Committee, noting that Japan submitted to MSC 80 a proposal to include, in the Sub-Committee's work programme, a new item (MSC 80/21/5) on a comprehensive review of the FTP Code, decided to hold this matter in abeyance pending the outcome of the consideration by MSC 80 of the proposal by Japan, and agreed that, if the abovementioned new work item proposal is approved by the Committee, this item could be merged with the item on the comprehensive review of the FTP Code.

6.4 The Committee was invited to extend the target completion date of this item to 2006 or, if a new work item on a comprehensive review of the FTP Code (MSC 80/21/5) is approved, delete this item from the Sub-Committee's work programme.

7 AMENDMENTS TO RESOLUTION A.754(18) RELATING TO PERFORMANCE CRITERIA FOR FIRE DOORS

7.1 The Sub-Committee recalled that, at FP 48, it had considered document FP 48/14 (France) proposing to revise resolution A.754(18) to allow for the testing of performance criteria at the threshold of ship doors without reducing the level of safety and, following a detailed discussion of the issues, agreed to further consider the matter at this session.

7.2 The Sub-Committee considered document FP 49/7 (France) proposing revisions to resolution A.754(18) to allow a wider gap during testing for door clearances between the leaf and the sill and, having agreed in principle to the above proposal, instructed the Secretariat, in consultation with interested delegations, to prepare draft amendments to the FTP Code, taking into account the comments and proposals made in plenary.

7.3 Having considered document FP 49/WP.7 (Secretariat) containing the draft amendments to the FTP Code, the Sub-Committee agreed, taking into account the concerns expressed by several delegations over the proposed increase of the gap gauge for "A" class doors, that further consideration was needed to resolve the matter and invited Members and international organizations to submit comments and proposals to FP 50.

8 REVIEW OF THE FIRE PROTECTION PROVISIONS OF THE LHNS GUIDELINES

8.1 The Sub-Committee recalled that, at FP 48, having finalized its work on revision of the fire protection references in the Guidelines for the design and construction of offshore supply vessels (resolution A.469(XII)), it had agreed to update the fire protection references in paragraphs 3.9.1 and 3.9.2.4 of the Guidelines for the transport and handling of limited amounts of hazardous and noxious liquid substances in bulk on offshore support vessels (resolution A.673(16)) and amended the title of the aforementioned work programme item accordingly.

8.2 The Sub-Committee considered document FP 49/8 (Secretariat) containing proposed recommendations to update the references, in the LHNS Guidelines, to the fire protection requirements of the SOLAS Convention to be in line with the relevant requirements of the revised SOLAS chapter II-2 and, after having made several amendments (FP 49/WP.6), agreed to the draft modifications to the LHNS Guidelines (resolution A.673(16)), as set out in annex 9, for referral to the SLF Sub-Committee for co-ordination purposes.

8.3 The Sub-Committee instructed the Secretariat to also inform BLG 10 and other sub-committees concerned of the above outcome.

9 PERFORMANCE STANDARDS FOR EVACUATION GUIDANCE SYSTEMS

9.1 The Sub-Committee recalled that, at FP 47, it had agreed that the acceptability of the directional sound system should be evaluated on the basis of performance standards for evacuation guidance systems and instructed the Working Group on Large Passenger Ships Safety, established at that session, to prepare performance standards for evacuation guidance systems.

9.2 The Sub-Committee also recalled that, at FP 48, it had noted that more time was necessary to prepare the draft performance-based standards for evacuation guidance systems and instructed the Correspondence Group on Large Passenger Ship Safety to further develop the draft standards for consideration at this session.

9.3 The Sub-Committee considered the part of the report of the correspondence group (FP 49/3/1) and, after a brief discussion on the draft standards, set out in annex 6 to document FP 49/3/1, agreed to refer the matter to the Working Group on Passenger Ship Safety, established under agenda item 3, to further consider the draft Performance standards for evacuation guidance systems, taking into account the comments made in plenary (see paragraph 3.7.6).

Report of the working group

9.4 In considering the part of the report of the working group (FP 49/WP.1) referring to the above matter, the Sub-Committee took action as indicated hereunder.

Evacuation guidance systems

9.5 The Sub-Committee agreed to the draft functional requirements and performance standards for the assessment of evacuation guidance systems and the associated draft MSC circular, as set out in annex 10, for submission to MSC 80 for approval.

Testing, approval and maintenance of evacuation guidance systems

9.6 The Sub-Committee agreed to the Interim Guidelines for the testing, approval and maintenance of evacuation guidance systems alternative to the low-location lighting systems and to the associated draft MSC circular, as set out in annex 11, for submission to MSC 80 for approval.

10 RECOMMENDATION ON EVACUATION ANALYSIS FOR NEW AND EXISTING PASSENGER SHIPS

10.1 The Sub-Committee recalled that FP 47, noting that MSC 75, in approving the Interim Guidelines on evacuation analyses for new and existing passenger ships (MSC/Circ.1033), encouraged Member Governments to collect and submit to the Sub-Committee any information and data resulting from research and development activities, full-scale tests and findings on human behaviour which may be relevant for the necessary future upgrading of the present Interim Guidelines, had agreed to keep this matter on its work programme, taking into account that the two methods of evacuation analysis provided in the Interim Guidelines still needed to be validated.

10.2 The Sub-Committee discussed documents FP 49/INF.3 (Japan), FP 49/INF.8, FP 49/INF.9, FP 49/INF.10 (United Kingdom) and MSC 78/INF.8 (Republic of Korea) containing information on experience gained with the application of the Interim Guidelines and the results of related ongoing research. In the context of the discussion, the Sub-Committee noted that it had been instructed by MSC 79 to update MSC/Circ.1033 with regard to the "safe area" concept, which is related to the work on passenger ship safety (see paragraph 3.7.5).

10.3 Having decided to finalize the review of the Interim Guidelines, the Sub-Committee agreed, in order to progress the work on this issue, to establish a correspondence group, under the co-ordination of Japan[*], with the following terms of reference:

.1 to review the Interim Guidelines on evacuation analyses for new and existing passenger ships (MSC/Circ.1033) based on information and research which may be relevant for the necessary upgrading of the present Interim Guidelines, taking into account documents FP 47/INF.4, FP 48/4, FP 48/4/1, FP 48/INF.2, FP 49/INF.3, FP 49/INF.8, FP 49/INF.9, FP 49/INF.10 and MSC 78/INF.8;

.2 consider matters related to the various evacuations times used in different IMO instruments and guidelines with a view to making sure they are properly addressed in the review of the MSC/Circ.1033;

.3 to consider whether it is necessary to update MSC/Circ.1033 to support the "safe area" concept, fire thresholds and habitability timeframe; and

.4 to submit a report to FP 50.

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10.4 The Sub-Committee invited Members and international organizations to submit, to FP 50, any information that may be relevant for the necessary upgrading of the present Interim Guidelines.

11 ANALYSIS OF FIRE CASUALTY RECORDS

11.1 The Sub-Committee noted that MSC 79, having considered a submission by France (MSC 79/22/8) providing information on explosions in petroleum tankers, had agreed to forward document MSC 79/22/8 to FP 49 for information purposes under its existing agenda item on the analysis of fire casualty records.

11.2 The delegation of France informed the Sub-Committee that it had recently submitted the full investigation report on the explosion aboard the chemical tanker **Chassiron** to the Organization in accordance with SOLAS regulation I/21. In this regard, the Sub-Committee noted that the investigation findings would be forwarded, in due course, to the members of the permanent Correspondence Group on Casualty Analysis, which operates under the auspices of the FSI Sub-Committee, for analysis and that the aforementioned correspondence group co-ordinator would prepare and submit a report of its findings to the FSI Sub-Committee for consideration together with a summary of the lessons learned.

11.3 The Sub-Committee, having noted that document MSC 79/22/8 contained proposed amendments to SOLAS chapter II-2, invited the delegation of France to submit to the MSC a proposal for a new work programme item in accordance with the Guidelines on the organization and method of work (MSC/Circ.1099).

12 DEVELOPMENT OF PROVISIONS FOR GAS-FUELLED SHIPS

12.1 The Sub-Committee recalled that MSC 78 had instructed the BLG, DE (co-ordinator) and FP Sub-Committees to develop appropriate draft Guidelines for gas-fuelled ships, with a view to establishing an international standard for the installation and operation of internal combustion engine installations using gas as fuel in all types of ships other than LNG carriers and included a high priority item on "Development of provisions for gas-fuelled ships" in the Sub-Committee's work programme and provisional agenda for FP 49 with a target completion date of 2007.

12.2 The Sub-Committee considered document MSC 78/24/8 (Norway) outlining the framework of provisions for gas-fuelled ships and noted that the Sub-Committee would be responsible for developing general provisions on fire protection as well as provisions for fire extinction and fire detection and alarm systems.

12.3 After a brief discussion, the Sub-Committee, having been informed that Norway had submitted to DE 48 preliminary draft provisions for gas-fuelled engine installations in ships (document DE 48/19) indicating, *inter alia*, that fire safety provisions were still to be developed, noted that the delegation of Norway would submit to FP 50 a document on draft fire safety provisions which the Sub-Committee would consider taking into account the outcome of DE 48 on the matter.

12.4 Members and interested organizations were invited to submit comments and proposals on the subject to FP 50.

13 CONSIDERATION OF IACS UNIFIED INTERPRETATIONS

General

13.1 The Sub-Committee recalled that MSC 78, in order to expedite the consideration of the IACS unified interpretations being submitted on a continuous basis, had decided that IACS should submit them directly, as appropriate, to the sub-committees concerned and, in this regard, the Committee agreed to retain, on a continuous basis, the item on "Consideration of IACS unified interpretations" in the work programme of the Sub-Committee, rather than assigning it a target completion date.

13.2 The Sub-Committee also recalled that MSC 78 had agreed to refer document MSC 78/22/1 containing IACS unified interpretations, to the Sub-Committee, instructing it to review the interpretations annexed to the aforementioned document which fall within its purview and prepare appropriate interpretations for approval.

Unified interpretations of SOLAS chapter II-2

13.3 In considering documents FP 49/13/1 and MSC 78/22/1 (IACS), the Sub-Committee noted that following IACS unified interpretations were under its purview:

.1 SC 79 – Certified Safe Type Electrical Equipment for Ships Carrying Dangerous Goods (FP 49/13/1, annex 1);

.2 SC 165 – Electrical Cables for the Emergency Fire Pump (FP 49/13/1, annex 2);

.3 SC 176 – Fixed Local Application Fire Extinguishing System (FP 49/13/1, annex 3);

.4 SC 189 – High Pressure Oil fuel Delivery Lines on Small Engines (FP 49/13/1, annex 4);

.5 SC 173 – Safety Devices in Venting Systems (MSC 78/22/1, annex 8);

.6 SC 174 – A 60 Front Insulation of Tankers (MSC 78/22/1, annex 9);

.7 SC 175 – Combustible Gaskets in Ventilation Duct Connections (MSC 78/22/1, annex 10);

.8 SC 176 – Fixed Local Application Fire Extinguishing System (MSC 78/22/1, annex 11);

.9 SC 177 – Lubricating Oil and other Flammable Oil System Arrangements – retroactive application of SOLAS II-2/regulations 15.3 and 15.4 (MSC 78/22/1, annex 12); and

.10 SC 178 – Emergency Fire Pumps in Cargo Ships (MSC 78/22/1, annex 13).

13.4 After having reviewed the above interpretations in detail, the Sub-Committee agreed that IACS interpretations SC 79, SC 165, SC 189 and SC 174 were either adequately covered by relevant IMO instruments and/or guidelines or needed no further action by the Sub-Committee.

However, the Sub-Committee agreed a draft MSC circular should be prepared on unified interpretations to SOLAS chapter II-2 for matters related to ventilation system arrangements, as set out in annexes 8 and 10 to document MSC 78/22/1, for approval by MSC 80 (see paragraph 13.10). IACS interpretation SC 176 was considered under agenda item 4 (see paragraph 4.23).

Emergency fire pumps in cargo ships

13.5 In considering document FP 49/13 (Japan) providing comments on IACS Unified Interpretation (SC 178) on Emergency fire pumps in cargo ships (MSC 78/22/1, annex 13), the Sub-Committee agreed that more time was needed to resolve this matter and invited Members and international organizations to submit comments and proposals to FP 50.

Proposed rectifications to SOLAS

13.6 In considering the IACS unified interpretation (SC 177) related to the application of SOLAS regulation II-2/15 for lubricating oil and other flammable oil system arrangements, in particular the retroactive application of SOLAS regulations II-2/15.3 and II-2/15.4 (MSC 78/22/1, annex 12), the Sub-Committee recalled that the Committee, at its sixty-third session, adopted, by resolution MSC.31(63), amendments to the SOLAS Convention including amendments to regulation II-2/15 – Arrangements for oil fuel, lubricating oil and other flammable oils.

13.7 The Sub-Committee noted that an inadvertent error relating to the 1994 Amendments to regulation II-2/15, as adopted by resolution MSC.31(63), had the effect of making the requirements of SOLAS regulations II-2/15.2.10 and II-2/15.2.11, with regard to lubricating oil and other flammable oil system arrangements, applicable to existing ships constructed on or after 1 February 1992 rather than only to new ships constructed on or after 1 July 1998, as was the intention and agreed the matter need to be rectified (see paragraphs 13.8.2 and 13.10 to 13.13).

Establishment of the drafting group

13.8 Recognizing the necessity to make progress on the above issues, the Sub-Committee established the Drafting Group on IACS Unified Interpretations and, taking into account the comments made and decisions taken in plenary, instructed it to:

.1 prepare the draft text of unified interpretations based on document MSC 78/22/1 (annexes 8 and 10); and

.2 prepare relevant recommendations and a justification for amending SOLAS regulation II-2/15 with a view to limiting the applications of paragraphs 3 and 4 to ships built on or after 1 July 1998, taking into account the Guidelines on the organization and method of work (MSC/Circ.1099).

Report of the drafting group

13.9 Having received the report of the drafting group (FP 49/WP.8), the Sub-Committee approved it in general and took action as outlined hereunder.

Unified interpretations of SOLAS chapter II-2

13.10 The Sub-Committee agreed to the draft MSC circular on Unified interpretations to SOLAS chapter II-2, as set out in annex 12, for submission to MSC 80 for approval.

Procès-verbal of rectification

13.11 Having received the view of the drafting group on the rectification of the error in SOLAS regulation II-2/15, the Sub-Committee agreed to invite MSC 80 to instruct the Secretariat to initiate the procedure for a procès-verbal of rectification to replace amendment No.1 to regulation II-2/15, as adopted by resolution MSC.31(63) (annex 2), by the following text:

"1 The text after the title is replaced by the following:

"(Paragraphs 2.9 to 2.12 of this regulation apply to ships constructed on or after 1 February 1992, except that the references to paragraphs 2.10 and 2.11 in paragraphs 3 and 4 apply to ships constructed on or after 1 July 1998)"."

Review of the application provisions of SOLAS regulation II-2/15 (resolution MSC.31(63))

13.12 In considering the recommendation to initiate the procedure for a procès-verbal of rectification referred to in paragraph 13.11 above, the Sub-Committee recognized that the Committee might not endorse its recommendation and, therefore, prepared a relevant justification for a new item in the Sub-Committee's work programme, in accordance with the Guidelines on the organization and method of work (MSC/Circ.1099), as set out in annex 13, for consideration by the Committee.

MSC circular informing SOLAS Contracting Governments of the correction

13.13 In light of the above recommendations referred to in paragraphs 13.11 and 13.12 above, the Sub-Committee agreed to invite MSC 80, if the Committee endorses any of the above recommendations, to approve the draft MSC circular on Application of the SOLAS regulation II-2/15 for lubricating oil and other flammable oil arrangements for ships built before 1 July 1998, set out in annex 14, recommending that Member Governments apply SOLAS regulations II-2/15.3 and 15.4, as adopted by resolution MSC.31(63) (annex 2), in terms of compliance with the requirements of paragraphs 2.10 and 2.11 of the regulations, to ships constructed on or after 1 July 1998 until a relevant rectification or amendment to SOLAS chapter II-2 enters into force.

14 WORK PROGRAMME AND AGENDA FOR FP 50

Work programme and agenda for FP 50

14.1 Taking into account the progress made during the session and the provisions of the agenda management procedure, the Sub-Committee reviewed its work programme and agenda for its next session (FP 49/WP.4) and prepared a proposed revised work programme and draft provisional agenda for FP 50. While doing so, the Sub-Committee agreed to invite the Committee to:

.1 delete the following work programme items, as work on them has been completed:

.1.1 item H.3 - Review of the fire protection provisions of the LHNS Guidelines; and

.1.2 item H.4 - Performance standards for evacuation guidance systems; and

.1.3 item H.5 - Review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code;

.2 extend the target completion dates of the following work programme items:

.2.1 item H.2 - Performance testing and approval standards for fire safety systems, to 2009;

.2.2 item H.6 - Amendments to resolution A.754(18) relating to performance criteria for fire doors, to 2006;

.2.3 item H.7 - Amendments to resolution A.653(16) relating to the preparation of specimens for sealants and mastics, to 2006;* and

.2.4 item H.8 - Recommendation on evacuation analysis for new and existing passenger ships, to 2006;

.3 replace the number of sessions needed for completion of the following work programme items by the target completion date, as the items have been included in the provisional agenda for FP 50:

.3.1	item H.9	-	Review of the SPS Code	2007
.3.2	item H.11	-	Measures to prevent fires in engine-rooms and cargo pump-rooms; and	2009

.4 renumber the work programme items accordingly.

14.2 The Committee was also invited to approve the proposed revised work programme of the Sub-Committee and draft provisional agenda for FP 50, as set out in annex 15.

Arrangements for the next session

14.3 The Sub-Committee tentatively agreed to establish, at FP 50, working and drafting groups on the following items:

.1 passenger ship safety;

.2 performance testing and approval standards for fire safety systems; and

* This item may be deleted if the proposed new work item on the comprehensive review of the FTP Code is approved by MSC 80.

.3 recommendation on evacuation analysis for new and existing passenger ships.

14.4 The Sub-Committee recalled that, following consideration of agenda items 3 and 4, it had agreed to establish correspondence groups on the following high priority items:

.1 passenger ship safety;

.2 performance testing and approval standards for fire safety systems; and

.3 recommendation and evacuation analysis for new and existing passenger ships.

14.5 The Sub-Committee noted that its fiftieth session had been tentatively scheduled to take place from 9 to 13 January 2006.

15 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2006

15.1 In accordance with the Rules of Procedure of the Maritime Safety Committee, the Sub-Committee unanimously re-elected Mr. J.C. Cubisino (Argentina) as Chairman and Mr. C. Abbate (Italy) as Vice-Chairman, both for 2006.

16 ANY OTHER BUSINESS

Measures to prevent fire in engine-rooms and cargo-pump rooms

16.1 The Sub-Committee considered documents FP 49/16, FP 49/16/4 and FP 49/INF.6 (Republic of Korea) proposing guidelines be developed on measures to prevent fire in engine-rooms and cargo pump-rooms and noted that the goal of the proposal was to provide practical and comprehensive engine-room and cargo pump-room fire safety guidelines for shipbuilders, ship operators, recognized organizations and Administrations.

16.2 Taking into account that this item was not on the agenda for this session and that the matter would be considered in detail at FP 50, the Sub-Committee invited Members to submit comments and proposals to FP 50 (see also paragraph 14.1.3.2).

Alternative design and arrangements for fire safety – References in SOLAS certificates

16.3 The Sub-Committee considered document FP 49/16/1 (Norway) proposing modifications to SOLAS safety certificates to include a reference to SOLAS regulation II-2/17 to record an approval of alternative arrangements, taking into account that currently there is no appropriate location for this information on SOLAS certificates and that, as specified in paragraph 7.4 of MSC/Circ.1002, a reference to the approved alternative design and arrangements should be included in the appropriate SOLAS certificate.

16.4 Noting that the proposed modifications to SOLAS certificates constituted amendments to the Convention, the Sub-Committee invited the delegation of Norway to submit a proposal to the Committee in accordance with the Guidelines on the organization and method of work (MSC/Circ.1099). Notwithstanding the above, the Sub-Committee invited MSC 80 to instruct the Secretariat to issue a corrigendum to MSC/Circ.1002 to correct the oversight by deleting paragraph 7.4.

Number and arrangement of portable fire extinguishers

16.5 The Sub-Committee considered document FP 49/16/2 (China) proposing to develop a guideline or a unified interpretation on the number and arrangement of portable fire extinguishers on board and, having agreed that this proposal should be considered as a new work programme item, invited the delegation of China to submit an appropriate proposal to the Committee in accordance with the Guidelines on the organization and method of work (MSC/Circ.1099).

Period of validity of the document of compliance with SOLAS regulation II-2/54 or II-2/19

16.6 The Sub-Committee considered document FP 49/16/3 (France) proposing that the validity period of the document of compliance issued to a passenger ship carrying dangerous goods should not exceed 12 months and should not be extended beyond the expiry date of the valid passenger ship safety certificate and, having noted that MSC/Circ.1027 allows the document of compliance to be valid up to 5 years, agreed that the proposal constituted a new work programme item. The Sub-Committee invited the delegation of France to submit an appropriate proposal to the Committee in accordance with the Guidelines on the organization and method of work (MSC/Circ.1099).

16.7 The delegation of France, having noted that the opinions of other delegations on this matter were divided, reserved its position as to the follow-up action to be taken on its proposal.

Result of a fire resistance test on a ventilation system

16.8 The Sub-Committee noted with appreciation the document submitted by the United Kingdom (FP 49/INF.2) providing information on the preliminary results of a fire resistance test on ventilation ducting penetrating an A-60 steel deck.

Test laboratories recognized by the Administrations

16.9 The Secretariat informed the Sub-Committee that the latest annual FP circular on test laboratories recognized by the Administrations had been published as FP/Circ.28 on 4 January 2005.

Halon banking and reception facilities

16.10 The Sub-Committee noted information provided by the Secretariat that the latest annual FP circular on halon banking and reception facilities had been published as FP/Circ.29 on 4 January 2005.

Expressions of appreciation

16.11 The Sub-Committee expressed appreciation to the following delegates who had recently relinquished their duties, retired or were transferred to other duties or were about to, for their invaluable contribution to its work and wished them a long and happy retirement or, as the case might be, every success in their new duties:

- Admiral Sergio Chagasteles (Brazil) (on transfer)

- Mr. Paul Kunst (Netherlands) (on retirement)

- M. Philippe Cauneau (France) (on transfer)

- Mr. Krister Ingvorson (Sweden) (on retirement).

17 ACTION REQUESTED OF THE COMMITTEE

17.1 The Maritime Safety Committee is invited to:

.1 endorse the Sub-Committee's decision regarding the work to be undertaken on matters related to passenger ship safety and take action if deemed appropriate (paragraphs 3.9 to 3.25 and annex 1);

.2 note that the COMSAR, NAV, DE, SLF and STW Sub-Committees were invited to consider matters relating to the functional requirement under their purview and modify the work plan for passenger ship safety, as appropriate, and that some performance standards on systems referred to in the functional requirement can be found in the SPHERE project (paragraphs 3.11, 3.12, 3.23 and 3.32);

.3 consider the request of the Sub-Committee to clarify the starting point for the 3-hour timeframe for habitability and take action as appropriate (paragraph 3.20);

.4 endorse the Sub-Committee's proposed modifications to the work plan on passenger ship safety, in particular for matters related to means of escape and fire prevention and take action as appropriate (paragraphs 3.35 and 3.36 and annex 1);

.5 note that paragraph 2.1.2 of the FSS Code contained a typographical error and endorse the Sub-Committee's recommendations to issue a note verbale of rectification to replace the heading of the aforementioned paragraph to "Sprinkler systems equivalent to those specified in paragraphs 2.2 to 2.5." (paragraph 4.4.3);

.6 approve the draft amendment to SOLAS regulation II-2/9.4.1.3.3 for consideration at MSC 81 with a view to adoption (paragraph 4.4.4 and annex 2);

.7 approve the draft MSC circular on Revised guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms (paragraph 4.13 and annex 3);

.8 approve the draft amendments to chapter 5 of the International Code for Fire Safety Systems (FSS Code), with a view to subsequent adoption (paragraph 4.16 and annex 4);

.9 note that the Sub-Committee has completed its work on matters related to the review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code and forwarded them to the DE Sub-Committee for co-ordination purposes (paragraphs 5.9 and 5.10 and annexes 5, 6 and 7);

.10 approve the draft MSC circular on Guidelines for a simplified evacuation analysis for high-speed passenger craft (paragraph 5.11 and annex 8);

.11 endorse the recommendation of the Sub-Committee to refer matters related to transport of dangerous goods on high-speed craft to DSC 10 (paragraphs 5.13 to 5.15);

.12 note that the review of the fire protection provisions of the LHNS Guidelines (resolution A.673(16)) has been completed and forwarded to the SLF Sub-Committee for co-ordination purposes (paragraph 8.2 and annex 9);

.13 approve the draft MSC circular on Guidelines on the assessment of evacuation guidance systems (paragraph 9.5 and annex 10);

.14 approve the draft MSC circular on Interim Guidelines for the testing and approval and maintenance of evacuation guidance systems alternative to the low-location lighting systems (paragraph 9.6 and annex 11);

.15 approve the draft MSC circular on Unified interpretations to SOLAS chapter II-2 (paragraph 13.10 and annex 12);

.16 consider the recommendations of the Sub-Committee to initiate the procedure for a procès-verbal of rectification for SOLAS regulation II-2/15, as adopted by resolution MSC.31(63) or, otherwise, to include a new item in the Sub-Committee's work programme based on the justification prepared by the Sub-Committee; and decide as appropriate (paragraphs 13.11 and 13.12 and annex 13);

.17 approve, subject to the appropriate decision on the matter referred to in sub-paragraph .16 above, the draft MSC circular on Application of the SOLAS regulation II-2/15 for lubricating oil and other flammable oil arrangements for ships built before 1 July 1998 (paragraph 13.13 and annex 14);

.18 approve the draft revised work programme of the Sub-Committee and the draft provisional agenda for FP 50 (paragraphs 14.1 and 14.2 and annex 15);

.19 endorse the recommendation of the Sub-Committee to instruct the Secretariat to issue a corrigendum to delete paragraph 7.4 of MSC/Circ.1002 (paragraph 16.4); and

.20 approve the report in general.

***

ANNEX 1

DRAFT MODIFICATION TO THE REVISED WORK PLAN ON PASSENGER SHIP SAFETY RELATING TO FIRE PROTECTION

TASK	WORK TO BE UNDERTAKEN	TARGET COMPLETION DATE	GENERAL PARAMETERS
Fire boundary penetration requirements (Task 2.2)	To determine if existing SOLAS chapter II-2, FTP Code and FSS Code requirements for ventilation ducting penetrations of "A" and "B" class divisions are consistent and provide justification of possible measures to improve their effectiveness.	2006	Type of space
Means to keep smoke and fire from spreading beyond the space of origin, specifically addressing emergency response by crew, shipboard safety systems and boundaries (Task 2.3)	To review existing requirements applicable to multiple deck spaces (atriums, theatres, etc.). To review existing requirements for shops taking into consideration their categorization ("7" or "8"), fire load, boundaries, access and location. To review existing prescriptive requirements for determining if they allow stairway enclosures to be directly entered from spaces having high or medium fire risk (theatre backstage, beauty parlours and the like).	2006	Type of space Time of day (use of space)
Means to link prevention and protection measures to the fire risk of laundry areas, carpenter shops, solvent cleaning rooms and other specific spaces not generally covered by the existing general categorization and regulations (Task 2.4)	To review the existing requirements for detection, suppression, active and passive fire protection main laundries and large storage areas. To determine the suitability of existing requirements for detection, suppression, active and passive fire protection to those closed or semi closed spaces (such as spaces under retractable roof, restaurants, cooking areas on open decks, etc.) not specifically addressed in SOLAS chapter II-2. To prepare a definition for the term "flammable liquids" used in regulation II-2/9 for allowing the correct categorization of stores and lockers.	2006	Application to all types of ships Type of products stored Amount of combustible

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ANNEX 2

DRAFT AMENDMENT TO SOLAS REGULATION II-2/9.4.1.3.3[1]

CHAPTER II-2

CONSTRUCTION – FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION

Regulation 9 – Containment of fire

1 In sub-paragraph 4.1.3.3.2, "." is replaced by "; or".

2 In paragraph 4.1.3.3, the following new sub-paragraph .3 is added after the existing sub-paragraph .2:

".3 water-mist nozzles that have been tested and approved in accordance with the guidelines approved by the Organization[2]."

***

[1] Some minor editorial changes will be made to regulation II-2/9.4.1.3.3 by the Secretariat to ensure proper format.

[2] Refer to the Revised Guidelines for approval of sprinkler systems equivalent to that referred to in SOLAS regulation II-2/12 (resolution A.800(19)).

ANNEX 3

DRAFT MSC CIRCULAR

REVISED GUIDELINES FOR THE APPROVAL OF EQUIVALENT WATER-BASED FIRE-EXTINGUISHING SYSTEMS FOR MACHINERY SPACES AND CARGO PUMP-ROOMS

1 The Maritime Safety Committee, at its sixty-fourth session (5 to 9 December 1994), recognizing the urgent necessity of providing guidelines for alternative arrangements for halon fire-extinguishing systems, approved guidelines for the approval of equivalent water-based fire-extinguishing systems as referred to in SOLAS 74 for machinery spaces and cargo pump-rooms as MSC/Circ.668.

2 The Committee, at its sixty-sixth session (28 May to 6 June 1996), having considered a proposal by the fortieth session of the Sub-Committee on Fire Protection to revise the interim test method for equivalent water-based fire-extinguishing systems contained in MSC/Circ.668, approved amendments to the test method for equivalent water-based fire-extinguishing systems for category A machinery spaces and cargo pump-rooms contained in MSC/Circ.668.

3 The Sub-Committee on Fire Protection, at its forty-ninth session (24 to 28 January 2005), reviewed the Guidelines for the approval of equivalent water-based fire-extinguishing systems as referred to in SOLAS 74 for machinery spaces and cargo pump-rooms (annex to MSC/Circ.668, as amended by MSC/Circ.728) and made amendments to the test method for equivalent water-based fire-extinguishing systems for machinery spaces of category A and cargo pump-rooms, taking into account the latest technological progress made in this area.

4 The Committee, at its [eightieth session (11 to 20 May 2005)], after having considered the above proposal by the forty-ninth session of the Sub-Committee on Fire Protection, approved Revised Guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms, as set out in the annex.

5 Member Governments are invited to apply the annexed Guidelines when approving equivalent water-based fire-extinguishing systems for machinery spaces and pump-rooms and bring them to the attention of ship designers, ship owners, equipment manufacturers, test laboratories and other parties concerned.

6 Test approvals already conducted in accordance with guidelines contained in MSC/Circ.668, as amended by MSC/Circ.728, should remain valid until 5 years after the date of this circular.

ANNEX

REVISED GUIDELINES FOR THE APPROVAL OF EQUIVALENT WATER-BASED FIRE-EXTINGUISHING SYSTEMS FOR MACHINERY SPACES AND CARGO PUMP-ROOMS

General

1 Water-based fire-extinguishing systems for use in machinery spaces of category A and cargo pump-rooms equivalent to fire-extinguishing systems required by SOLAS regulation II-2/10 and chapter 5 of the FSS Code should prove that they have the same reliability which has been identified as significant for the performance of fixed pressure water-spraying systems approved under the requirements of SOLAS regulation II-2/10 and chapter 5 of the FSS Code. 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.

Definitions

2 **Antifreeze system**. A wet pipe system containing an antifreeze solution and connected to a water supply. The antifreeze solution is discharged, followed by water, immediately upon operation of nozzles.

3 **Bilge area**. The space between the solid engine-room floor plates and the bottom of the engine-room

4 **Deluge system**. A system employing open nozzles attached to a piping system connected to a water supply through a valve that is opened by the operation of a detection system installed in the same areas as the nozzles or opened manually. When this valve opens, water flows into the piping system and discharges from all nozzles attached thereto.

5 **Dry Pipe system**. A system employing nozzles attached to a piping system containing air or nitrogen under pressure, the release of which (as from the opening of a nozzle) permits the water pressure to open a valve known as a dry pipe valve. The water then flows into the piping system and out of the opened nozzle.

6 **Fire extinction**. A reduction of the heat release from the fire and a total elimination of all flames and glowing parts by means of direct and sufficient application of extinguishing media.

7 **Preaction system**. A system employing automatic nozzles attached to a piping system containing air that mayor may not be under pressure, with a supplemental detection system installed in the same area as the nozzles. Actuation of the detection system opens a valve that permits water to flow into the piping system and to be discharged from any nozzles that may be open.

8 **Water-based extinguishing medium** is fresh water or seawater with or without additives mixed to enhance fire-extinguishing capability.

9 **Wet pipe system**. A system employing nozzles attached to a piping system containing water and connected to a water supply so that water discharges immediately from the nozzles upon system activation.

Principal requirements for the system

10 The system should be capable of manual release.

11 The system should be capable of fire extinction, and tested to the satisfaction of the Administration in accordance with Appendix B to these guidelines.

12 The system should be available for immediate use and capable of continuously supplying water for at least 30 min in order to prevent re-ignition or fire spread within that period of time. Systems which operate at a reduced discharge rate after the initial extinguishing period should have a second full fire-extinguishing capability available within a 5 min period of initial activation.

13 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. Components within the protected spaces should be designed to withstand the elevated temperatures which could occur during a fire.

14 The system and its components should be designed and installed in accordance with international standards acceptable to the Organization[1] and manufactured and tested to the satisfaction of the Administration in accordance with appropriate elements of Appendices A and B to these guidelines.

16 The nozzle location, type of nozzle and nozzle characteristics should be within the limits tested to provide fire extinction as referred to in paragraph 10.

17 The electrical components of the pressure source for the system should have a minimum rating of IP 54. The system should be supplied by both main and emergency sources of power and should be provided with an automatic change-over switch. The emergency power supply should be provided from outside the protected machinery space.

18 The system should be provided with a redundant means of pumping. The capacity of the redundant means should be sufficient to compensate for the loss of any single supply pump. The system should be fitted with a permanent sea inlet and be capable of continuous operation using seawater.

19 The piping system should be sized in accordance with an hydraulic calculation technique.[2]

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[1] Pending the development of international standards acceptable to the Organization, national standards as prescribed by the Administration should be applied.

[2] Where the Hazen-Williams Method is used, the following values of the friction factor "C" for different pipe types which may be considered should apply:

Pipe type	**C**
Black or galvanized mild steel	100
Copper and copper alloys	150
Stainless steel	150

20 Systems capable of supplying water at the full discharge rate for 30 min may be grouped into separate sections within a protected space. The sectioning of the system within such spaces should be approved by the Administration in each case.

21 In all cases the capacity and design of the system should be based on the complete protection of the space demanding the greatest volume of water.

22 The system operation controls should be available at easily accessible positions outside the spaces to be protected and should not be liable to be cut off by a fire in the protected spaces.

23 Pressure source components of the system should be located outside the protected spaces.

24 A means for testing the operation of the system for assuring the required pressure and flow should be provided.

25 Activation of any water distribution valve should give a visual and audible alarm in the protected space and at a continuously manned central control station. An alarm in the central control station should indicate the specific valve activated.

26 Operating instructions for the system should be displayed at each operating position. The operating instructions should be in the official language of the flag State. If the language is neither English nor French, a translation into one of these languages should be included.

27 Spare parts and operating and maintenance instructions for the system should be provided as recommended by the manufacturer.

28 Additives should not be used for the protection of normally occupied spaces unless they have been approved for fire protection service by an independent authority. The approval should consider possible adverse health effects to exposed personnel, including inhalation toxicity.

APPENDIX A

COMPONENT MANUFACTURING STANDARDS OF EQUIVALENT WATER-BASED FIRE-EXTINGUISHING SYSTEMS

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Figures given in square brackets refer to ISO Standard 6182/1.

INTRODUCTION

This document is intended to address minimum fire protection performance, construction, and marking requirements, excluding fire performance, for water-mist nozzles.

Numbers in brackets following a section or sub-section heading refer to the appropriate section or paragraph in the Standard for Automatic sprinkler systems - Part 1: Requirements and methods of test for sprinklers, ISO 6182-1.

The requirements for automatically operating nozzles which involve release mechanism need not be met by nozzles of manually operating systems.

1 DEFINITIONS

1.1 Conductivity factor - A measure of the conductance between the nozzle's heat responsive element and the fitting expressed in units of $(m/s)^{0.5}$.

1.2 Rated working pressure - Maximum service pressure at which a hydraulic device is intended to operate.

1.3 Response time index: (RTI) - A measure of nozzle sensitivity expressed as $RTI = tu^{0.5}$, where **t** is the time constant of the heat responsive element in units of seconds, and **u** is the gas velocity expressed in metres per second. RTI can be used in combination with the conductivity factor (C) to predict the response of a nozzle in fire environments defined in terms of gas temperature and velocity versus time. RTI has units of $(m.s)^{0.5}$.

1.4 Standard orientation - In the case of nozzles with symmetrical heat responsive elements supported by frame arms, standard orientation is with the air flow perpendicular to both the axis of the nozzle's inlet and the plane of the frame arms. In the case of nonsymmetrical heat responsive elements, standard orientation is with the air flow perpendicular to both the inlet axis and the plane of the frame arms which produces the shortest response time.

1.5 Worst case orientation - The orientation which produces the longest response time with the axis of the nozzle inlet perpendicular to the air flow.

2 PRODUCT CONSISTENCY

2.1 It should be the responsibility of the manufacturer to implement a quality control programme to ensure that production continuously meets the requirements in the same manner as the originally tested samples.

2.2 The load on the heat responsive element in automatic nozzles should be set and secured by the manufacturer in such a manner so as to prevent field adjustment or replacement.

3 WATER-MIST NOZZLE REQUIREMENTS

3.1 Dimensions

Nozzles should be provided with a nominal 6 mm (1/4 in.) or larger nominal inlet thread or equivalent. The dimensions of all threaded connections should conform to International Standards where applied. National Standards may be used if International Standards are not applicable.

3.2 Nominal release temperatures (6.2)

3.2.1 The nominal release temperatures of automatic glass bulb nozzles should be as indicated in table 1.

3.2.2 the nominal release temperatures of fusible automatic element nozzles should b specified in advance by the manufacturer and verified in accordance with 3.3. Nominal release temperatures should be within the ranges specified in table 1.

3.3 Operating temperatures (see 4.6.1) [6.3]

Automatic nozzles should open within a temperature range of

$$X \pm 0.035.X + 0.62)^{o}C$$

where X is the nominal release temperature.

3.4 Water flow and distribution

3.4.1 Flow constant (see 4.10) [6.4.1]

3.4.1.1 The flow constant K for nozzles is given in the following formula:

$$K = Q/P^{0.5}$$

where:

P is the pressure in bars; and
Q is the flow rate in litres per min.

3.4.1.2 The value of the flow constant K published in the Manufacturer's Design and Installation Instructions should be verified using the test method of 4.10. The average flow constant K should be verified within ± 5% of the manufacturer's value.

3.5 Function (see 4.5) [6.5]

3.5.1 When tested in accordance with 4.5, the nozzle should open and, within 5 s after the release of the heat responsive element, should operate satisfactorily by complying with the requirements of 4.10. Any lodgement of released parts should be cleared within 60 s of release for standard response heat responsive elements and within 10 s of release for fast and special

response heat responsive elements or the nozzle should then comply with the requirement of 4.11.

3.5.2 The nozzle discharge components should not sustain significant damage as a result of the functional test specified in 4.5.6 and should have the same flow constant range and water droplet size and velocity within 5 percent of values as previously determined per 3.4.1 and 3.4.3.

3.6 Strength of body (see 4.3) [6.6]

The nozzle body should not show permanent elongation of more than 0.2% between the load-bearing points after being subjected to twice the average service load as determined using the method of 4.3.1.

3.7 Strength of release element [6.7]

3.7.1 Glass bulbs (see 4.9.1)

The lower tolerance limit for bulb strength should be greater than two times the upper tolerance limit for the bulb design load based on calculations with a degree of confidence of 0.99 for 99 percent of the samples as determined in 4.9.1. Calculations will be based on the Normal or Gaussian Distribution except where another distribution can be shown to be more applicable due to manufacturing or design factors.

3.7.2 Fusible elements (see 4.9.2)

Fusible heat-responsive elements in the ordinary temperature range should be designed to:

- sustain a load of 15 times its design load corresponding to the maximum service load measured in 4.3.1 for a period of 100 hours in accordance with 4.9.2.1, or

- demonstrate the ability to sustain the design load when tested in accordance with 4.9.2.2.

3.8 Leak resistance and hydrostatic strength (see 4.4) [6.8]

3.8.1 A nozzle should not show any sign of leakage when tested by the method specified in 4.4.1.

3.8.2 A nozzle should not rupture, operate or release any parts when tested by the method specified in 4.4.2.

3.9 Heat exposure [6.9]

3.9.1 Glass bulb nozzles (see 4.7.1)

There should be no damage to the glass bulb element when the nozzle is tested by the method specified in 4.7.1.

3.9.2 All uncoated nozzles (see 4.7.2)

Nozzles should withstand exposure to increased ambient temperature without evidence of weakness or failure, when tested by the method specified in 4.7.2.

3.9.3 Coated nozzles (see 4.7.3)

In addition to meeting the requirement of 4.7.2 in an uncoated version, coated nozzles should withstand exposure to ambient temperatures without evidence of weakness or failure of the coating, when tested by the method specified in 4.7.3.

3.10 Thermal shock (see 4.8) [6.10]

Glass bulb nozzles should not be damaged when tested by the method specified in 4.8. Proper operation is not considered as damage.

3.11 Corrosion [6.11]

3.11.1 Stress corrosion (see 4.12.1 and 4.12.2)

When tested in accordance with 4.12.1, all brass nozzles should show no fractures which could affect their ability to function as intended and satisfy other requirements.

When tested in accordance with 4.12.2, stainless steel parts of water-mist nozzles should show no fractures or breakage which could affect their ability to function as intended and satisfy other requirements.

3.11.2 Sulphur dioxide corrosion (see 4.12.3)

Nozzles should be sufficiently resistant to sulphur dioxide saturated with water vapour when conditioned in accordance with 4.12.2. Following exposure, five nozzles should operate when functionally tested at their minimum flowing pressure (see 3.5.1 and 3.5.2). The remaining five samples should meet the dynamic heating requirements of 3.14.2.

3.11.3 Salt spray corrosion (see 4.12.4)

Coated and uncoated nozzles should be resistant to salt spray when conditioned in accordance with 4.12.4. Following exposure, the samples should meet the dynamic heating requirements of 3.14.2.

3.11.4 Moist air exposure (see 4.12.5)

Nozzles should be sufficiently resistant to moist air exposure and should satisfy the requirements of 3.14.2 after being tested in accordance with 4.12.5.

3.12 Integrity of nozzle coatings [6.12]

3.12.1 Evaporation of wax and bitumen used for atmospheric protection of nozzles (see 4.13.1)

Waxes and bitumens used for coating nozzles should not contain volatile matter in sufficient quantities to cause shrinkage, hardening, cracking or flaking of the applied coating. The loss in mass should not exceed 5% of that of the original sample when tested by the method in 4.13.1.

3.12.2 Resistance to low temperatures (see 4.13.2)

All coatings used for nozzles should not crack or flake when subjected to low temperatures by the method in 4.13.2.

3.12.3 Resistance to high temperature (see 3.9.3)

Coated nozzles should meet the requirements of 3.9.3.

3.13 Water hammer (see 4.15) [6.13]

Nozzles should not leak when subjected to pressure surges from 4 bar to four times the rated pressure for operating pressures up to 100 bars and two times the rated pressure for pressures greater than 100 bar. They should show no signs of mechanical damage when tested in accordance with 4.15 and shall operate within the parameters of 3.5.1 at the minimum design pressure.

3.14 Dynamic heating (see 4.6.2) [6.14]

3.14.1 Automatic nozzles intended for installation in other than accommodation spaces and residential areas should comply with the requirements for RTI and C limits shown in Figure 1. Automatic nozzles intended for installation in accommodation spaces or residential areas should comply with fast response requirements for RTI and C limits shown in Figure 1. Maximum and minimum RTI values for all data points calculated using C for the fast and standard response nozzles should fall within the appropriate category shown in figure 1. Special response nozzles should have an average RTI value, calculated using C, between 50 and 80 with no value less than 40 or more than 100. When tested at an angular offset to the worst case orientation as described in section 4.6.2, the RTI should not exceed 600 $(m.s)^{0.5}$ or 250 percent of the value of RTI in the standard orientation, whichever is less. The angular offset should be 15º for standard response, 20º for special response and 25º for fast response.

3.14.2 After exposure to the corrosion test described in sections 3.11.2, 3.11.3 and 3.11.4, nozzles should be tested in the standard orientation as described in section 4.6.2.1 to determine the post exposure RTI. All post exposure RTI values should not exceed the limits shown in Figure 1 for the appropriate category. In addition, the average RTI value should not exceed 130% of the pre-exposure average value. All post exposure RTI values should be calculated as in section 4.6.2.3 using the pre-exposure conductivity factor (C).

3.15 Resistance to heat (see 4.14) [6.15]

Open nozzles should be sufficiently resistant to high temperatures when tested in accordance with 4.14. After exposure, the nozzle should not show: (1) visual breakage or deformation, (2) a change in flow constant K of more than 5 percent, and (3) no changes in the discharge characteristics of the Water Distribution Test (see 3.4.2) exceeding 5 percent.

3.16 Resistance to vibration (see 4.16) [6.16]

Nozzles should be able to withstand the effects of vibration without deterioration of their performance characteristics when tested in accordance with 4.16. After the vibration test of 4.16, nozzles should show no visible deterioration and should meet the requirements of 3.5 and 3.8.

3.17 Impact test (see 4.17) [6.17]

Nozzles should have adequate strength to withstand impacts associated with handling, transport and installation without deterioration of their performance or reliability. Resistance to impact should be determined in accordance with 4.1.

3.18 Lateral discharge (see 4.18) [6.19]

Nozzles should not prevent the operation of adjacent automatic nozzles when tested in accordance with 4.21.

3.19 30 day leakage resistance (see 4.19) [6.20]

Nozzles should not leak, sustain distortion or other mechanical damage when subjected to twice the rated pressure for 30 days. Following exposure, the nozzles should satisfy the test requirements of 4.22.

3.20 Vacuum resistance (see 4.23) [6.21]

Nozzles should not exhibit distortion, mechanical damage or leakage after being subjected to the test in 4.23.

3.21 Water shield [6.22 and 6.23]

3.21.1 General

An automatic nozzle intended for use at intermediate levels or beneath open grating should be provided with a water shield which complies with 3.21.2 and 3.21.3.

3.21.2 Angle of protection (see 4.21.1)

Water shields should provide an "angle of protection" of 45º or less for the heat responsive element against direct impingement of run-off water from the shield caused by discharge from nozzles at higher elevations. Compliance with this requirement should be determined in accordance with 4.24.1.

3.21.3 Rotation (see 4.21.2)

Rotation of the water shield should not alter the nozzle service load when evaluated in accordance with 4.24.2.

3.22 Clogging (see 4.21) [6.28.3]

A water-mist nozzle should show no evidence of clogging during 30 minutes of continuous flow at rated working pressure using water that has been contaminated in accordance with 4.21.3. Following the 30 minutes of flow, the water flow at rated pressure of the nozzle and strainer or filter should be within ± 10 percent of the value obtained prior to conducting the clogging test.

4.0 METHODS OF TEST [7]

4.1 General

The following tests should be conducted for each type of nozzle. Before testing, precise drawings of parts and the assembly should be submitted together with the appropriate specifications (using SI units). Tests should be carried out at an ambient temperature of (20,±5)ºC, unless other temperatures are indicated.

4.2 Visual examination [7.2]

Before testing, nozzles should be examined visually with respect to the following points:

(a) marking
(b) conformity of the nozzles with the manufacturer's drawings and specification
(c) obvious defects

4.3 Body strength test [7.3]

4.3.1 The design load should be measured on ten automatic nozzles by securely installing each nozzle, at room temperature, in a tensile/compression test machine and applying a force equivalent to the application of the rated working pressure.

An indicator capable of reading deflection to an accuracy of 0.01 mm should be used to measure any change in length of the nozzle between its load bearing points. Movement of the nozzle shank thread in the threaded bushing of the test machine should be avoided or taken into account.

The hydraulic pressure and load is then released and the heat responsive element is then removed by a suitable method. When the nozzle is at room temperature, a second measurement is to be made using the indicator.

An increasing mechanical load to the nozzle is then applied at a rate not exceeding 500 N/minute, until the indicator reading at the load bearing point initially measured returns to the initial value achieved under hydrostatic load. The mechanical load necessary to achieve this should be recorded as the service load. Calculate the average service load.

4.3.2 The applied load is then progressively increased at a rate not exceeding 500 N/minute on each of the five specimens until twice the average service load has been applied. Maintain this load for 15 ± 5 s.

The load is then removed and any permanent elongation as defined in 3.6 is recorded.

4.4 Leak resistance and hydrostatic strength tests (see 3.8) [7.4]

4.4.1 Twenty nozzles should be subjected to a water pressure of twice their rated working pressure, but not less than 34.5 bar. The pressure is increased from 0 bar to the test pressure, maintained at twice rated working pressure for a period of 3 min and then decreased to 0 bar. After the pressure has returned to 0 bar, it is increased to the minimum operating pressure specified by the manufacturer in not more than 5 s. This pressure is to be maintained for 15 s and then increased to rated working pressure and maintained for 15 s.

4.4.2 Following the test of 4.4.1, the twenty nozzles should be subjected to an internal hydrostatic pressure of four times the rated working pressure. The pressure is increased from 0 bar to four times the rated working pressure and held there for a period of 1 minute. The nozzle under test should not rupture, operate or release any of its operating parts during the pressure increase nor while being maintained at four times the rated working pressure for 1 minute.

4.5 Functional test (see 3.5) [7.5]

4.5.1 Nozzles having nominal release temperatures less than 78°C, should be heated to activation in an oven. While being heated, they should be subjected to each of the water pressures specified in 4.5.3 applied to their inlet. The temperature of the oven should be increased to 400 ± 20°C in 3 min measured in close proximity to the nozzle. Nozzles having nominal release temperatures exceeding 78°C should be heated using a suitable heat source. Heating should continue until the nozzle has activated.

4.5.2 Eight nozzles should be tested in each normal mounting position and at pressures equivalent to the minimum operating pressure, the rated working pressure and at the average operating pressure. The flowing pressure should be at least 75% of the initial operating pressure.

4.5.3 If lodgement occurs in the release mechanism at any operating pressure and mounting position, 24 more nozzles should be tested in that mounting position and at that pressure. The total number of nozzles for which lodgement occurs should not exceed 1 in the 32 tested at that pressure and mounting position.

4.5.4 Lodgement is considered to have occurred when one or more of the released parts lodge in the discharge assembly in such a way as to cause the water distribution to be altered after the period of time specified in 3.5.1.

4.5.5 In order to check the strength of the deflector/orifice assembly, three nozzles should be submitted to the functional test in each normal mounting position at 125 percent of the rated working pressure. The water should be allowed to flow at 125 percent of the rated working pressure for a period of 15 min.

4.6 Heat responsive element operating characteristics

4.6.1 Operating temperature test (see 3.3) [7.6]

Ten nozzles should be heated from room temperature to 20 to 22°C below their nominal release temperature. The rate of increase of temperature should not exceed 20°C/min and the temperature should be maintained for 10 min. The temperature should then be increased at a rate between 0.4°C/min to 0.7°C/min until the nozzle operates.

The nominal operating temperature should be ascertained with equipment having an accuracy of ±0.35% of the nominal temperature rating or ±0.25°C, whichever is greater.

The test should be conducted in a water bath for nozzles or separate glass bulbs having nominal release temperatures less than or equal to 80°C. A suitable oil should be used for higher-rated release elements. The liquid bath should be constructed in such a way that the temperature deviation within the test zone does not exceed 0.5%, or 0.5°C, whichever is greater.

4.6.2 Dynamic heating test (see 3.4)

4.6.2.1 Plunge test

Tests should be conducted to determine the standard and worst case orientations as defined in 1.4 and 1.5. Ten additional plunge tests should be performed at both of the identified orientations. The worst case orientation should be as defined in 3.14.1. The RTI is calculated as described in 4.6.2.3 and 4.6.2.4 for each orientation, respectively. The plunge tests are to be conducted using a brass nozzle mount designed such that the mount or water temperature rise does not exceed 2°C for the duration of an individual plunge test up to a response time of 55 s. (The temperature should be measured by a thermocouple heatsinked and embedded in the mount not more than 8 mm radially outward from the root diameter of the internal thread or by a thermocouple located in the water at the centre of the nozzle inlet.) If the response time is greater than 55 s, then the mount or water temperature in degrees Celsius should not increase more than 0.036 times the response time in seconds for the duration of an individual plunge test.

The nozzle under test should have 1 to 1.5 wraps of PTFE sealant tape applied to the nozzle threads. It should be screwed into a mount to a torque of 15 ±3 Nm. Each nozzle is to be mounted on a tunnel test section cover and maintained in a conditioning chamber to allow the nozzle and cover to reach ambient temperature for a period of not less than 30 min.

At least 25 ml of water, conditioned to ambient temperature, should be introduced into the nozzle inlet prior to testing. A timer accurate to ±0.01 s with suitable measuring devices to sense the time between when the nozzle is plunged into the tunnel and the time it operates should be utilized to obtain the response time.

A tunnel should be utilized with air flow and temperature conditions[3] at the test section (nozzle location) selected from the appropriate range of conditions shown in table 2. To minimize radiation exchange between the sensing element and the boundaries confining the flow,

[3] Tunnel conditions should be selected to limit maximum anticipated equipment error to 3%.

the test section of the apparatus should be designed to limit radiation effects to within ± 3% of calculated RTI values[4].

The range of permissible tunnel operating conditions is shown in table 2. The selected operating condition should be maintained for the duration of the test with the tolerances as specified by footnotes 4 and 5 in table 2.

4.6.2.2 Determination of conductivity factor (C) [7.6.2.2]

The conductivity factor (C) should be determined using the prolonged plunge test (see 4.6.2.2.1) or the prolonged exposure ramp test (see 4.6.2.2.2).

4.6.2.2.1 Prolonged plunge test [7.6.2.2.1]

The prolonged plunge test is an iterative process to determine C and may require up to twenty nozzle samples. A new nozzle sample must be used for each test in this section even if the sample does not operate during the prolonged plunge test.

The nozzle under test should have 1 to 1.5 wraps of PTFE sealant tape applied to the nozzle threads. It should be screwed into a mount to a torque of 15 + 3 Nm. Each nozzle is to be mounted on a tunnel test section cover and maintained in a conditioning chamber to allow the nozzle and cover to reach ambient temperature for a period of not less than 30 min. At least 25 ml of water, conditioned to ambient temperature, should be introduced into the nozzle inlet prior to testing.

A timer accurate to ± 0.01 s with suitable measuring devices to sense the time between when the nozzle is plunged into the tunnel and the time it operates should be utilized to obtain the response time.

The mount temperature should be maintained at 20 ± 0.5°C for the duration of each test. The air velocity in the tunnel test section at the nozzle location should be maintained with ± 2% of the selected velocity. Air temperature should be selected and maintained during the test as specified in table 3.

The range of permissible tunnel operating conditions is shown in table 3. The selected operating condition should be maintained for the duration of the test with the tolerances as specified in table 3.

To determine C, the nozzle is immersed in the test stream at various air velocities for a maximum of 15 min.[5] Velocities are chosen such that actuation is bracketed between two successive test velocities. That is, two velocities must be established such that at the lower velocity (u_j) actuation does not occur in the 15 min test interval. At the next higher velocity (u_h), actuation must occur within the 15 min. time limit. If the nozzle does not operate at the highest velocity, select an air temperature from table 3 for the next higher temperature rating.

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[4] A suggested method for determining radiation effects is by conducting comparative plunge tests on a blackened (high emissivity) metallic test specimen and a polished (low emissivity) metallic test specimen.

[5] If the value of C is determined to be less than 0.5 $(m.s)^{0.5}$ a C of 0.25 $(m.s)^{0.5}$ should be assumed for calculating RTI value.

Table 2 – Plunge oven test conditions

	Air temperature ranges*			Velocity ranges**		
Normal Temperature, ºC	**Standard Response, ºC**	**Special Response, ºC**	**Fast Response, m/s**	**Standard Response, m/s**	**Special Response, m/s**	**Fast Response Nozzle, m/s**
57 to 77	191 to 203	129 to 141	129 to 141	2.4 to 2.6	2.4 to 2.6	1.65 to 1.85
79 to 107	282 to 300	191 to 203	191 to 203	2.4 to 2.6	2.4 to 2.6	1.65 to 1.85
121 to 149	382 to 432	282 to 300	282 to 300	2.4 to 2.6	2.4 to 2.6	1.65 to 1.85
163 to 191	382 to 432	382 to 432	382 to 432	3.4 to 3.6	2.4 to 2.6	1.65 to 1.85

* The selected air temperature should be known and maintained constant within the test section throughout the test to an accuracy of ±1ºC for the air temperature range of 129 to 141ºC within the test section and within ±2ºC for all other air temperatures.

** The selected air velocity should be known and maintained constant throughout the test to an accuracy of ±0.03 m/s for velocities of 1.65 to 1.85 and 2.4 to 2.6 m/s and ±0.04 m/s for velocities of 3.4 to 3.6 m/s.

Table 3 – Plunge oven test conditions for conductivity determination

Nominal nozzle temperature, ºC	**Oven temperature, ºC**	**Maximum variation of air temperature during test, ºC**
57	85 to 91	± 1.0
58 to 77	124 to 130	± 1.5
78 to 107	193 to 201	± 3.0
121 to 149	287 to 295	± 4.5
163 to 191	402 to 412	± 6.0

Test velocity selection should ensure that:

$(U_H/U_L)^{0.5} \leq 1.1$

The test value of C is the average of the values calculated at the two velocities using the following equation:

$$C = (\Delta T_g / \Delta T_{ea} - 1)u^{0.5}$$

where:

ΔT_g Actual gas (air) temperature minus the mount temperature (Tm) in ºC.

ΔT_{ea} Mean liquid bath operating temperature minus the mount temperature (Tm) in ºC.

u Actual air velocity in the test section in m/s.

The nozzle C value is determined by repeating the bracketing procedure three times and calculating the numerical average of the three C values. This nozzle C value is used to calculate all standard orientation RTI values for determining compliance with 3.14.1.

4.6.2.2.2 Prolonged exposure ramp test [7.6.2.2.2]

The prolonged exposure ramp test for the determination of the parameter C should be carried out in the test section of a wind tunnel and with the requirements for the temperature in the nozzle mount as described for the dynamic heating test. A preconditioning of the nozzle is not necessary.

Ten samples should be tested of each nozzle type, all nozzles positioned in standard orientation. The nozzle should be plunged into an air stream of a constant velocity of 1 m/s ± 10% and an air temperature at the nominal temperature of the nozzle at the beginning of the test.

The air temperature should then be increased at a rate of 1 ± 0.25ºC/min until the nozzle operates. The air temperature, velocity and mount temperature should be controlled from the initiation of the rate of rise and should be measured and recorded at nozzle operation. The C value is determined using the same equation as in 4.6.2.2.1 as the average of the ten test values.

4.6.2.3 RTI value calculation [7.6.2.3]

The equation used to determine the RTI value is as follows:

$$RTI = \frac{-t_r\,(u)^{0.5}(1+C/u^{0.5})}{In\,[1-\Delta T_{ea}\quad (1+C/(u)^{\,0.5})/\Delta T_g\,]}$$

where:

t_r Response time of nozzles in seconds

u Actual air velocity in the test section of the tunnel in m/s from table 2

ΔT_{ea} Mean liquid bath operating temperature of the nozzle minus the ambient temperature in ºC

ΔT_g Actual air temperature in the test section minus the ambient temperature in ºC

C Conductivity factor as determined in 4.6.2.2

4.6.2.4 Determination of worst case orientation RTI

The equation used to determine the RTI for the worst case orientation is as follows:

$$RTI_{wc} = \frac{-t_{r-wc}\,(u)^{0.5}[(1+C(RTI_{wc}/RTI)/(u)^{0.5})]}{In\{1-\Delta T_{ea}\quad [1+C(RTI_{wc}/RTI)/(u)^{\,0.5})]/\Delta T_g\}}$$

where:

$T_{t\text{-}wc}$ Response time of the nozzles in seconds for the worst case orientation

All variables are known at this time per the equation in paragraph 4.6.2.3 except RTI_{wc} (Response Time Index for the worst case orientation) which can be solved iteratively per the above equation.

In the case of fast response nozzles, if a solution for the worse case orientation RTI is unattainable, plunge testing in the worst case orientation should be repeated using the plunge test conditions under Special Response shown in table 2.

4.7 Heat exposure test [7.7]

4.7.1 Glass bulb nozzles (see 3.9.1)

Glass bulb nozzles having nominal release temperatures less than or equal to 80°C should be heated in a water bath from a temperature of (20 ± 5)ºC to (20 ± 2) ºC below their nominal release temperature. The rate of increase of temperature should not exceed 20°C/min. High temperature oil, such as silicone oil should be used for higher temperature rated release elements.

This temperature should then be increased at a rate of 1°C/min to the temperature at which the gas bubble dissolves, or to a temperature 5°C lower than the nominal operating temperature, whichever is lower. Remove the nozzle from the liquid bath and allow it to cool in air until the gas bubble has formed again. During the cooling period, the pointed end of the glass bulb (seal end) should be pointing downwards. This test should be performed four times on each of four nozzles.

4.7.2 All uncoated nozzles (see 3.9.2) [7.7.2]

Twelve uncoated nozzles should be exposed for a period of 90 days to a high ambient temperature that is 11°C below the nominal rating or at the temperature shown in table 4, whichever is lower, but not less than 49°C. If the service load is dependent on the service pressure, nozzles should be tested under the rated working pressure. After exposure, four of the nozzles should be subjected to the tests specified in 4.4.1, four nozzles to the test of 4.5.1, two at the minimum operating pressure and two at the rated working pressure, and four nozzles to the requirements of 3.3. If a nozzle fails the applicable requirements of a test, eight additional nozzles should be tested as described above and subjected to the test in which the failure was recorded. All eight nozzles should comply with the test requirements.

4.7.3 Coated nozzles (see 3.9.3) [7.7.3]

In addition to the exposure test of 4.7.2 in an uncoated version, twelve coated nozzles should be exposed to the test of 4.7.2 using the temperatures shown in table 4 for coated nozzles.

The test should be conducted for 90 days. During this period, the sample should be removed from the oven at intervals of approximately 7 days and allowed to cool for 2 h to 4 h. During this cooling period, the sample should be examined. After exposure, four of the nozzles should be subjected to the tests specified in 4.4.1, four nozzles to the test of 4.5.1; two at the

minimum operating pressure and two at the rated working pressure, and four nozzles to the requirements of 3.3.

Table 4 – Test temperatures for coated and uncoated nozzles

Values in degrees Celsius		
Nominal release Temperature	**Uncoated nozzle test temperature**	**Coated nozzle test temperature**
57-60	49	49
61-77	52	49
78-107	79	66
108-149	121	107
150-191	149	149
192-246	191	191
247-302	246	246
303-343	302	302

4.8 Thermal shock test for glass bulb nozzles (see 3.10) [7.8]

Before starting the test, condition at least 24 nozzles at room temperature of 20 to 25ºC for at least 30 min.

The nozzle should be immersed in a bath of liquid, the temperature of which should be 10 ± 2ºC below the nominal release temperature of the nozzles. After 5 min., the nozzles are to be removed from the bath and immersed immediately in another bath of liquid, with the bulb seal downwards, at a temperature of 10 ± 2ºC. Then test the nozzles in accordance with 4.5.1.

4.9 Strength test for release elements [7.9]

4.9.1 Glass bulbs (see 3.7.1) [7.9.1]

At least 15 sample bulbs in the lowest temperature rating of each bulb type should be positioned individually in a text fixture using the sprinkler seating parts. Each bulb should then be subjected to a uniformly increasing force at a rate not exceeding 250 N/s in the test machine until the bulb fails.

Each test should be conducted with the bulb mounted in new seating parts. The mounting device may be reinforced externally to prevent its collapse, but in a manner which does not interfere with bulb failure.

Record the failure load for each bulb. Calculate the lower tolerance limit (TLI) for bulb strength. Using the values of service load recorded in 4.3.1, calculate the upper tolerance limit (TL2) for the bulb design load. Verify compliance with 3.7.1.

4.9.2 Fusible elements (see 3.7.2)

4.10 Water flow test (see 3.4.1) [7.10]

The nozzle and a pressure gauge should be mounted on a supply pipe. The water flow should be measured at pressures ranging from the minimum operating pressure to the rated

working pressure at intervals of approximately 10% of the service pressure range on two sample nozzles. In one series of tests, the pressure should be increased from zero to each value and, in the next series, the pressure shall be decreased from the rated pressure to each value. The flow constant, K, should be averaged from each series of readings, i.e., increasing pressure and decreasing pressure. During the test, pressures should be corrected for differences in height between the gauge and the outlet orifice of the nozzle.

4.11 Corrosion tests [7.12]

4.11.1 Stress corrosion test for brass nozzle parts (see 3.11.1)

Five nozzles should be subjected to the following aqueous ammonia test. The inlet of each nozzle should be sealed with a nonreactive cap, e.g., plastic.

The samples are degreased and exposed for 10 days to a moist ammonia-air mixture in a glass container of volume 0.02 ± 0.01 m^3.

An aqueous ammonia solution, having a density of 0.94 g/cm^3, should be maintained in the bottom of the container, approximately 40 mm below the bottom of the samples. A volume of aqueous ammonia solution corresponding to 0.01 ml per cubic centimetre of the volume of the container will give approximately the following atmospheric concentrations: 35% ammonia, 5% water vapour, and 60% air. The inlet of each sample should be sealed with a nonreactive cap, e.g. plastic.

The moist ammonia-air mixture should be maintained as closely as possible at atmospheric pressure, with the temperature maintained at 34 ± 2°C. Provision should be made for venting the chamber via a capillary tube to avoid the build-up of pressure. Specimens should be shielded from condensate drippage.

After exposure, rinse and dry the nozzles, and conduct a detailed examination. If a crack, delamination or failure of any operating part is observed, the nozzle(s) should be subjected to a leak resistance test at the rated pressure for 1 min and to the functional test at the minimum flowing pressure (see 3.1.5).

Nozzles showing cracking, delamination or failure of any non-operating part should not show evidence of separation of permanently attached parts when subjected to flowing water at the rated working pressure for 30 min.

4.11.2 Stress-Corrosion Cracking of Stainless Steel Nozzle Parts (see 3.11.1)

4.11.2.1 Five samples are to be degreased prior to being exposed to the magnesium chloride solution.

4.11.2.2 Parts used in nozzles are to be placed in a 500-millilitre flask that is fitted with a thermometer and a wet condenser approximately 760 mm long. The flask is to be filled approximately one-half full with a 42% by weight magnesium chloride solution, placed on a thermostatically-controlled electrically heated mantel, and maintained at a boiling temperature of 150 ± 1°C. The parts are to be unassembled, that is, not contained in a nozzle assembly. The exposure is to last for 500 hours.

4.11.2.3 After the exposure period, the test samples are to be removed from the boiling magnesium chloride solution and rinsed in deionized water.

4.11.2.4 The test samples are then to be examined using a microscope having a magnification of 25X for any cracking, delamination, or other degradation as a result of the test exposure. Test samples exhibiting degradation are to be tested as described in 4.12.5.5 or 4.12.5.6, as applicable. Test samples not exhibiting degradation are considered acceptable without further test.

4.11.2.5 Operating parts exhibiting degradation are to be further tested as follows. Five new sets of parts are to be assembled in nozzle frames made of materials that do not alter the corrosive effects of the magnesium chloride solution on the stainless steel parts. These test samples are to be degreased and subjected to the magnesium chloride solution exposure specified in paragraph 4.12.5.2. Following the exposure, the test samples should withstand, without leakage, a hydrostatic test pressure equal to the rated working pressure for 1 minute and then be subjected to the functional test at the minimum operating pressure in accordance with 4.5.1.

4.11.2.6 Non-operating parts exhibiting degradation are to be further tested as follows. Five new sets of parts are to be assembled in nozzle frames made of materials that do not alter the corrosive effects of the magnesium chloride solution on the stainless steel parts. These test samples are to be degreased and subjected to the magnesium chloride solution exposure specified in paragraph 4.12.5.1. Following the exposure, the test samples should withstand a flowing pressure equal to the rated working pressure for 30 minutes without separation of permanently attached parts.

4.11.3 Sulphur dioxide corrosion test (see 3.11.2 and 3.14.2)

Ten nozzles should be subjected to the following sulphur dioxide corrosion test. The inlet of each sample should be sealed with a nonreactive cap, e.g. plastic.

The test equipment should consist of a 5 litre vessel (instead of a 5 litre vessel, other volumes up to 15 litre may be used in which case the quantities of chemicals given below shall be increased in proportion) made of heat-resistant glass, with a corrosion-resistant lid of such a shape as to prevent condensate dripping on the nozzles. The vessel should be electrically heated through the base, and provided with a cooling coil around the side walls. A temperature sensor placed centrally 160 mm ± 20 mm above the bottom of the vessel should regulate the heating so that the temperature inside the glass vessel is 45°C ± 3ºC. During the test, water should flow through the cooling coil at a sufficient rate to keep the temperature of the discharge water below 30°C. This combination of heating and cooling should encourage condensation on the surfaces of the nozzles. The sample nozzles should be shielded from condensate drippage.

The nozzles to be tested should be suspended in their normal mounting position under the lid inside the vessel and subjected to a corrosive sulphur dioxide atmosphere for 8 days. The corrosive atmosphere should be obtained by introducing a solution made up by dissolving 20 g of sodium thiosulphate ($Na_2S_20_3H_2O$) crystals in 500 ml of water.

For at least six days of the 8-day exposure period, 20 ml of dilute sulphuric acid consisting of 156 ml of normal H_2SO_4 (0.5 mol/litre) diluted with 844 ml of water should be added at a constant rate. After 8 days, the nozzles should be removed from the container and allowed to dry for 4 to 7 days at a temperature not exceeding 35°C with a relative humidity not greater than 70%.

After the drying period, five nozzles should be subjected to a functional test at the minimum operating pressure in accordance with 4.5.1 and five nozzles should be subjected to the dynamic heating test in accordance with 3.14.2.

4.11.4 Salt spray corrosion test (see 3.11.3 and 3.14.2) [7.12.3]

4.11.4.1 Nozzles intended for normal atmospheres

Ten nozzles should be exposed to a salt spray within a fog chamber. The inlet of each sample should be sealed with a nonreactive cap, e.g. plastic.

During the corrosive exposure, the inlet thread orifice is to be sealed by a plastic cap after the nozzles have been filled with deionized water. The salt solution should be a 20% by mass sodium chloride solution in distilled water. The pH should be between 6.5 and 7.2 and the density between 1.126 g/ml and 1.157 g/ml when atomized at 35ºC. Suitable means of controlling the atmosphere in the chamber should be provided. The specimens should be supported in their normal operating position and exposed to the salt spray (fog) in a chamber having a volume of at least 0.43 m^3 in which the exposure zone shall be maintained at a temperature of 35 ± 2ºC. The temperature should be recorded at least once per day, at least 7 hours apart (except weekends and holidays when the chamber normally would not be opened). Salt solution should be supplied from a recirculating reservoir through air-aspirating nozzles, at a pressure between 0.7 bar (0.07 MPa) and 1.7 bar (0.17 MPa). Salt solution runoff from exposed samples should be collected and should not return to the reservoir for recirculation. The sample nozzles should be shielded from condensate drippage.

Fog should be collected from at least two points in the exposure zone to determine the rate of application and salt concentration. The fog should be such that for each 80 cm^2 of collection area, 1 m1 to 2 ml of solution should be collected per hour over a 16 hour period and the salt concentration shall be 20 ± 1% by mass.

The nozzles should withstand exposure to the salt spray for a period of 10 days. After this period, the nozzles should be removed from the fog chamber and allowed to dry for 4 to 7 days at a temperature of 20°C to 25°C in an atmosphere having a relative humidity not greater than 70%. Following the drying period, five nozzles should be submitted to the functional test at the minimum operating pressure in accordance with 4.5.1 and five nozzles should be subjected to the dynamic heating test in accordance with 3.14.2.

4.11.4.2 Nozzles intended for corrosive atmospheres [7.12.3.2]

Five nozzles should be subjected to the tests specified in 4.12.3.1 except that the duration of the salt spray exposure shall be extended from 10 days to 30 days.

4.11.5 Moist air exposure test (see 3.11.4 and 3.14.2) [7.12.4]

Ten nozzles should be exposed to a high temperature-humidity atmosphere consisting of a relative humidity of 98% ± 2% and a temperature of 95°C ± 4ºC. The nozzles are to be installed on a pipe manifold containing de-ionized water. The entire manifold is to be placed in the high temperature humidity enclosure for 90 days. After this period, the nozzles should be removed from the temperature-humidity enclosure and allowed to dry for 4-7 days at a temperature of 25 ± 5°C in an atmosphere having a relative humidity of not greater than 70%. Following the

drying period, five nozzles should be functionally tested at the minimum operating pressure in accordance with 4.5.1 and five nozzles should be subjected to the dynamic heating test in accordance with 3.14.2.

NOTE: At the manufacturer's option, additional samples may be furnished for this test to provide early evidence of failure. The additional samples may be removed from the test chamber at 30-day intervals for testing.

4.12 Nozzle coating tests [7.13]

4.12.1 Evaporation test (see 3.12.1) [7.13.1]

A 50 cm^3 sample of wax or bitumen should be placed in a metal or glass cylindrical container, having a flat bottom, an internal diameter of 55 mm and an internal height of 35 mm. The container, without lid, should be placed in an automatically controlled electric, constant ambient temperature oven with air circulation. The temperature in the oven should be controlled at 16°C below the nominal release temperature of the nozzle, but at not less than 50°C. The sample should be weighed before and after 90 days exposure to determine any loss of volatile matter; the sample should meet the requirements of 3.12.1.

4.13.2 Low-temperature test (see 3.12.2) [7.13.2]

Five nozzles, coated by normal production methods, whether with wax, bitumen or a metallic coating, should be subjected to a temperature of -10°C for a period of 24 hours. On removal from the low-temperature cabinet, the nozzles should be exposed to normal ambient temperature for at least 30 min before examination of the coating to the requirements of 3.1.12.2.

4.13 Heat-resistance test (see 3.15) [7.14]

One nozzle body should be heated in an oven at 800°C for a period of 15 min, with the nozzle in its normal installed position. The nozzle body should then be removed, holding it by the threaded inlet, and should be promptly immersed in a water bath at a temperature of approximately 15°C. It should meet the requirements of 3.14.

4.14 Water-hammer test (see 3.13) [7.15]

Five nozzles should be connected, in their normal operating position, to the test equipment. After purging the air from the nozzles and the test equipment, 3,000 cycles of pressure varying from 4 ± 2 bar ((0.4 ± 0.2)MPa) to twice the rated working pressure should be generated. The pressure should be raised from 4 bar to twice the rated pressure at a rate of 60 ± 10 bar/s. At least 30 cycles of pressure per minute should be generated. The pressure should be measured with an electrical pressure transducer.

Visually examine each nozzle for leakage during the test. After the test, each nozzle should meet the leakage resistance requirement of 3.8.1 and the functional requirement of 3.5.1 at the minimum operating pressure.

4.15 Vibration test (see 3.16) [7.16]

4.15.1 Five nozzles should be fixed vertically to a vibration table. They should be subjected at room temperature to sinusoidal vibrations. The direction of vibration should be along the axis of the connecting thread.

4.15.2 The nozzles should be vibrated continuously from 5 Hz to 40 Hz at a maximum rate of 5 min/octave and an amplitude of 1 mm (1/2 peak-to-peak value). If one or more resonant points are detected, the nozzles after coming to 40 Hz, should be vibrated at each of these resonant frequencies for 120 hours/number of resonances. If no resonances are detected, the vibration from 5 Hz to 40 Hz should be continued for 120 hours.

4.15.3 The nozzle should then be subjected to the leakage test in accordance with 3.8.1 and the functional test in accordance with 3.5.1 at the minimum operating pressure.

4.16 Impact test (see 3.17) [7.17]

Five nozzles should be tested by dropping a mass onto the nozzle along the axial centreline of waterway. The kinetic energy of the dropped mass at the point of impact should be equivalent to a mass equal to that of the test nozzle dropped from a height 1 m. See Figure 2. The mass is to be prevented from impacting more than once upon each sample.

Following the test a visual examination of each nozzle shall show no signs of fracture, deformation, or other deficiency. If none is detected, the nozzles should be subjected to the leak resistance test, described in 4.4.1. Following the leakage test, each sample should meet the functional test requirement of 4.5.1 at a pressure equal to the minimum flowing pressure.

4.17 Lateral discharge test (see 3.18) [7.19]

Water is to be discharged from a spray nozzle at the minimum operating and rated working pressure. A second automatic nozzle located at the minimum distance specified by the manufacturer is mounted on a pipe parallel to the pipe discharging water.

The nozzle orifices or distribution plates (if used), are to be placed 550 mm, 356 mm and 152 mm below a flat smooth ceiling for three separate tests, respectively at each test pressure. The top of a square pan measuring 305 mm square and 102 mm deep is to be positioned 152 mm below the heat responsive element for each test. The pan is filled with 0.47 litres of heptane. After ignition, the automatic nozzle is to operate before the heptane is consumed.

4.18 30 day leakage test (see 3.19) [7.20]

Five nozzles are to be installed on a water filled test line maintained under a constant pressure of twice the rated working pressure for 30 days at an ambient temperature of (20 ± 5°C).

The nozzles should be inspected visually at least weekly for leakage. Following completion of this 30 day test, all samples should meet the leak resistance requirements specified in 3.2.4 and should exhibit no evidence of distortion or other mechanical damage.

4.19 Vacuum test (see 3.20) [7.21]

Three nozzles should be subjected to a vacuum of 460 mm of mercury applied to a nozzle inlet for 1 min at an ambient temperature of (20 ± 5°C). Following this test, each sample should be examined to verify that no distortion or mechanical damage has occurred and then should meet the leak resistance requirements specified in 4.4.1.

4.20 Clogging Test (see 3.22) [7.28]

4.20.1 The water flow rate of an open water-mist nozzle with its strainer or filter should be measured at its rated working pressure. The nozzle and strainer or filter should then be installed in test apparatus described in Figure 3 and subjected to 30 minutes of continuous flow at rated working pressure using contaminated water which has been prepared in accordance with 4.20.3.

4.20.2 Immediately following the 30 minutes of continuous flow with the contaminated water, the flow rate of the nozzle and strainer or filter should be measured at rated working pressure. No removal, cleaning or flushing of the nozzle, filter or strainer is permitted during the test.

4.20.3 The water used during the 30 minutes of continuous flow at rated working pressure specified in 4.20.1 should consist of 60 litres of tap water into which has been mixed 1.58 kilograms of contaminants which sieve as described in table 6. The solution should be continuously agitated during the test.

4.20.4 Alternative supply arrangements to the apparatus shown in figure 3 may be used where damage to the pump is possible. Restrictions to piping defined by note 2 of table 5 should apply to such systems.

Table 6 – Contaminant for the contaminated water cycling test

SIEVE DESIGNATION*	NOMINAL SIEVE OPENING, MM	GRAMS OF CONTAMINANT (± 5 PERCENT)**		
		PIPE SCALE	TOP SOIL	SAND
No. 25	0.706	-	456	200
No. 50	0.297	82	82	327
No. 100	0.150	84	6	89
No. 200	0.074	81	-	21
No. 325	0.043	153	-	3
	TOTAL	400	544	640

* Sieve designations correspond with those specified in the standard for wire-cloth sieves for testing purposes, ASTM E11-87, CENCO-MEINZEN sieve sizes 25 mesh, 50 mesh, 100 mesh, 200 mesh and 325 mesh, corresponding with the number designation in the table, have been found to comply with ASTM E11-87.

** The amount of contaminant may be reduced by 50 percent for nozzles limited to use with copper or stainless steel piping and by 90 per cent for nozzles having a rated pressure of 50 bar or higher and limited to use with stainless steel piping.

5 WATER-MIST NOZZLE MARKING

5.1 General

Each nozzle complying with the requirements of this Standard should be permanently marked as follows:

(a) trademark or manufacturer's name

(b) model identification

(c) manufacturer's factory identification. This is only required if the manufacturer has more than one nozzle manufacturing facility

(d) nominal year of manufacture[6] (automatic nozzles only)

(e) nominal release temperature[7]

(f) K-factor. This is only required if a given model nozzle is available with more than 1 orifice size.

In countries where colour-coding of yoke arms of glass bulb nozzles is required, the colour code for fusible element nozzles should be used.

5.2 Nozzle housings

Recessed housings, if provided, should be marked for use with the corresponding nozzles unless the housing is a non-removable part of the nozzle.

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[6] The year of manufacture may include the last three months of the preceding year and the first six months of the following year. Only the last two digits need be indicated.

[7] Except for coated and plated nozzles, the nominal release temperature range should be colour-coded on the nozzle to identify the nominal rating. The colour code should be visible on the yoke arms holding the distribution plate for fusible element nozzles, and should be indicated by the colour of the liquid in glass bulbs. The nominal temperature rating should be stamped or cast on the fusible element of fusible element nozzles. All nozzles should be stamped, cast, engraved or colour-coded in such a way that the nominal rating is recognizable even if the nozzle has operated. This should be in accordance with table 1.

FIGURE 1

RTI AND C LIMITS FOR STANDARD ORIENTATION

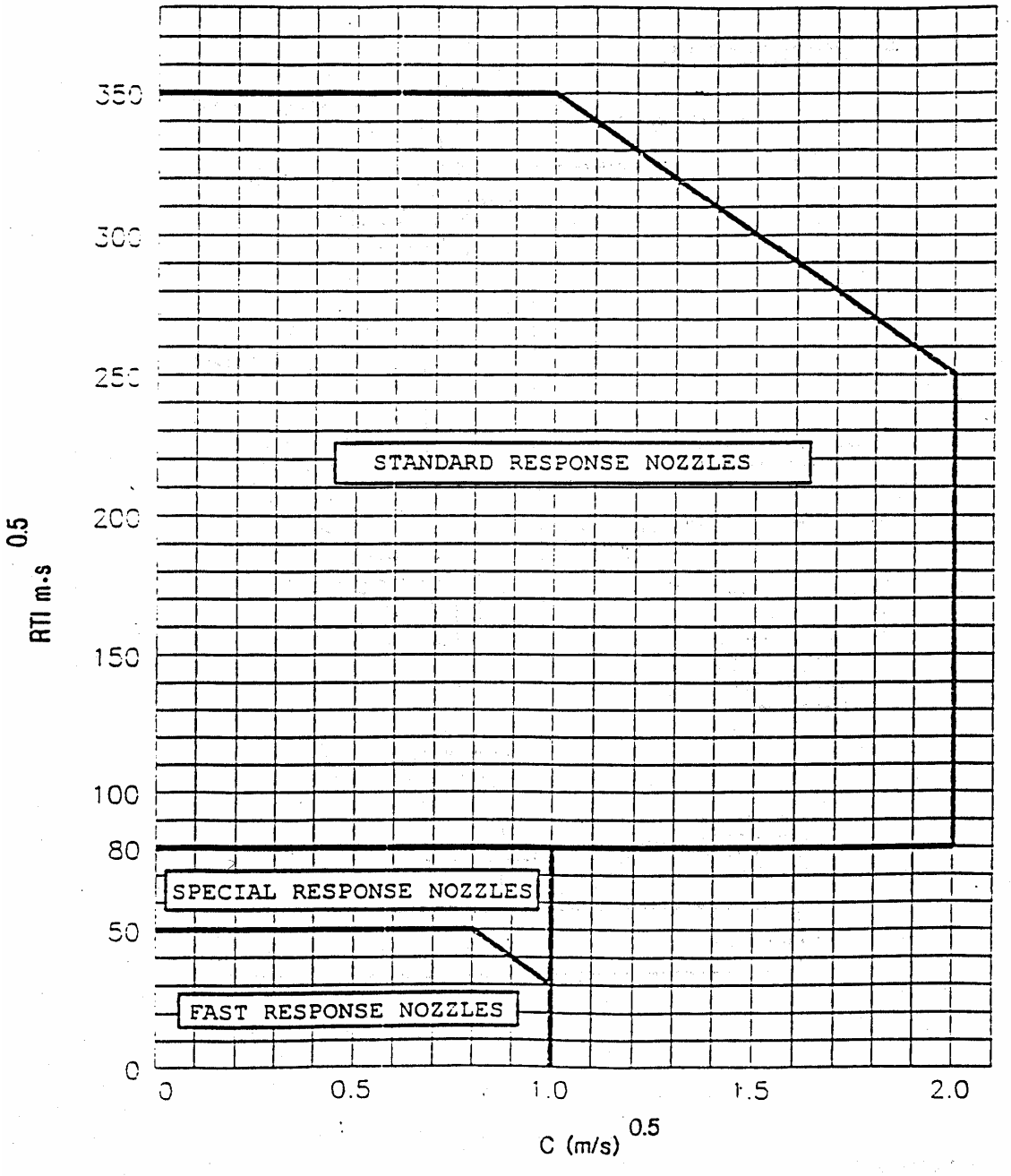


FIGURE 2

IMPACT TEST APPARATUS

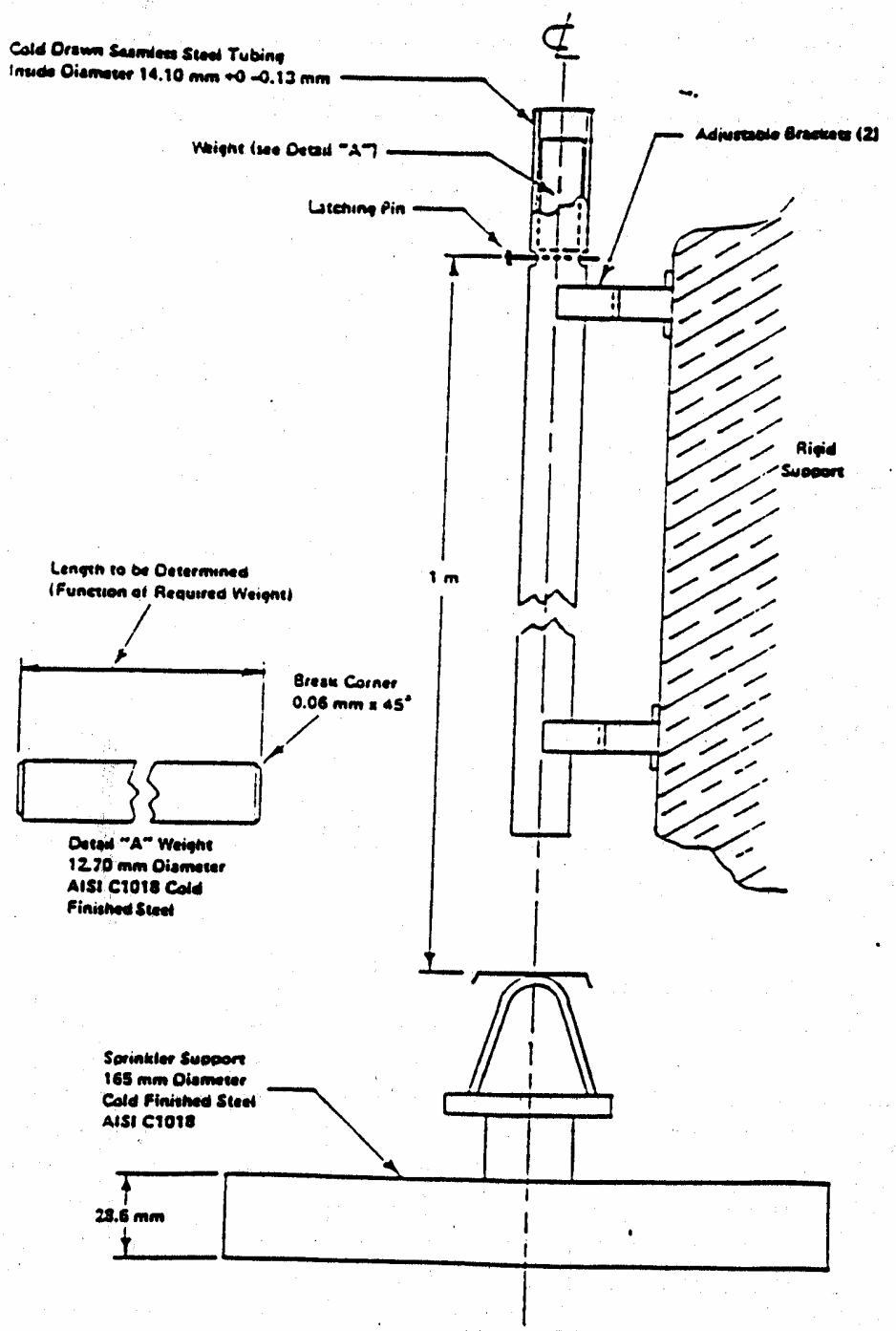
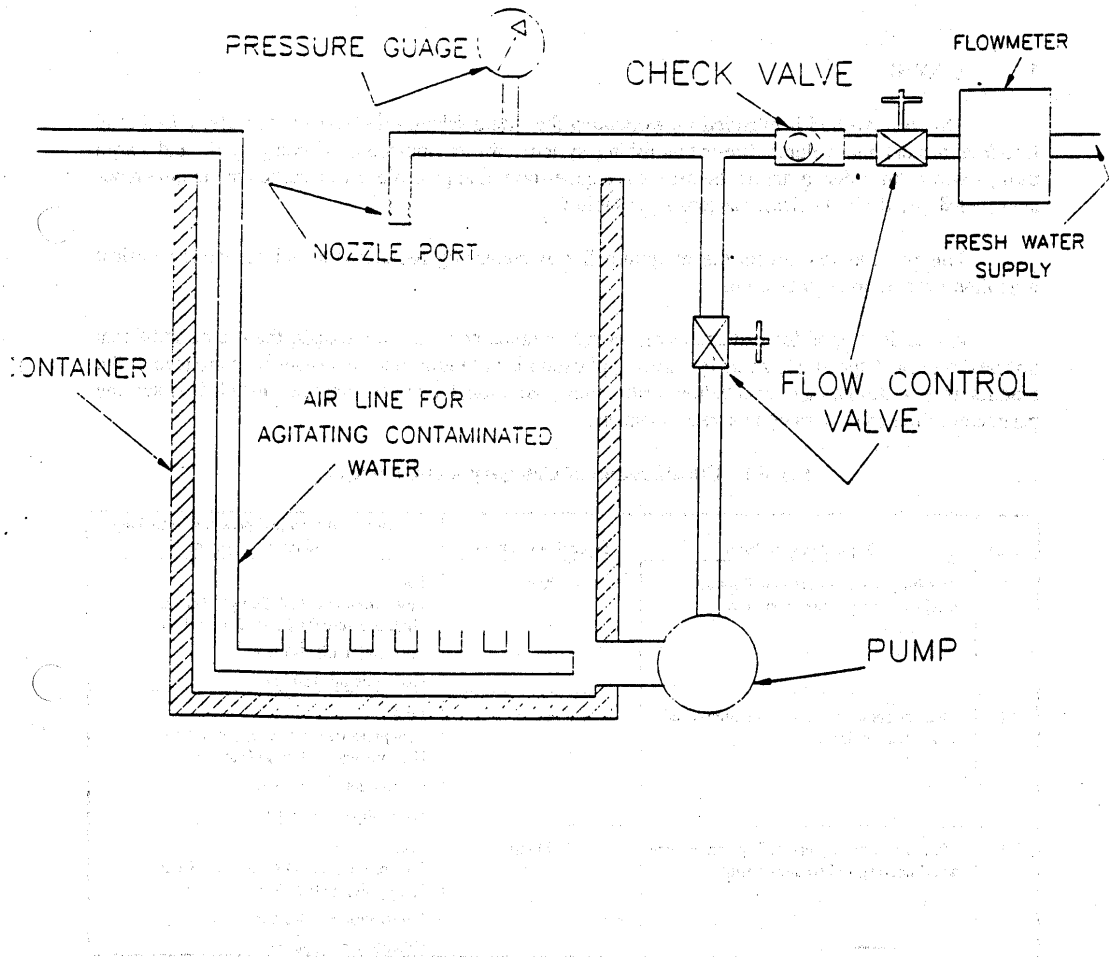


FIGURE 3

CLOGGING TEST APPARATUS



APPENDIX B

TEST METHOD FOR FIRE TESTING EQUIVALENT WATER-BASED FIRE-EXTINGUISHING SYSTEMS FOR MACHINERY SPACES OF CATEGORY A AND CARGO PUMP-ROOMS

1 SCOPE

This test method is intended for evaluating the extinguishing effectiveness of water-based total flooding fire-extinguishing systems for the protection of engine-rooms of category A and cargo pump-rooms.

The test method covers the minimum fire-extinguishing requirement and prevention against reignition for fires in engine-rooms.

It was developed for systems using ceiling mounted nozzles or multiple levels of nozzles. Bilge nozzles are required for all systems. The bilge nozzles may be part of the main system, or they may be a separate bilge area protection system.

In the tests, the use of additional nozzles to protect specific hazards by direct application is not permitted. However for ship board applications additional nozzles may be added as recommended by the manufacturer.

2 FIELD OF APPLICATION

The test method is applicable for water-based fire-extinguishing systems which will be used as alternative fire-extinguishing systems as required by SOLAS regulation II-2/10.4.1 and II-2/10.9.1. For the installation of the system, nozzles shall be installed to protect the entire hazard volume (total flooding). The installation specification provided by the manufacturer should include maximum horizontal and vertical nozzle spacing, maximum enclosure height, distance of nozzles below the ceiling and maximum enclosure volume which, as a principle, should not exceed the values used in approval fire test. However, when based on the scientific methods developed by the Organization*, scaling from the maximum tested volume to a larger volume may be permitted. The scaling should not exceed twice the tested volume.

3 SAMPLING

The components to be tested should be supplied by the manufacturer together with design and installation criteria, operational instructions, drawings and technical data sufficient for the identification of the components.

4 METHOD OF TEST

4.1 Principle

This test procedure enables the determination of the effectiveness of different water-based extinguishing systems against spray fires, cascade fires, pool fires, and Class A fires which are obstructed by an engine mock-up.

* To be developed by the Organization.

4.2 Apparatus

4.2.1 *Engine mock-up*

The fire test should be performed in a test apparatus consisting of:

.1 an engine mock-up of the size (width × length × height) of 1 m × 3 m × 3 m constructed of sheet steel with a nominal thickness of 5 mm. The mock-up is fitted with two steel tubes of 0.3 m in diameter and 3 m in length that simulate exhaust manifolds and a grating. At the top of the mock-up, a 3 m^2 tray is arranged (see figure 1); and

.2 a floor plate system of the size (width × length × height) of 4 m × 6 m × 0.5 m, surrounding the mock-up. Provision shall be made for placement of the fuel trays, described in table 1, and located as described in figure 1.

4.2.2 *Fire test compartment*

The tests should be performed in a room having a specified area greater than 100 m^2, a specified height of at least 5 m and ventilation through a door opening of 2 m × 2 m in size. Fires and engine mock-up should be according to tables 1, 2, 3 and figure 2.

The test hall should have an ambient temperature of between 10°C and 30°C at the start of each test.

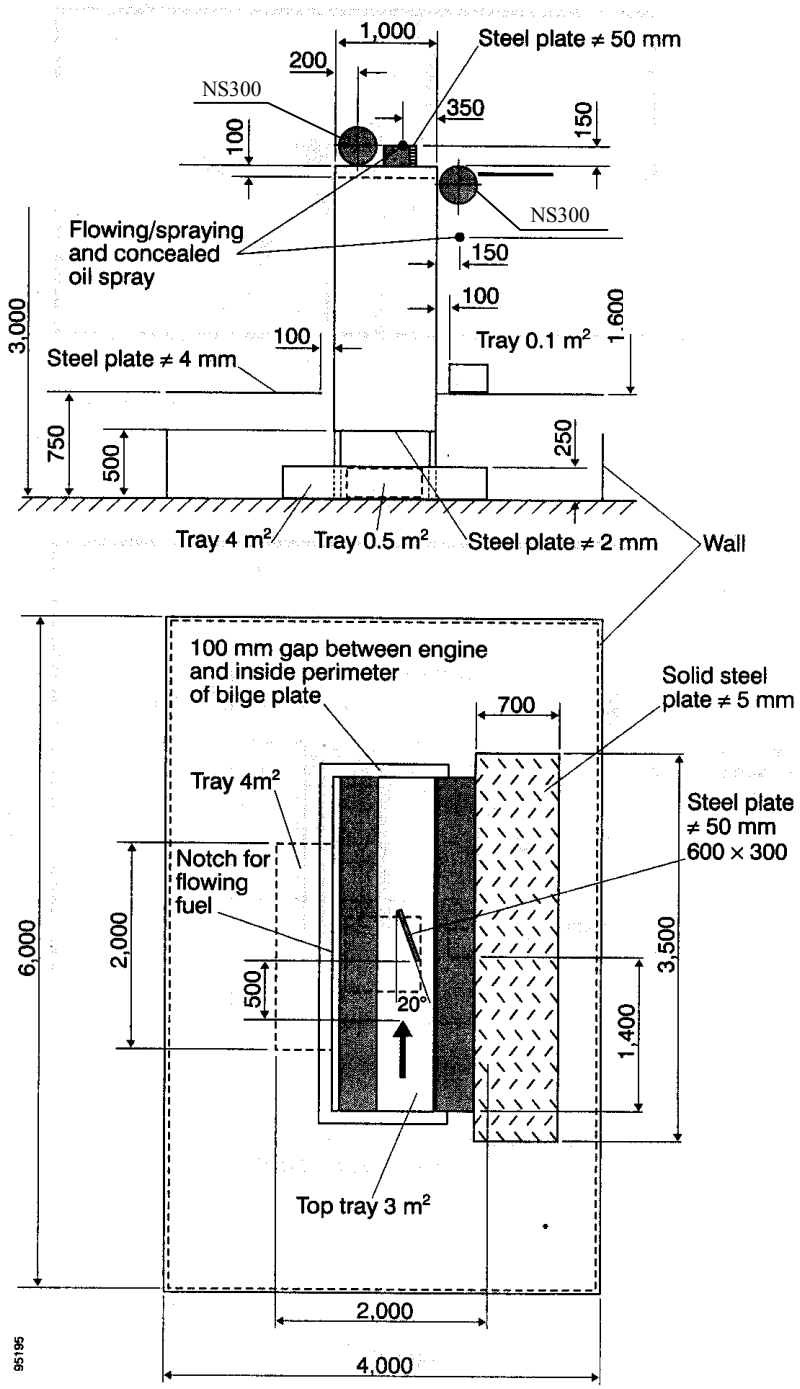

1,000
Steel plate ≠ 50 mm
200
NS300
350
150
100
NS300
Flowing/spraying
and concealed
oil spray
150
100
3,000
100
Tray 0.1 m²
1,600
Steel plate ≠ 4 mm
750
500
250
Tray 4 m²
Tray 0.5 m²
Steel plate ≠ 2 mm
Wall
100 mm gap between engine
and inside perimeter
of bilge plate
700
Solid steel
plate ≠ 5 mm
Tray 4m²
Steel plate
≠ 50 mm
600 × 300
Notch for
flowing
fuel
6,000
2,000
500
20°
3,500
1,400
Top tray 3 m²
2,000
4,000
95195

Figure 1

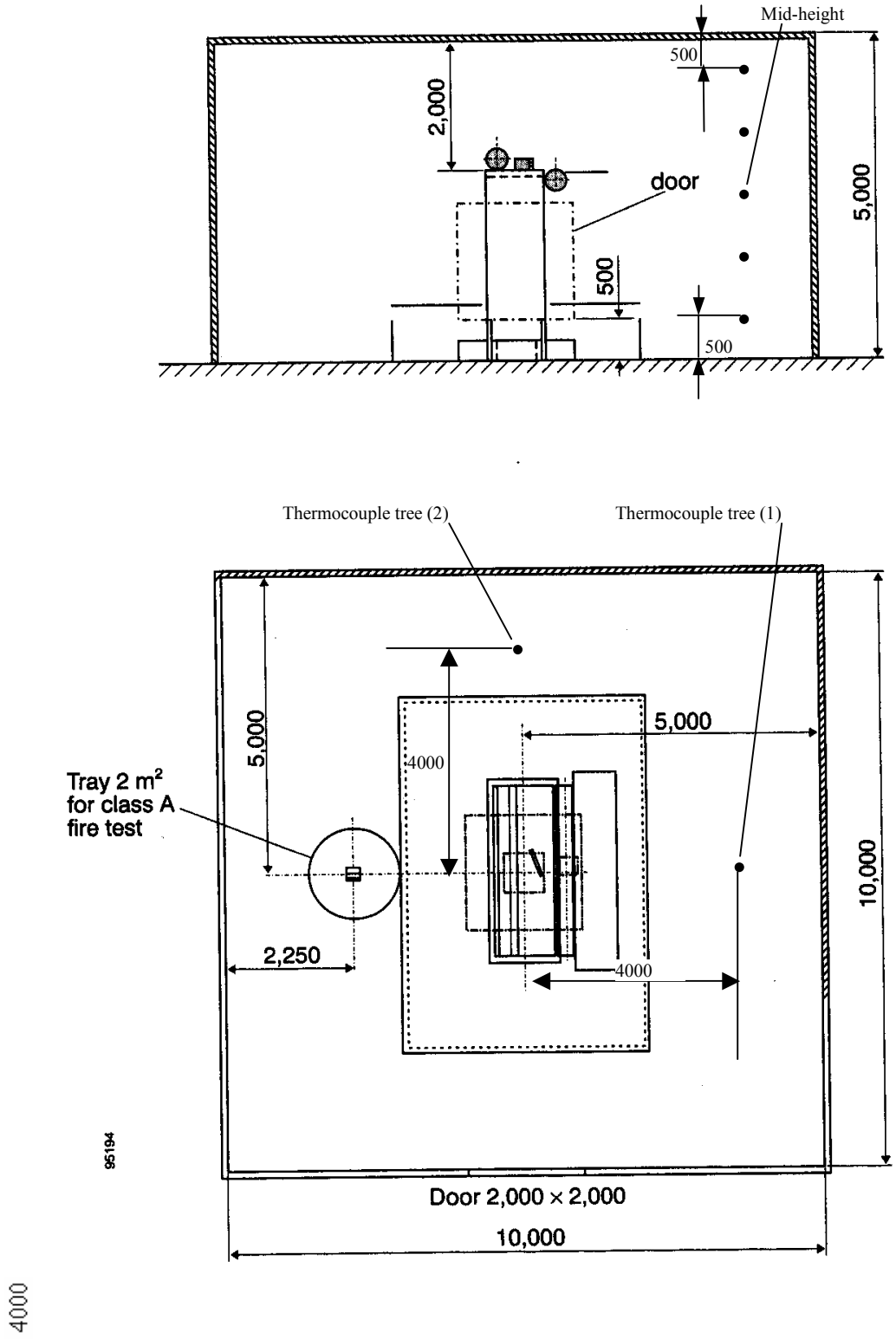

Mid-height
500
2,000
door
5,000
500
500
Thermocouple tree (2)
Thermocouple tree (1)
5,000
4000
5,000
Tray 2 m²
for class A
fire test
10,000
2,250
4000
95194
Door 2,000 × 2,000
10,000
4000

Figure 2

4.3 Test scenario

4.3.1 *Fire-extinguishing tests*

Table 1

Test No.	Fire Scenario	Test Fuel
1	Low pressure horizontal spray on top of simulated engine between agent nozzles.	Commercial fuel oil or light diesel oil
2	Low pressure spray in top of simulated engine centred with nozzle angled upward at a 45° angle to strike a 12-15 mm diameter rod 1 m away.	Commercial fuel oil or light diesel oil
3	High pressure horizontal spray on top of the simulated engine.	Commercial fuel oil or light diesel oil
4	Low pressure concealed horizontal spray fire on the side of simulated engine with oil spray nozzle positioned 0.1 m in from the end of the engine and 0.1 m^2 tray positioned on tope of the bilge plate 1.4 m in from the engine end at the edge of the bilge plate closest to the engine.	Commercial fuel oil or light diesel oil
5	Concealed 0.7 m × 3.0 m fire tray on top of bilge plate centred under exhaust plate.	Heptane
6	Flowing fire 0.25 kg/s from top of mock-up. See figure 3.	Heptane
7	Class A fires wood crib (see Note) in 2 m^2 pool fire with 30 s preburn. The test tray should be positioned 0.75 m above the floor as shown in figure 1.	Heptane
8	A steel plate (30 cm × 60 cm × 5 cm) offset 20° to the spray is heated to 350°C by the top low pressure spray nozzle positioned horizontally 0.5 m from the front edge of the plate. When the plate reaches 350°C, the system is activated. Following system shutoff, no reignition of spray is permitted.	Heptane

Notes: 1 The wood crib is to weigh 5.4 to 5.9 kg and is to be dimensioned approximately 305 mm × 305 mm × 305 mm. The crib is to consist of eight alternate layers of four trade size 38.1 mm × 38.1 mm kiln-dried spruce or fir lumber 305 mm long. The alternate layers of the lumber are to be placed at right angles to the adjacent layers. The individual wood members in each layer are to be evenly spaced along the length of the previous layer of wood members and stapled. After the wood crib is assembled, it is to be conditioned at a temperature of 49 $\pm$ 5°C for not less than 16 h. Following the conditioning, the moisture content of the crib is to be measured with a probe type moisture meter. The moisture content of the crib should not exceed 5% prior to the fire test.

Table 2 - *Test Programme for Bilge Nozzles*

Test No.	Fire Scenario	Test Fuel
1	0.5 m^2 central under mock-up	Heptane
2	0.5 m^2 central under mock-up	SAE 10W30 mineral based lubrication oil
3	4 m^2 tray under mock-up	Commercial fuel oil or light diesel oil

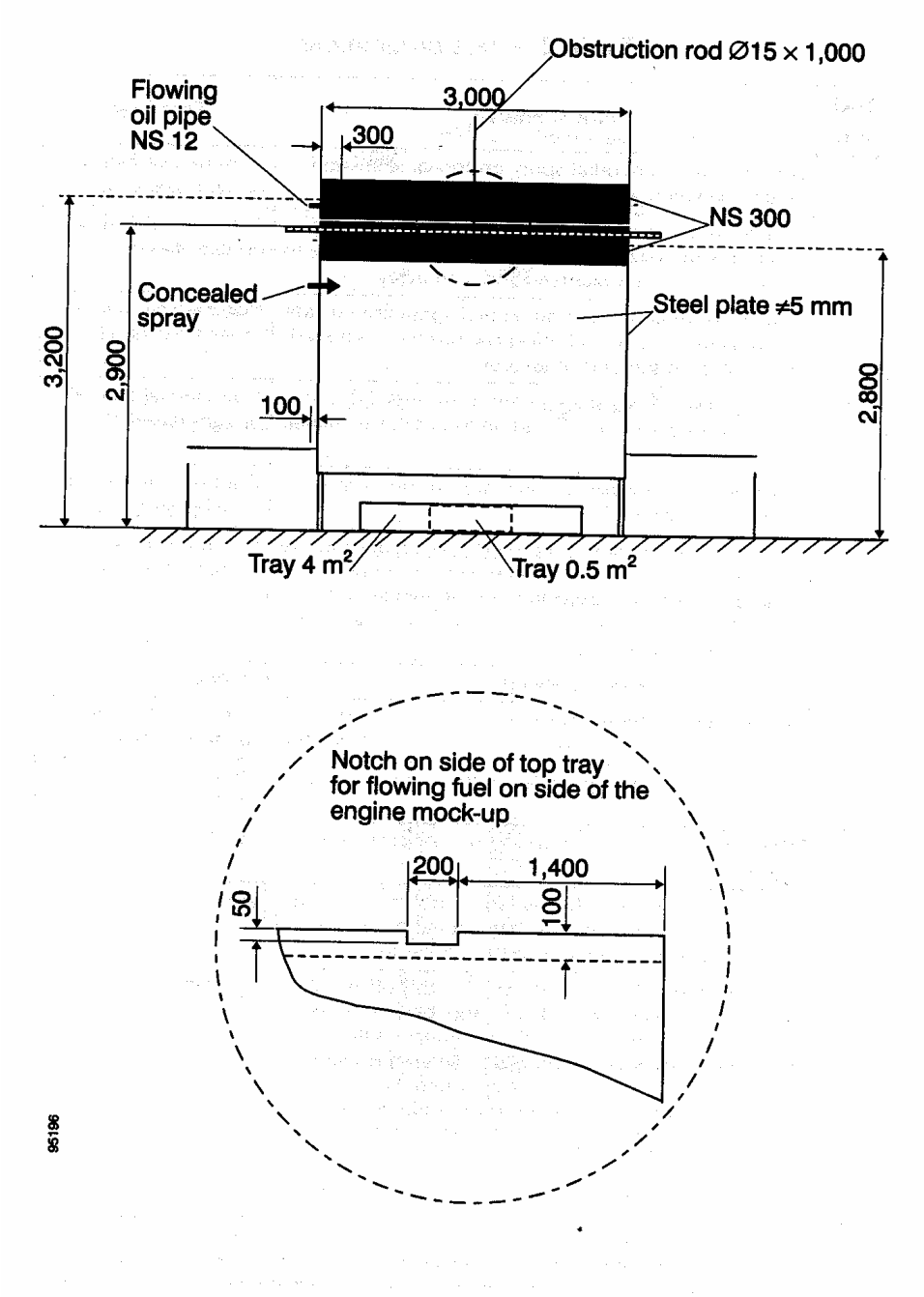


Figure 3

Table 3 - S*pray fire test parameters*

Fire type	**Low pressure**	**High pressure**
Spray nozzle	Wide spray angle (120° to 125°) full cone type	Standard angle (at 6 bar) full cone type
Nominal fuel pressure	8 bar	150 bar
Fuel flow	0.16 ± 0.01 kg/s	0.050 ± 0.002 kg/s
Fuel temperature	20 ± 5°C	20 ± 5°C
Nominal heat release rate	5.8 ± 0.6 MW	1.8 ± 0.2 MW

4.3.2 *Thermal management tests*

4.3.2.1 Instrumentation

Thermocouples should be installed in two trees. One tree should be located 4 m from the centre of the mock-up, on the opposite side of the 2 m^2 tray for class A fire test as shown in figure 2. The other tree should be located 4 m from the centre of the mock-up, on the opposite side of the door opening.

Each tree should consist of five thermocouples of diameter not exceeding 0.5 mm, positioned at the following heights: (1) 500 mm below the ceiling; (2) 500 mm above floor level; (3) at mid-height of the test compartment; (4) between the uppermost thermocouple and the thermocouple at mid-height and (5) between the lowest thermocouple and the thermocouple at mid-height.

Measures should be provided to avoid direct water spray impingement of the thermocouples.

The temperatures should be measured continuously, at least once every two seconds, throughout the test.

4.3.2.2 Fire size and position

For the determination of the thermal management, an obstructed n-Heptane pool fire scenario should be used. The nominal fire sizes should be correlated to the test compartment volume according to table 4. The test tray should be positioned in accordance with test No.7 as shown in table 1 and figure 2.

Table 4 - Correlation between nominal pool fire sizes and test compartment volume

Test compartment volume	Pool fire scenario
500 m^3	1 MW
1000 m^3	2 MW
1500 m^3	3 MW
2000 m^3	4 MW
2500 m^3	5 MW
3000 m^3	6 MW

Note: Interpolation of the data in the table is allowed.

The rim height of the trays should be 150 mm and the tray should be filled with 50 mm of fuel. Additional water should be added to provide a freeboard of 50 mm. Table 5 provides examples of pool tray diameters and the corresponding area, for a selection of nominal heat release rates.

Table 5 - Pool tray diameters and the corresponding area, for a selection of nominal heat release rates

Nominal HRR	Diameter (cm)	Area (m^2)	Size of obstruction steel plate (m x m)
0.5 MW	62	0.30	2.0 x 2.0
1 MW	83	0.54	2.0 x 2.0
2 MW	112	0.99	2.0 x 2.0
3 MW	136	1.45	2.25 x 2.25
4 MW	156	1.90	2.25 x 2.25
5 MW	173	2.36	2.5 x 2.5
6 MW	189	2.81	2.5 x 2.5

Note: Interpolation or extrapolation of the data is allowed according to the following equation:

$$Q = 2.195A - 0.18$$

where:

Q = the desired nominal heat release rate (MW)
A = the area of the fire tray (m^2)

A square horizontal obstruction steel plate should shield the pool fire tray from direct water spray impingement. The size of the obstruction steel plate is dictated by the size of the fire tray, as indicated in table 5. The vertical distance measured from the floor to the underside of the obstruction steel plate should be 1.0 m.

The thickness of the steel plate should be a nominal 4 mm. The vertical distance measured from the rim of the trays to the underneath of the horizontal obstruction steel plate should be 0.85 m.

4.4 Extinguishing system

During fire test conditions the extinguishing system should be installed according to the manufacturer's design and installation instructions in a uniformly spaced overhead nozzle grid. The lowest level of nozzles should be located at least 5 m above the floor. For actual installations, if the water-mist system includes bilge area protection, water-mist nozzles must be installed throughout the bilges in accordance with the manufacturer's recommended dimensioning as developed from bilge system testing using the tests in table 2 conducted with the bilge plate located at the maximum height for which approval is sought. Tests should be performed with nozzles located in the highest and lowest recommended position above the bilge fires. Bilge systems using the nozzle spacing tested may be approved for fire protection of bilge areas of any size.

The system fire tests should be conducted at the minimum system operating pressure, or at the conditions providing the minimum water application rate.

During the laboratory fire tests the bilge system nozzles may not be located beneath the engine mock-up but should be located beneath the simulated bilge plates at least one-half the nozzle spacing away from the engine mock-up.

4.5 Procedure

4.5.1 *Ignition*

The trays used in the test should be filled with at least 50 mm fuel on a water base. Freeboard is to be 150±10 mm.

4.5.2 *Flow and pressure measurements (Fuel system)*

The fuel flow and pressure in the fuel system should be measured before each test. The fuel pressure should be measured during the test.

4.5.3 *Flow and pressure measurements (Extinguishing system)*

Agent flow and pressure in the extinguishing system should be measured continuously on the high pressure side of a pump or equivalent equipment at intervals not exceeding 5 s during the test, alternatively, the flow can be determined by the pressure and the *K* factor of the nozzles.

4.5.4 *Duration of test*

After ignition of all fuel sources, a 2 min preburn time is required before the extinguishing agent is discharged for the fuel tray fires and 5-15 s for the fuel spray and heptane fires and 30 s for the Class A fire test (Test No.7).

The fire should be allowed to burn until the fire is extinguished or for a period of 15 minutes, whichever is less, measured from the ignition. The fuel spray, if used, should be shut off 15 s after the end of agent discharge.

4.5.5 *Observations before and during the test*

Before the test, the test room, fuel and mock-up temperature is to be measured.

During the test the following items should be recorded:

.1 the start of the ignition procedure;

.2 the start of the test (ignition);

.3 the time when the extinguishing system is activated;

.4 the time when the fire is extinguished, if it is;

.5 the time when the extinguishing system is shut off;

.6 the time of re-ignition, if any;

.7 the time when the oil flow for the spray fire is shut off;

.8 the time when the test is finished; and

.9 data from all test instrumentation.

4.5.6 *Observations after the test*

.1 Damage to any system components;

.2 The level of fuel in the tray(s) to make sure that the fuel was not totally consumed.

.3 Test room, fuel and mock-up temperature.

5 CLASSIFICATION CRITERIA

5.1 Fire-extinguishing tests

All fires in the fire-extinguishing tests should be extinguished within 15 minutes of system activation and there should be no re-ignition or fire spread.

5.2 Thermal management tests

The 60 s time-weighted average temperature should be kept below 100°C, no later than 300 s after activation of the system for the thermal management test in 4.3.2.

6 TEST REPORT

The test report should include the following information:

.1 Name and address of the test laboratory;

.2 Date and identification number of the test report;

.3 Name and address of client;

.4 Purpose of the test;

.5 Method of sampling;

.6 Name and address of manufacturer or supplier of the product;

.7 Name or other identification marks of the product;

.8 Description of the tested product:

- drawings,
- descriptions,
- assembly instructions,
- specification of included materials,
- detailed drawing of test set-up;

.9 Date of supply of the product;

.10 Date of test;

.11 Test method;

.12 Drawing of each test configuration;

.13 Measured nozzle characteristics;

.14 Identification of the test equipment and used instruments;

.15 Conclusions;

.16 Deviations from the test method, if any;

.17 Test results including observations during and after the test; and

.18 Date and signature.

***

ANNEX 4

DRAFT AMENDMENTS TO THE INTERNATIONAL CODE FOR FIRE SAFETY SYSTEMS (FSS CODE)

1 The existing text of chapter 5 of the FSS Code is replaced by the following:

"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. The system shall be fitted with normally closed control valves arranged to direct the agent into the appropriate space.

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, piping 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.*

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* Publication ISO – 9809/1: Refillable seamless steel gas cylinders (design, construction and testing);
ISO – 3500: Seamless steel CO_2 cylinders. For fixed fire-fighting installations on ships, specifying the principal external dimensions, accessories, filling ratio and marking for seamless steel CO_2 cylinders used in fixed fire-fighting installations on ships, in order to facilitate their interchange ability;
ISO – 5923: Fire protection – Fire-extinguishing media – Carbon dioxide;
ISO – 13769: Gas cylinders – Stamp marking;
ISO – 6406: Periodic inspection and testing of seamless steel gas cylinders;
ISO – 9329, part 1: Seamless steel tubes for pressure purposes -- Technical delivery conditions – Part 1: Unalloyed steels with specified room temperature properties;
ISO – 9329, part 2: Seamless steel tubes for pressure purposes -- Technical delivery conditions – Part 2: Unalloyed and alloyed steels with specified elevated temperature properties;
ISO – 9330, part 1: Welded steel tubes for pressure purposes -- Technical delivery conditions – Part 1: Unalloyed steel tubes with specified room temperature properties;
ISO – 9330, part 2: Welded steel tubes for pressure purposes -- Technical delivery conditions – Part 2: Electric resistance and induction welded unalloyed and alloyed steel tubes with specified elevated temperature properties.

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. System flow calculations shall be performed using a calculation technique acceptable to the Administration.

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.

2.1.2.4 In piping sections where valve arrangements introduce sections of closed piping, such sections shall be fitted with a pressure relief valve and the outlet of the valve shall be led to open deck.

2.1.2.5 All discharge piping, fittings and nozzles in the protected spaces shall be constructed of materials having a melting temperature which exceeds 925°C. The piping and associated equipment shall be adequately supported.

2.1.2.6 A fitting shall be installed in the discharge piping to permit the air testing as required by paragraph 2.2.3.1.

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^2. 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 and visual 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 audible alarms shall be located so as to be audible throughout the protected space with all machinery operating, and the alarms should be distinguished from other audible alarms by adjustment of sound pressure or sound patterns. 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 m^3/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

2.2.2.1 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. Positive means shall be provided so they can only be operated in that order; 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.

2.2.3 Testing of the installation

When the system has been installed, pressure-tested and inspected the following shall be carried out:

.1 a test of the free air flow in all pipes and nozzles; and

.2 a functional test of the alarm equipment.

2.2.4 Low-pressure CO_2 system

Where a low pressure CO_2 system is fitted to comply with this regulation, the following applies:

2.2.4.1 The system control devices and the refrigerating plants shall be located within the same room where the pressure vessels are stored.

2.2.4.2 The rated amount of liquid carbon dioxide shall be stored in vessel(s) under the working pressure in the range of 1.8 to 2.2 N/mm^2. The normal liquid charge in the container shall be limited to provide sufficient vapour space to allow for expansion of the liquid under the maximum storage temperatures than can be obtained corresponding to the setting of the pressure relief valves but shall not exceed 95% of the volumetric capacity of the container.

2.2.4.3 Provision shall be made for:

.1 pressure gauge;

.2 high pressure alarm: not more than setting of the relief valve;

.3 low pressure alarm: not less than 1.8 N/mm^2;

.4 branch pipes with stop valves for filling the vessel;

.5 discharge pipes;

.6 liquid CO_2 level indicator, fitted on the vessel(s); and

.7 two safety valves.

2.2.4.4 The two safety relief valves shall be arranged so that either valve can be shut off while the other is connected to the vessel. The setting of the relief valves shall not be less than 1.1 times working pressure. The capacity of each valve shall be such that the vapours generated under fire condition can be discharged with a pressure rise not more than 20% above the setting pressure. The discharge from the safety valves shall be led to the open.

2.2.4.5 The vessel(s) and outgoing pipes permanently filled with carbon dioxide shall have thermal insulation preventing the operation of the safety valve in 24h after de-energizing the plant, at ambient temperature of 45^{o}C and an initial pressure equal to the starting pressure of the refrigeration unit.

2.2.4.6 The vessel(s) shall be serviced by two automated completely independent refrigerating units solely intended for this purpose, each comprising a compressor and the relevant prime mover, evaporator and condenser.

2.2.4.7 The refrigerating capacity and the automatic control of each unit shall be so as to maintain the required temperature under conditions of continuous operation during 24 hours at sea temperatures up to 32^{o}C and ambient air temperatures up to 45^{o}C.

2.2.4.8 Each electric refrigerating unit shall be supplied from the main switchboard busbars by a separate feeder.

2.2.4.9 Cooling water supply to the refrigerating plant (where required) shall be provided from at least two circulating pumps one of which being used as a stand-by. The stand-by pump may be a pump used for other services so long as its use for cooling would not interfere with any other essential service of the ship. Cooling water shall be taken from not less than two sea connections, preferably one port and one starboard.

2.2.4.10 Safety relief devices shall be provided in each section of pipe that may be isolated by block valves and in which there could be a build-up of pressure in excess of the design pressure of any of the components.

2.2.4.11 Audible and visual alarms shall be given in a central control station when:

- the pressure in the vessel(s) reaches the low and high values according to 2.2.4.2;
- any one of the refrigerating units fails to operate;
- the lowest permissible level of the liquid in the vessels is reached.

2.2.4.12 If the system serves more than one space, means for control of discharge quantities of CO_2 shall be provided, e.g. automatic timer or accurate level indicators located at the control position(s).

2.2.4.13 If a device is provided which automatically regulates the discharge of the rated quantity of carbon dioxide into the protected spaces, it shall be also possible to regulate the discharge manually.

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^3 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.[*]"

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[*] 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) and the Guidelines for the approval of fixed aerosol fire-extinguishing systems equivalent to fixed gas fire-extinguishing systems, as referred to in SOLAS 74, for machinery spaces (MSC/Circ.1007).

ANNEX 5

PROPOSED AMENDMENTS TO THE 2000 HSC CODE

Chapter 1 – General comments and requirements

1 The existing paragraph under 1.2 – General requirements – is numbered as 1.2.1 and a new paragraph 1.2.2 is added as follows:

"1.2.2 New installation of materials containing asbestos used for the structure, machinery, electrical installations and equipment of a craft to which this Code applies shall be prohibited except for:

.1 vanes used in rotary vane compressors and rotary vane vacuum pumps;

.2 watertight joints and linings used for the circulation of fluids when, at high temperature (in excess of 350°C) or pressure (in excess of 7 x 10^6 Pa), there is a risk of fire, corrosion or toxicity; and

.3 supple and flexible thermal insulation assemblies used for temperatures above 1000°C."

2 In paragraph 1.4.29, the word "food" is inserted between the words "cooking or" and "heating".

3 A new paragraph 1.4.32 is inserted as follows and the existing paragraphs 1.4.32 to 1.4.61 are renumbered accordingly as 1.4.33 to 1.4.62:

"1.4.32 *IMDG Code* means the International Maritime Dangerous Goods (IMDG) Code as defined in chapter VII of the Convention."

4 In paragraph 1.4.54, a second sentence is added as follows:

"Such spaces containing no cooking appliances may contain:

.1 coffee automat, toaster, dish washer, microwave oven, water boiler and similar appliances, each of them with a maximum power of 5 kW; and

.2 electrically heated cooking plates and hot plates for keeping food warm, each of them with a maximum power of 2 kW and a surface temperature not above 150°C."

Chapter 4 – Accommodation and escape measures

5 In paragraph 4.7.10, the second sentence is replaced with the following:

"Clear markings, including the location of the fire control plan, shall also be provided for the guidance of rescue personnel outside the craft."

6 In paragraph 4.7.12, the following text is added at the end:

"Doors providing escape from a space shall, where possible, be situated at opposite ends of the space. Where the doors providing escape from a space are situated in the same end of the space, the distance between those doors shall be greater than the maximum length of the space."

7 In paragraph 4.7.13, the following text is added at the end:

"Requirements of this paragraph do not apply to aisles (fore-aft passageways separating seating areas) or to spaces between adjacent rows of seats. However, the width of aisles and the seat pitch should be such as to allow the craft to comply with the provisions of section 4.8 on evacuation."

8 Existing paragraphs 4.7.15 and 4.7.16 are renumbered as 4.7.16 and 4.7.17, respectively, and the following new paragraph 4.7.14 is inserted:

"4.7.14 Special category spaces used for stowage of motor vehicles shall be provided with walkways leading to a safe means of escape, having a width of at least 600 mm."

9 In paragraph 4.7.17, the following new sentence is added at the end:

"At least one means of escape from a machinery space shall consist of either a ladder leading to a door or hatch (not being a horizontal flush-hatch) or a door located in the lower part of that space and giving access to an adjacent compartment from which a safe means of escape is provided."

10 A new paragraph 4.7.18 is inserted as follows:

"4.7.18 Spaces that are only entered occasionally by crew members may have only one means of escape provided that it is independent of watertight doors."

11 In paragraph 4.8.1, the following new sentence is added at the end:

"Means of escape need not be dimensioned to take into account the additional number of persons that could use it in the event of an accident in an adjacent zone."

Chapter 7 – Fire safety

12 In paragraph 7.3.1.2, in the first bullet point, the term "1.4.4" is replaced with "1.4.5".

13 In paragraph 7.3.1.3, in the first bullet point, the term "1.4.5" is replaced with "1.4.6".

14 In paragraph 7.3.1.4, the words "as defined in 1.4.15" are replaced with the words "as defined in 1.4.16".

15 Existing paragraph 7.3.2 is renumbered as 7.3.3 and the following new paragraph 7.3.2 is inserted:

"7.3.2 In relation to the classification of spaces in 7.3.1, the following additional criteria shall be applied:

.1 If a space is divided by partial bulkheads into two (or more) smaller areas such that they form enclosed spaces, then the enclosed spaces shall be surrounded by bulkheads and decks in accordance with tables 7.4-1 and 7.4-2, as applicable. However, if the separating bulkheads of such spaces are at least 30% open, then the spaces may be considered as the same space.

.2 Cabinets having a deck area of less than 2 m^2 may be accepted as part of the space they serve, provided they have open ventilation to the space and do not contain any material or equipment that could be a fire risk.

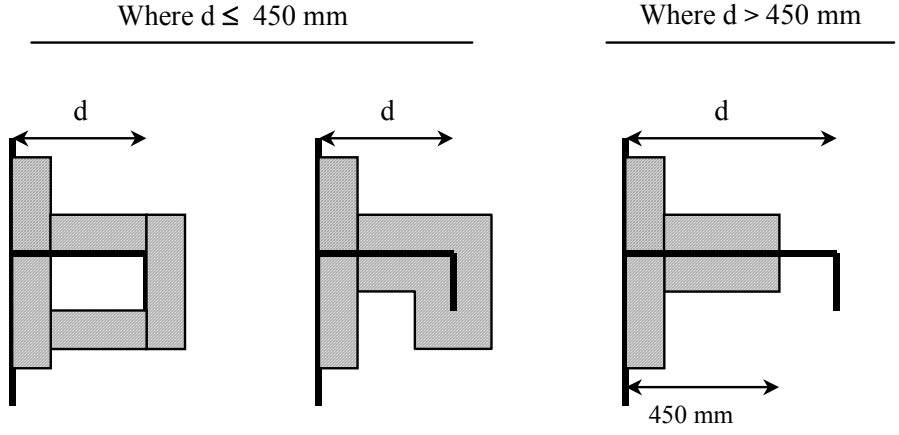
.3 Where a space has the special characteristics of two or more space groupings, the structural fire protection time of the divisions shall be the highest for the space groupings concerned. For example, the structural fire protection time of the divisions of emergency generator rooms shall be of the highest value for the space when the space is considered as being a control station (D) and a machinery space (A)."

16 The following new paragraphs 7.3.4 to 7.3.6 and associated figures 7.3.4a, 7.3.4b and 7.3.6 are inserted after paragraph 7.3.3:

"7.3.4 To prevent heat transmission at intersections and terminal points, the insulation of the deck or bulkhead shall be carried past the intersection or terminal point for a distance of at least 450 mm in the case of steel or aluminium structures (refer to figures 7.3.4a and 7.3.4b).

7.3.5 If a space is divided by a deck or bulkhead and the fire insulation required for each space is different, the insulation with the higher structural fire protection time shall continue on the deck or bulkhead with the insulation of the lesser structural fire protection time for a distance of at least 450 mm beyond the boundary between the spaces.

7.3.6 Where the lower part of the fire insulation has to be cut for drainage, the construction shall be in accordance with the structural details shown in figure 7.3.6."



d = depth of stiffener on girder

Figure 7.3.4a

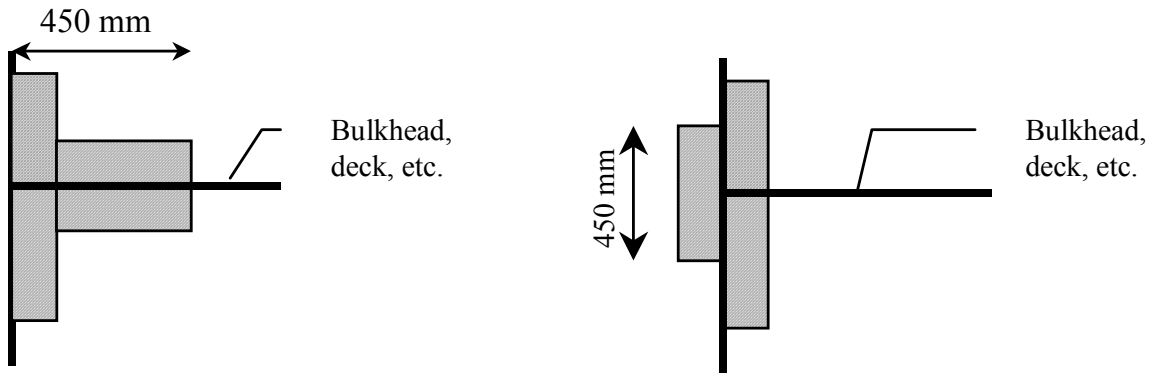


Figure 7.3.4b

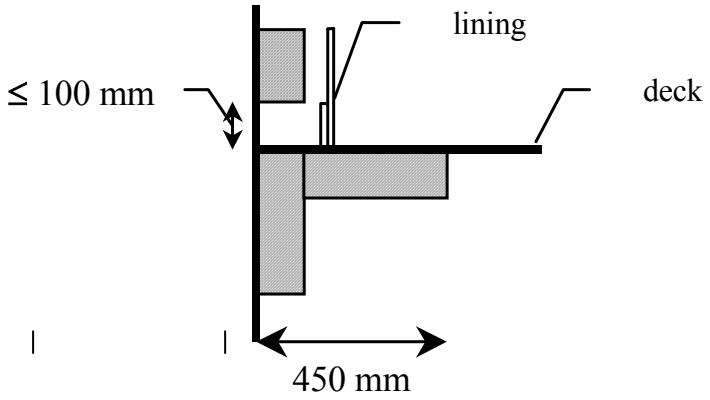


Figure 7.3.6

17 Insert a new paragraph 7.4.1.4 after existing paragraph 7.4.1.3 as follows:

"7.4.1.4 7.4.1.3 does not apply to appendages such as air propellers, air ducts to propellers, transmission shafts, rudders and other control surfaces, struts, spars, flexible skirts, etc. which do not comprise part of the main structure of the craft."

18 In tables 7.4-1 and 7.4-2, Note 1 is replaced by the following:

"1 The upper side of decks within spaces protected by fixed fire-extinguishing systems need not be insulated."

19 In paragraph 7.4.2.1, in the second sentence, the words "at the lightweight condition" are replaced with the words "at least 300 mm below the craft's waterline in the lightweight condition in displacement mode".

20 At the end of paragraph 7.4.2.6, a new sentence is added as follows:

"Where machinery shafts penetrate fire-resisting watertight divisions, arrangements shall be made to ensure that the required watertight and fire-resisting integrity of the division is not impaired."

21 A new paragraph 7.4.2.7 is inserted after existing paragraph 7.4.2.6 as follows:

"7.4.2.7 Ventilation openings may be accepted in entrance doors to public toilets, provided they are positioned in the lower portion of the door and fitted with closable grilles made of non-combustible or fire-restricting material and operable from outside the space."

22 At the end of paragraph 7.4.3.2, the following sentence is added:

"The fire insulation in such spaces may be covered by metal sheets (not perforated) or by vapour proof glass cloth accurately sealed at the joint."

23 In paragraph 7.4.3.3.1, the words "e.g. desks, wardrobes, dressing tables, bureaux and dressers" are inserted after the words "case furniture".

24 In paragraph 7.4.3.4, the words "Subject to paragraph 7.4.3.5" are inserted at the beginning of the paragraph.

25 The following new paragraph 7.4.3.5 is inserted after existing paragraph 7.4.3.4 and renumber existing paragraphs 7.4.3.5 to 7.4.3.10 accordingly as 7.4.3.6 to 7.4.3.11:

"7.4.3.5 7.4.3.4 does not apply to partitions, windows and sidescuttles made of glass which are deemed to be non-combustible and to comply with the requirements for low-flame spread surfaces or to items and materials referred to in 7.4.3.3."

26 The last sentence of paragraph 7.4.4.1 is deleted.

27 The following new paragraph 7.4.4.2 is added after paragraph 7.4.4.1 and existing paragraphs 7.4.4.2 and 7.4.4.3 are renumbered as 7.4.4.3 and 7.4.4.4:

"7.4.4.2 Stairways may be fitted in the open in a public space consisting of only two decks, providing they lie wholly within such public space and the following conditions are met:

.1 all levels are used for the same purpose;

.2 the area of the opening between the lower and upper part of the space is at least 10% of the deck area between the upper and lower part of the space;

.3 the design is such that persons within the space should be generally aware, or could easily be made aware of, a developing fire or other hazardous situation located within that space;

.4 sufficient means of escape are provided from both levels of the space directly leading to an adjacent safe area or compartment; and

.5 the whole space is served by one section of the sprinkler system."

28 The second sentence of paragraph 7.4.4.4 is replaced with the following:

"Draught stops are not required in public spaces of Category A craft having only one public space and on other craft in spaces with open ceilings (perforated ceilings) where the opening is 40% or more and the ceiling is arranged in such a way that a fire behind the ceiling can be easily seen and extinguished."

29 The following sentence is added at the end of paragraph 7.5.2:

"The use of aluminium in lubricating oil sump tanks for engines, or in lubricating oil filter housings fitted integral with the engines, is accepted."

30 In paragraph 7.6.1, the following sentence is inserted between the two existing sentences:

"The controls shall be easily accessible as well as prominently and permanently marked and shall indicate whether the shut-off is open or closed."

31 In paragraph 7.6.3.2, the words "(the junction between the duct and the galley range hood)" are inserted after the words "lower end of the duct".

32 In paragraph 7.6.3.4, the word "means" is replaced with the words "a remote means located with the above controls".

33 The following sentence is added at the end of paragraph 7.6.3.5:

"At minimum, one hatch shall be provided close to the exhaust fan and others located in areas of high grease accumulation such as the lower end of the duct as referred to in 7.6.3.2."

34 The following text is added at the end of paragraph 7.6.4:

"Fire and smoke dampers shall be arranged so as to be readily accessible. Where placed behind ceilings or linings, they shall be provided with an inspection door marked to identify the damper. Such identification shall also be placed on any required remote controls."

35 In paragraph 7.6.6, the following sentence is inserted before the last sentence:

"Manual closing may be achieved by mechanical means of release or by remote operation of the fire or smoke damper by means of a fail-safe electrical switch or pneumatic release (i.e. spring-loaded, etc.)."

36 In paragraph 7.7.1, the following sentence is inserted after the first sentence:

"Control stations not normally occupied (e.g. emergency generator rooms) need not be provided with manually operated call points."

37 In paragraph 7.7.1.1.4, the words ", each of which shall comprise a group of fire detectors and manually operated call points as displayed at the indicating unit(s) required by this paragraph." are added at the end of the first sentence.

38 In paragraph 7.7.1.1.9, in the first sentence, the text after "7.11.1" is deleted and a new sentence as follows is added at the end of the paragraph:

> "Notwithstanding the preceding requirements of this paragraph, the Administration may accept that the same section of detectors may serve spaces on more than one deck if such spaces are located in the fore or aft end of the craft or they are so arranged that they constitute common spaces on different decks (e.g. fan rooms, galleys, public spaces, etc.)."

39 The following sentence is added at the end of paragraph 7.7.1.1.10:

> "In the case of a fire detection system with remotely and individually identifiable fire detectors, this requirement is met if no machinery spaces of a major fire hazard are included in a loop (electrical circuit linking detectors of various sections in a sequence and connected (input and output) to the indicating unit(s)) covering accommodation spaces, service spaces and control stations."

40 In paragraph 7.7.1.1.14, the text following the words "except that" is replaced with the following:

> "the control panel may be used to activate one or more of:
>
> .1 paging system;
>
> .2 fan stops;
>
> .3 closure of fire doors;
>
> .4 closure of fire and smoke dampers; and
>
> .5 sprinkler system."

41 In paragraph 7.7.1.1.15, the text of the chapeau is replaced with the following:

> "Fire-detection systems in which all fire detectors are individually identifiable (i.e. having zone address identification capability) shall be so arranged that:"

42 In paragraph 7.7.1.1.15.1, the following words are added at the end of the paragraph:

> "and no loop shall pass through a space twice. When this is not practical (e.g. for large public spaces), the part of the loop which by necessity passes through the space for a second time shall be installed at the maximum possible distance from the other parts of the loop."

43 In paragraph 7.7.1.1.15.2, the word "not" is inserted between the words "shall" and "render".

44 A new paragraph 7.7.1.1.16 is inserted as follows:

"7.7.1.1.16 The fire detection system in vehicle deck spaces, excluding manual call points, may be switched off with a timer during loading/unloading of vehicles."

45 The last sentence of paragraph 7.7.1.2.3 is replaced with the following:

"Detectors which are located in the overhead shall be a minimum distance of 0.5 m away from bulkheads, except in corridors, lockers and stairways."

46 The following sentence is added at the end of paragraph 7.7.3.1:

"The system shall be remotely controlled in such a way that it is fully serviceable from the operating compartment without any intervention of personnel outside that space in normal conditions."

47 The following new paragraph 7.7.3.2 is inserted after paragraph 7.7.3.1 and existing paragraphs 7.7.3.2 and 7.7.3.3 are renumbered accordingly as 7.3.3.3 and 7.3.3.4:

"7.7.3.2 Any fixed fire-extinguishing system fitted to the craft is to meet the requirements of this sub-section, whether or not the system is required by 7.7."

48 In paragraph 7.7.3.3.3, the following text is added after the first sentence:

"Pipelines may pass through accommodation spaces, provided they are of substantial thickness and their tightness is verified with a pressure test, after their installation, at a pressure head not less than 5 N/mm^2. In addition, pipelines passing through accommodation areas shall only be joined by welding and should not be fitted with drains or other openings within such spaces. Pipelines shall not pass through refrigerated spaces."

49 The following sentence is added at the end of paragraph 7.7.3.3.5:

"Openings that may admit air to, or allow gas to escape from, a protected space shall be capable of being closed from outside the protected space."

50 The following text is added at the end of paragraph 7.7.3.3.6:

"corresponding to the gross volume of the machinery space being increased by the volume of air receivers converted to free air volume. Alternatively, a discharge pipe connected to a safety valve may be fitted to each air receiver, provided it leads directly to the open air."

51 In paragraph 7.7.3.3.7, the words "which personnel can be expected to enter (e.g. ro-ro spaces) and where their access is facilitated by doors or hatches" are inserted after the words "work or" in the first sentence. In the second sentence, the word "operate" is replaced with the words "automatically operate (e.g. by opening of the release cabinet door)".

52 The following text is added at the end of paragraph 7.7.3.3.10:

"Spaces are considered as separated where divisions comply with tables 7.4-1 and 7.4-2, as appropriate, or the divisions are of steel construction."

53 The following text is added at the end of paragraph 7.7.3.3.12:

"without moving the containers completely from their fixing position."

54 Paragraph 7.7.3.3.14 is replaced with the following:

"When the fire-extinguishing medium is stored outside a protected space, it shall be stored in a room which shall be situated in a safe and readily accessible position. For the purpose of the application of tables 7.4-1 and 7.4-2, such storage rooms shall be treated as control stations. The following requirements are applicable only for the storage rooms for fire-extinguishing media of fixed gas fire-extinguishing systems:

.1 the storage room shall not be used for any other purposes;

.2 if the storage space is located below deck, it shall be located no more than one deck below the open deck and shall be directly accessible by a stairway or ladder from the open deck;

.3 spaces which are located below deck or spaces where access from the open deck is not provided, shall be fitted with a mechanical ventilation system designed to take exhaust air from the bottom of the space and shall be sized to provide at least 6 air changes per hour; and

.4 access doors shall open outwards, and bulkheads and decks including doors and other means of closing any opening therein, which form the boundaries between such rooms and adjacent enclosed spaces shall be gas tight."

55 The following text is added at the end of paragraph 7.7.4:

"Each portable fire extinguisher shall:

.1 not exceed 23 kg in total mass;

.2 have a capacity of at least 5 kg if of powder or carbon dioxide type;

.3 have a capacity of at least 9 litres if of foam type;

.4 be examined annually by a competent person;

.5 be provided with a sign indicating the date when was last examined;

.6 be hydraulic pressure tested (cylinders and propellant bottles) every 10 years;

.7 not be placed in accommodation spaces if of carbon dioxide type;

.8 where located in control stations and other spaces containing electrical or electronic equipment or appliances necessary for the safety of the craft, be provided with extinguishing media which are neither electrically conductive nor harmful to the equipment and appliances;

.9 be ready for use and located in easily visible places such that it can be reached quickly and easily at any time in the event of a fire;

.10 be located such that its serviceability is not impaired by the weather, vibration or other external factors; and

.11 be provided with a device to identify whether it has been used."

56 In paragraph 7.7.5.1, the words "independently driven pumps" are replaced with the words "pumps powered by independent sources of power".

57 The following sentence is inserted before the last sentence of paragraph 7.7.5.3:

"The fire main shall be capable of being drained and fitted with valves arranged so that fire main branches can be isolated when the main is used for purposes other than fire-fighting."

58 The following text is added at the end of paragraph 7.7.5.4:

"One hydrant shall be located in the vicinity of and outside each entrance to a machinery space."

59 In paragraph 7.7.5.5, the text after the words "non-perishable material" is replaced with the following:

"Fire hoses shall have a length of:

.1 at least 10 m;

.2 not more than 15 m in machinery spaces; and

.3 not more than 20 m for other spaces and open decks."

60 In paragraph 7.8.1.1, the words "Subject to 7.8.1.2" are inserted at the beginning and the second sentence is deleted. The words ", including open ro-ro space," are inserted after the words "ro-ro space".

61 A new paragraph 7.8.1.2 is added as follows and existing paragraphs 7.8.1.2 and 7.8.1.3 are renumbered accordingly as 7.8.1.3 and 7.8.1.4:

"7.8.1.2 The vehicle deck of a special category space or a ro-ro space, including an open ro-ro space, need only be insulated on the underside if required. Vehicle decks located totally within ro-ro spaces may be accepted without structural fire protection, provided these decks are not part of, or do not provide support to, the craft's main load-carrying structure and provided satisfactory measures are taken to ensure that the safety of the

craft, including fire-fighting abilities, integrity of fire resisting divisions and means of evacuation, is not affected by a partial or total collapse of these internal decks."

62 Insert the following text at the end of paragraph 7.8.2:

"7.8.2.1 The pumps of the system shall be capable of maintaining:

.1 half the total required application rate with any one pump unit out of function, for category A craft; and

.2 the total required application rate with any one pump unit room out of function, for category B craft.

7.8.2.2 Fixed fire-extinguishing systems shall fulfil the following requirements:

.1 the valve manifold should be provided with a pressure gauge and each of the valves should be marked;

.2 instructions for maintenance and operation of the installation shall be set up in the room where the valves are located; and

.3 the piping system shall be provided with a sufficient number of drainage valves."

63 The following text is added at the end of paragraph 7.8.4.1:

" - a water fog applicator consists of a metal L-shaped pipe, the long limb being approximately 2 m in length and capable of being fitted to a fire hose, and the short limb being approximately 250 mm in length and fitted with a fixed water fog nozzle or capable of being fitted with a water spray nozzle."

64 The following text is added at the end of paragraph 7.8.4.3:

"In addition to complying with 7.7.4, fire extinguishers shall be suitable for A and B class fires and have a capacity of 12 kg dry powder or equivalent."

65 Paragraph 7.8.6 is renumbered as 7.8.6.1 and the words "scuppers shall be fitted so" in the first sentence are replaced with the words "pumping and drainage arrangements should be such as to prevent such accumulation. Scuppers fitted for this purpose shall be so arranged".

66 A new paragraph 7.8.6.2 is inserted as follows:

"7.8.6.2 In respect of scuppers and drainage pumps fitted in accordance with 7.8.6.1:

.1 the amount of water for which drainage is provided shall take into account the capacity of both the water spraying system pumps and required number of fire hose nozzles;

.2 the drainage system shall have a capacity of not less than 125% of the capacity specified in .1 above; and

.3 bilge wells shall be of sufficient holding capacity and shall be arranged at the side shell of the ship at a distance from each other of not more than 40 m in each watertight compartment."

67 In paragraph 7.8.7.1, the text after the first sentence is replaced with the following:

"Electrical equipment installed more than 450 mm above the deck or platform shall be of a type enclosed and protected by either an enclosure having an ingress protection of at least IP 55 as defined in IEC publication 529 or by apparatus for use in zone 2 areas as defined in IEC publication 79. However, if the installation of electrical equipment and wiring at less than 450 mm above the deck or platform is necessary for the safe operation of the craft, such electrical equipment and wiring may be installed provided that the equipment is certified "safe type" and that the equipment and wiring, if fitted, are suitable for use in zone 1 areas as defined in IEC Publication 79."

68 The text of paragraph 7.8.7.2 is replaced with the following:

"If installed in an exhaust ventilation duct, electrical equipment shall be certified "safe type". The equipment and wiring, if fitted, shall be suitable for use in zone 1 areas as defined in IEC publication 79 and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition."

69 In paragraph 7.10.1.2, the words "complying with the requirements of 7.8.4.1." are inserted after the words "water fog applicator".

70 In paragraph 7.10.2, the words "or sets of personal equipment shall be so stored as" are replaced with the words "and sets of personal equipment shall be stored in permanently and clearly marked locations arranged so as".

71 In paragraph 7.10.3.1.2, the words "and gloves" are deleted.

72 In paragraph 7.10.3.1.4, the word "type" is replaced with the words "explosion-proof type certified to gas group II A and temperature class T 3".

73 The words "having handle provided with high-voltage insulation." are added at the end of paragraph 7.10.3.1.5.

74 Paragraphs 7.10.3.2 and 7.10.3.2.1 are deleted and remaining paragraph 7.10.3.2.2 is renumbered as 7.10.3.2.

75 The second sentence of paragraph 7.10.3.2 is replaced with the following:

"Two spare charges suitable for use with the apparatus shall be provided for each required apparatus."

76 In paragraph 7.10.3.3, the words "sufficient length" are replaced with the words "approximately 30m in length" and the following new sentence is added at the end:

"The lifeline shall be subjected to a test by static load of 3.5 kN for 5 min."

77 In paragraph 7.11.1.3, the words "within the structural fire protection time for areas of major fire hazard." are added at the end.

78 In paragraph 7.13.1, the following sentence is inserted after the first sentence:

"A stairway open at one deck shall be considered part of the space to which it is open and consequently shall be protected by any sprinkler system provided for that space."

79 The text of paragraph 7.17.2.2 is replaced with the following:

"purpose-built container craft and cargo spaces intended for the carriage of dangerous goods in freight containers and portable tanks. In this regard a purpose-built container space is a cargo space fitted with cell guides for stowage and securing containers;"

80 In paragraph 7.17.2.3, the words ", including special category spaces and vehicle deck spaces as defined in the IMDG Code," are inserted after the words "ro-ro spaces".

81 The following text is added at the end of paragraph 7.17.3:

"For the purpose of this section, "on deck" shall be taken to mean spaces on the weather deck. There are no special construction and equipment requirements for the carriage of dangerous goods of classes 6.2 and 7 or for the carriage of dangerous goods in limited quantities, as stated in chapter 3.4 of the IMDG Code."

82 In paragraph 7.17.3.1.2, the word "supplying" is replaced with the words "simultaneously supplying the arrangements required by 7.17.3.1.3 for the largest designated cargo space and the" and the following sentence is inserted after the first sentence:

"This requirement shall be met by the total capacity of the main fire pump(s) not including the capacity of the emergency fire pump, if fitted."

83 In paragraph 7.17.3.1.3, the following amendments are made:

.1 the words "shall be provided" are deleted from the end of the first sentence and are re-inserted after the first word "Means";

.2 the words "copious quantities of water" are replaced with the words "with water at not less than 5 *l*/min/m^2 of the horizontal area of cargo spaces"; and

.3 the words "meet the requirements of 7.8.6 and" are inserted after the words "drainage and pumping arrangements shall".

84 The following sentence is added at the end of paragraph 7.17.3.1.4:

"Substitution by a high expansion foam system complying with regulation II-2/10.4.1.1.2 of the Convention is also acceptable, except if cargoes are of class 4.3 (refer to the IMDG Code)."

85 The following new paragraphs 7.17.3.1.5 and 7.17.3.1.6 are added after existing paragraph 7.17.3.1.4:

> "7.17.3.1.5 The requirements of 7.17.3.1.1 to 7.17.3.1.4 may be fulfilled by a water spray system meeting the requirements of 9.2, 9.3 and 9.4 of MSC/Circ.608/Rev.1 on Interim guidelines for open-top containerships, provided that the amount of water provided for fire-fighting purposes in the largest cargo space allows simultaneous use of the water spray system plus four jets of water from hose nozzles in accordance with 7.17.3.1.2.
>
> 7.17.3.1.6 Craft carrying dangerous goods shall be provided with both 3 fire hoses and 3 nozzles in addition to those required by 7.7.5.5."

86 In paragraph 7.17.3.4.2, the sentence "Exhaust fans shall be of non-sparking type." is inserted after the first sentence and the text of the last sentence is replaced with the following:

> "Suitable wire mesh guards having a mesh size not exceeding 13 mm x 13 mm shall be fitted over inlet and outlet ventilation openings to prevent foreign objects from entering into the casing."

87 Existing paragraph 7.17.3.4.3 is renumbered as 7.17.3.4.4; the relevant reference in table 7.17-2 is amended; and the following new paragraph 7.17.3.4.3 is inserted:

> "7.17.3.4.3 If adjacent spaces are not separated from cargo spaces by gastight bulkheads or decks, ventilation requirements apply to the adjacent spaces as for the cargo space itself as required under regulation II-2/19.3.4.2 of the Convention and its interpretations."

88 The following new paragraph 7.17.3.4.5 is added after existing paragraph 7.17.3.4.4:

> "7.17.3.4.5 For open-top container ships, power ventilation is required only for the lower part of the cargo hold for which purpose ducting is required. The ventilation capacity shall be at least two air changes per hour based on the empty hold volume below weather deck."

89 In table 7.17-1, the term "x" in the column "7.17.2.3 Open ro-ro spaces" in the row for rule 7.17.3.2 is deleted and the words "(includes cargoes of group B of the Bulk Cargo Code except for cargoes denoted Materials Hazardous in Bulk)" are added to the words "Solid dangerous goods in bulk" at the head of the right-hand column.

90 The following note 7 is inserted with references from row 7.17.3.4.2, columns 4.2 and 4.3 of Table 7.17-2, and notes 7 to 11 together with their references in Table 7.17-3 are renumbered as 8 to 12:

> "For seedcake containing solvent extraction and cargoes of IMDG Code Class 4.3, two separate fans shall be permanently fitted or being of a portable type adapted for being permanently fitted prior to loading and during voyage. The fans shall be either explosion proof or arranged such that the escaping gas flow is separated from electrical cables and components. The total ventilation shall be at least six air changes per hour, based upon

the empty space. Ventilation shall be such that any escaping gases cannot reach passenger or living spaces on or under deck."

91 In tables 7.17-2 and 7.17-3, the words "Cargoes of IMDG Code" are inserted before "class" and "classes" wherever occurring.

92 In table 7.17-3, in column 7 and 8, the terms "3.1 3.2" and "3.3" are replaced with "3" and the following new note 13 is added to "x" in column "5.2", last and penultimate lines:

"Under the provisions of the IMDG Code, as amended, stowage of class 5.2 dangerous goods under deck or in enclosed ro-ro spaces is prohibited."

93 The following sub-paragraphs are added to paragraph 7.17.3.5:

".1 If the bilge drainage system for cargo spaces is additional to the system served by pumps in the machinery space, the capacity of the system shall be not less than 10 m^3/h per cargo space served. If the additional system is a common system, the capacity need not exceed 25 m^3/h. The additional bilge system need not be arranged with redundancy. Whenever flammable or toxic liquids are carried, the bilge line into the machinery space shall be isolated either by fitting a blank flange or by a closed lockable valve.

.2 If bilge drainage of cargo spaces is arranged by gravity drainage, the drainage shall be either lead directly overboard or to a closed drain tank located outside the machinery spaces. The tank shall be provided with vent pipe to a safe location on the open deck.

.3 Enclosed spaces outside machinery spaces containing bilge pumps serving cargo spaces intended for carriage of flammable or toxic liquids shall be fitted with separate mechanical ventilation giving at least six air changes per hour. Electrical equipment in the space shall be of certified safe type. If the space has access from another enclosed space, the door shall be self-closing.

.4 Drainage from a cargo space into bilge wells in a lower space is only permitted if that space satisfies the same requirements as the cargo space above."

94 The following text is added at the end of paragraph 7.17.3.6.1:

"The protective clothing, which is required for emergency purposes, shall be selected taking into account the danger of the chemicals according to the class and liquid or gaseous. For solid bulk cargoes the protective clothing shall satisfy the equipment requirements specified in the respective schedules of the BC Code for the individual substances. For packaged goods the protective clothing shall satisfy the equipment requirements specified in emergency procedures (EmS) of the Supplement to IMDG Code for the individual substances."

95 The following new sentence is added at the end of paragraph 7.17.3.6.2:

"In addition to the requirements of 7.10.3.2.2, two spare charges for the breathing apparatus shall be provided."

96 In paragraph 7.17.3.8.2, the words "meet the requirements of 7.8.6, have its valves operable from outside the space at a position in the vicinity of the extinguishing system controls and" are inserted after the words "drainage and pumping arrangements shall".

FOOTNOTES IN THE 2000 HSC CODE TO BE AMENDED OR ADDED

1 The footnote in paragraph 4.8.2 is replaced with the following:

"Refer to MSC/Circ.1001, as amended, on Guidelines for a simplified evacuation analysis of high-speed passenger craft."

2 The following footnote is added to the chapeau of paragraph 7.4.3.3:

"Fire test procedures referenced in the FTP Code (resolution MSC.61(67), as amended by resolutions MSC.101(73) and MSC.173(79)) and MSC/Circs.916, 964, 1004, 1008, 1036 and 1120 should be applied to items and materials covered by this paragraph as follows:

.1 case furniture (FTP Code, annex 1, parts 1 and 10);

.2 frames of all other furniture (FTP Code, annex 1, parts 1 and 10);

.3 draperies, textiles and other suspended textile materials (FTP Code, annex 1, part 7);

.4 upholstered furniture, e.g. passenger seating (FTP Code, annex 1, part 8);

.5 bedding components (FTP Code, annex 1, part 9); and

.6 deck finish materials (FTP Code, annex 1, parts 2 and 6)."

3 The following footnote is added to paragraph 7.4.3.5:

"Refer to 7.9.3.4 and the FTP Code, annex 2, clauses 1 and 5.1."

4 The footnote to paragraph 7.7.3.3.1 is replaced with the following:

"Refer to MSC/Circ.913 on Guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces, and the associated interpretations of MSC/Circ.1082."

5 The following footnote is added to paragraph 7.7.3.3.7:

"Refer to resolution A.830(19) on Code on Alarms and Indicators, 1995."

6 The following footnote is added to paragraph 7.7.4:

"Refer to resolution A.951(23) on Improved guidelines for marine portable fire extinguishers, and ISO 7165:1999 - Fire protection equipment - Portable fire extinguishers - Performance and construction."

7 In paragraph 7.8.2, the following footnote is inserted after the words “approved fixed pressure water-spraying system”:

> “Refer to resolution A.123(V) on Recommendation on fixed fire-extinguishing systems for special category spaces.”

8 The following footnote is inserted after “effective power ventilation system” in paragraph 7.8.5.1:

> “Refer to MSC/Circ.729 on Design guidelines and operational recommendations for ventilation systems in ro-ro cargo spaces.”

9 In paragraph 7.9.3.4, a footnote reference is inserted after the words "open spaces" to read “Refer to the definition in 7.3.1.6.”

10 In paragraph 7.10.3.1.1, the following footnote reference is inserted after the words “protective clothing”:

> “Refer to ISO 6942:2002 - Protective clothing - Protection against heat and fire - Evaluation of materials and material assemblies when exposed to source of radiant heat.”

11 The following footnote reference is inserted after the words “temperature class T 3”:

> “Refer to IEC Publication 60079 - Electrical apparatus for explosive gas atmospheres.”

12 The words “and the associated interpretations of MSC/Circ.912.” are added at the end of the footnotes to paragraphs 7.13.1 and 7.16.1.

13 In the footnote to the title of Part D of chapter 7, the words “adopted by the Organization by resolution A.716(17)” are deleted and the reference “A.434(XI)” is replaced with “MSC.193(79)”.

14 The following footnote is added to paragraph 7.17.3.1.3:

> “Refer to resolution A.123(V) on Recommendation on fixed fire-extinguishing systems for special category spaces.”

15 The footnote to paragraph 7.17.3.2 is amended to read:

> “Refer to IEC Publication 60092-506: Electrical installations in ships - Part 506: Special features - Ships carrying specific dangerous goods and materials hazardous only in bulk and IEC Publication 79 – Electrical apparatus for explosive gas atmospheres.”

16 In paragraph 7.17.3.4.2, a footnote “Refer to IACS Unified Requirement F 29, as revised.” is inserted after the words “non-sparking type.”

17 The following footnote is added to paragraph 7.17.3.5.3 after the words “certified safe type”:

"Refer to IEC 60092-506 Special features – Ships carrying dangerous goods and materials hazardous only in bulk."

18 The footnote to paragraph 7.17.3.8.1 is amended to refer to MSC/Circ.1146 instead of MSC/Circ.671.

19 In paragraph 7.17.3.8.2, the following footnotes are added after the words "water-spraying system" and at the end of the penultimate sentence, respectively:

"Refer to resolution A.123(V) on Recommendation on fixed fire-extinguishing systems for special category spaces."

"Refer to relevant provisions of regulation II-2/20.6.1.4 of the Convention."

20 In paragraph 7.17.4, the following footnote is added:

"Refer to MSC/Circ.1027 - Document of compliance with the special requirements for ships carrying dangerous goods under the provisions of regulation II-2/19 of SOLAS 74, as amended, and MSC/Circ.1148 – Issuing and renewal of document of compliance with the special requirements applicable to ships carrying dangerous goods."

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ANNEX 6

PROPOSED AMENDMENTS TO THE 1994 HSC CODE

Chapter 1 – General comments and requirements

The existing paragraph under 1.2 (General requirements) is numbered as 1.2.1 and a new paragraph 1.2.2 is added as follows:

> "1.2.2 New installation of materials containing asbestos used for the structure, machinery, electrical installations and equipment of a craft to which this Code applies shall be prohibited except for:
>
> .1 vanes used in rotary vane compressors and rotary vane vacuum pumps;
>
> .2 watertight joints and linings used for the circulation of fluids when, at high temperature (in excess of 350°C) or pressure (in excess of 7×10^6 Pa), there is a risk of fire, corrosion or toxicity; and
>
> .3 supple and flexible thermal insulation assemblies used for temperatures above 1000°C."

***

ANNEX 7

PROPOSED AMENDMENTS TO THE DSC CODE

Chapter 1 – General

A new paragraph 1.1.5 is added after existing paragraph 1.1.4 as follows:

"1.1.5 New installation of materials containing asbestos used for the structure, machinery, electrical installations and equipment of a craft to which this Code applies shall be prohibited except for:

.1 vanes used in rotary vane compressors and rotary vane vacuum pumps;

.2 watertight joints and linings used for the circulation of fluids when, at high temperature (in excess of 350°C) or pressure (in excess of 7×10^6 Pa), there is a risk of fire, corrosion or toxicity; and

.3 supple and flexible thermal insulation assemblies used for temperatures above 1000°C."

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ANNEX 8

DRAFT MSC CIRCULAR

GUIDELINES FOR A SIMPLIFIED EVACUATION ANALYSIS FOR HIGH-SPEED PASSENGER CRAFT

1 The Maritime Safety Committee, at its seventy-third session (27 November to 6 December 2000), adopted the International Code of Safety for High-Speed Craft, 2000 (2000 HSC Code) by resolution MSC.97(73), which entered into force on 1 July 2002. This Code requires in section 4.8.2 that "an evacuation procedure, including an evacuation analysis carried out taking into account the guidelines developed by the Organization shall be developed for the information of the Administration in connection with the approval of fire insulation plans and for assisting the owners and builders in planning the evacuation demonstration required in 4.8.3" of the Code.

2 The Committee, at its seventy-fourth session (30 May to 8 June 2001), noting that computerized simulation systems are still under development, decided that a simplified evacuation analysis method was needed in the interim and, having considered a proposal by the forty-fifth session of the Sub-Committee on Fire Protection, approved Interim Guidelines for a simplified evacuation analysis of high-speed passenger craft and invited Member Governments to apply the Interim Guidelines when implementing the requirements of section 4.8.2 of the 2000 HSC Code, and to submit to the Sub-Committee on Fire Protection information on experience gained in their implementation.

3 The Committee, at its [eightieth session (11 to 20 May 2005)], after having considered a proposal by the forty-ninth session of the Sub-Committee on Fire Protection made in light of the experienced gained in the application of the aforementioned Interim Guidelines, approved the Guidelines for a simplified evacuation analysis of high-speed passenger craft, together with the worked example appended thereto, as set out in the annex.

4 Member Governments are invited to apply the annexed Guidelines when implementing the requirements of section 4.8.2 of the 2000 HSC Code and bring them to the attention of craft designers, craft owners and other parties involved in the design, construction and operation of high-speed passenger craft.

5 This circular supersedes MSC/Circ.1001.

ANNEX

GUIDELINES FOR A SIMPLIFIED EVACUATION ANALYSIS FOR HIGH-SPEED PASSENGER CRAFT

1 General

1.1 In addition to the relevant requirements for means of escape, escape routes in high-speed passenger craft are required to be evaluated by an evacuation analysis early in the design process, under the International Code of Safety for High-Speed Craft, 2000 (2000 HSC Code), section 4.8.2.

1.2 The purpose of the Interim Guidelines is to provide guidance on how to execute a simplified (hydraulic) evacuation analysis and use its results to plan the evacuation demonstration required in section 4.8.5 of the 2000 HSC Code.

2 Definitions

2.1 *Ideal deployment time (t_M)* is the time needed for the preparation and launching of the marine evacuation system (MES) and the first survival craft in calm water.

2.2 *Ideal travel time (t_I)* is the time needed for the slowest group of people to reach the embarkation point in calm water. Unless otherwise stated in the evacuation procedure, the number of people of the slowest group should be assumed equal to the capacity of the largest survival craft onboard. For the purpose of these Interim Guidelines, t_I is assumed to run concurrently with t_M.

2.3 *Ideal embarkation time (t_E)* is the time needed for all passengers and crew to board the survival craft from the starting situation described in 4.8.7.1 of the Code.

2.4 *Structural fire protection time (SFP)* is the protection time for areas of major fire risk as defined in section 4.8.1 of the 2000 HSC Code.

2.5 *Slowest group of people* is the group of evacuating persons for which the highest travel time is obtained from calculations according to paragraph 3.6.3.3.

3 Method of evaluation

The steps in the evacuation analysis are:

3.1 *Description of the system*

.1 Identification of assembly stations.

.2 Identification of embarkation stations, MES and survival craft.

.3 Description of the evacuation procedure including the role of the crew.

.4 Identification of groups and their escape route.

3.2 *Assumptions*

This method for estimating evacuation time is basic in nature and, therefore, common evacuation analysis assumptions should be made as follows:

.1 passengers and crew should carry out the evacuation in a sequence of groups according to the evacuation procedure;

.2 passengers and crew will evacuate via the primary escape route;

.3 walking speed depends on the type of escape facility, assuming that the flow is only in the direction of the escape route, and that there is no overtaking;

.4 passengers' disabilities or medical conditions that will severely hamper their ability to keep up with the flow are neglected (see paragraph 3.2.8.1 below);

.5 passenger load is assumed to be 100% (full load);

.6 full availability of escape arrangements is considered;

.7 people can move unhindered;

.8 the allowable evacuation time as per section 4.8.1 of the 2000 HSC Code is given by $\frac{SFP - 7}{3}$ (min), where:

.8.1 division by 3 accounts for the safety factor, which includes passengers' ages and disabilities, restricted visibility due to smoke, effects of waves and craft motions on deployment, travel and embarkation time and of violations to the evacuation procedure;

.8.2 subtraction of 7 min accounts for initial detection and extinguishing action (section 4.8.1 of the 2000 HSC Code); and

.8.3 for category B craft, the passenger awareness time, the time needed for passengers to reach assembly stations and the time needed for manning emergency stations is included in the 7 min time (see section 4.8 of the 2000 HSC Code);

.9 as the evacuation procedure is designed to carry out evacuation under controlled conditions (section 4.8.1 of the 2000 HSC Code), no counter flow takes place; and

.10 when using table 3.6 it is assumed that at the beginning of the evacuation, passengers are located at a distance not greater than two decks from the embarkation station.

3.3 *Scenarios to be considered*

3.3.1 For the purpose of calculating the evacuation time in category A craft, passengers should be assumed to be distributed in a normal voyage configuration (section 4.8.4.1 of the 2000 HSC Code).

3.3.2 For the purpose of calculating the evacuation time in category B craft, passengers and the crew should be assumed to be distributed among assembly stations and be ready for embarkation (section 4.8.4.2 of the 2000 HSC Code).

3.4 *Performance standards*

3.4.1 The following two performance standards should be complied with for calculating the overall evacuation time:

$$t_M + t_E \leq \frac{SFP - 7}{3} \qquad (3.4.1.1)$$

$$t_I + t_E \leq \frac{SFP - 7}{3} \qquad (3.4.1.2)$$

3.4.2 Both performance standards are derived from section 4.8.1 of the 2000 HSC Code.

3.5 *Calculation of t_E and t_M*

3.5.1 The values of t_E and t_M shall be calculated separately based on an appropriate combination of the following documented and independently witnessed trials as is acceptable to the Administration but which may be subject to verification trials:

.1 type approval trials[10] for any inflatable liferafts and marine evacuation systems used for the evacuation of the craft, the relevant deployment and embarkation times being increased by factors of 1.30 and 1.14, respectively; and

.2 full scale shipboard trials on closely similar craft and evacuation systems.

3.5.2 Safety factors on t_E and t_M are accounted for by dividing by 3 in performance standards formulae (3.4.1.1) and (3.4.1.2).

3.6 *Calculation of t_I*

3.6.1 Parameters to be considered:

.1 clear width, W_c , is:

.1 measured off the handrail(s) for corridors and stairways;

.2 the actual passage width of a door in its fully open position;

[10] Refer to resolution MSC.81(70) on Revised recommendation on testing of life-saving appliances, and in particular the times measured in accordance with 5.17.3.3 and 12.6.1 of that recommendation.

.3 the space between the fixed seats for aisles in public spaces; and

.4 the space between the most intruding portions of the seats (when unoccupied) in a row of seats in public spaces;

.2 speed of persons, S (m/s) is the speed of evacuees along the escape route (table 3.6 provides the values of S which should be used for the analysis);

.3 specific flow of persons, F_s (p/(m/s)), is the number of evacuating persons past a point in the escape route per unit time per unit of clear width W_c (table 3.6 provides the values of F_s which should be used for the analysis).

Table 3.6*

Type of Facility	Speed of persons S (m/s)	Specific Flow Fs (p/(m/s))
Stairs (down)	0.55	1.1
Stairs (up)	0.44	0.88
Corridors, doorways	0.67	1.3

.4 calculated flow of persons, F_c (p/s), is the predicted number of persons passing a particular point in an escape route per unit time. It is obtained from:

$$F_c = F_s \cdot W_c \qquad (3.6.1.4)$$

.5 flow time, t_F (s), is the total time needed for a group of N persons to move past a point in the egress system. It is calculated as:

$$t_F = N / F_c \qquad (3.6.1.5)$$

.6 walking time, t_w (s), is the total time needed for a person to cover the distance between the assembly station and the embarkation station.

3.6.2 Transitions

Transitions are those points in the egress system where the type of a route changes (e.g. from a corridor to a stairway) where routes merge or branch out.

3.6.3 Procedure for calculation of t_I is as follows:

.1 Groups of people:

For the purposes of evacuation, the total number of persons on board is broken down into one or more groups of people. It should be assumed that all persons in

* Data derived from land-based stairs, corridors and doors in civil buildings, and are extracted from the publication "SFPE Fire Protection Engineering Handbook, 2nd edition NFPA 1995".

a group carry out the evacuation at the same time, along the same route and towards the same embarkation station. The number of persons in each group, the number of groups and the embarkation station assigned to each group should be in accordance with the evacuation procedure.

.2 Schematic representation:

The escape routes from assembly stations to embarkation stations are represented as a hydraulic network, where the pipes are the corridors and stairways, the valves are the doors and restrictions in general.

.3 For each foreseen group of people:

.1 The walking time, t_w, is calculated by using the speed of persons specified in table 3.6 and the distance between the pertinent assembly and embarkation stations.

.2 The flow time, t_F, of each portion of the escape route is calculated using the specific flow F_s from table 3.6 and the appropriate clear width of that portion of escape route. The total flow time is the largest value obtained.

.3 The travel time is obtained as the sum of the walking time and the total flow time.

3.6.4 Ideal travel time t_I

Calculations as per paragraph 3.6.3.3 should be repeated for each foreseen group of people. The highest resulting travel time is then taken as the ideal travel time for use in performance standard in paragraph 3.4.

4 Corrective actions

If the performance standards under paragraph 3.4 are not fulfilled, corrective actions should be considered at the design stage by either modifying one or more components in the evacuation system (e.g., escape routes, life-saving appliances, passengers load, etc.) or by modifying the evacuation procedure.

5 Documentation

The documentation of the analysis should report the following items:

.1 the basic assumptions for the analysis;

.2 a schematic representation of the layout of the craft;

.3 position and role of the crew during the evacuation, according to the evacuation procedure;

.4 the method for the analysis, if different from these Interim Guidelines;

.5 details of the calculation; and

.6 the resulting overall evacuation time.

APPENDIX

EXAMPLE OF APPLICATION

1 General

The example provides an illustration on the application of the Interim Guidelines. Therefore it should not be viewed as a comprehensive and complete analysis nor as an indication of the data to be used. More specifically, the short description of the evacuation procedure provided in paragraph 3.3 is only an outline, for the purpose of the evacuation analysis, of the complete evacuation procedure the embarkation time and the deployment time used in paragraph 4 below are purely illustrative.

2 Craft characteristics

The high-speed craft considered is a Category B craft with a total capacity of 800 persons (784 passengers and 16 crew members). As shown in figure 1, when the order to abandon the craft is given, passengers are distributed in the public spaces on two decks (210 on the upper deck and 574 on the lower deck), the lower deck is equipped with 4 MES. The structural fire protection time (SPF) is 60 min.

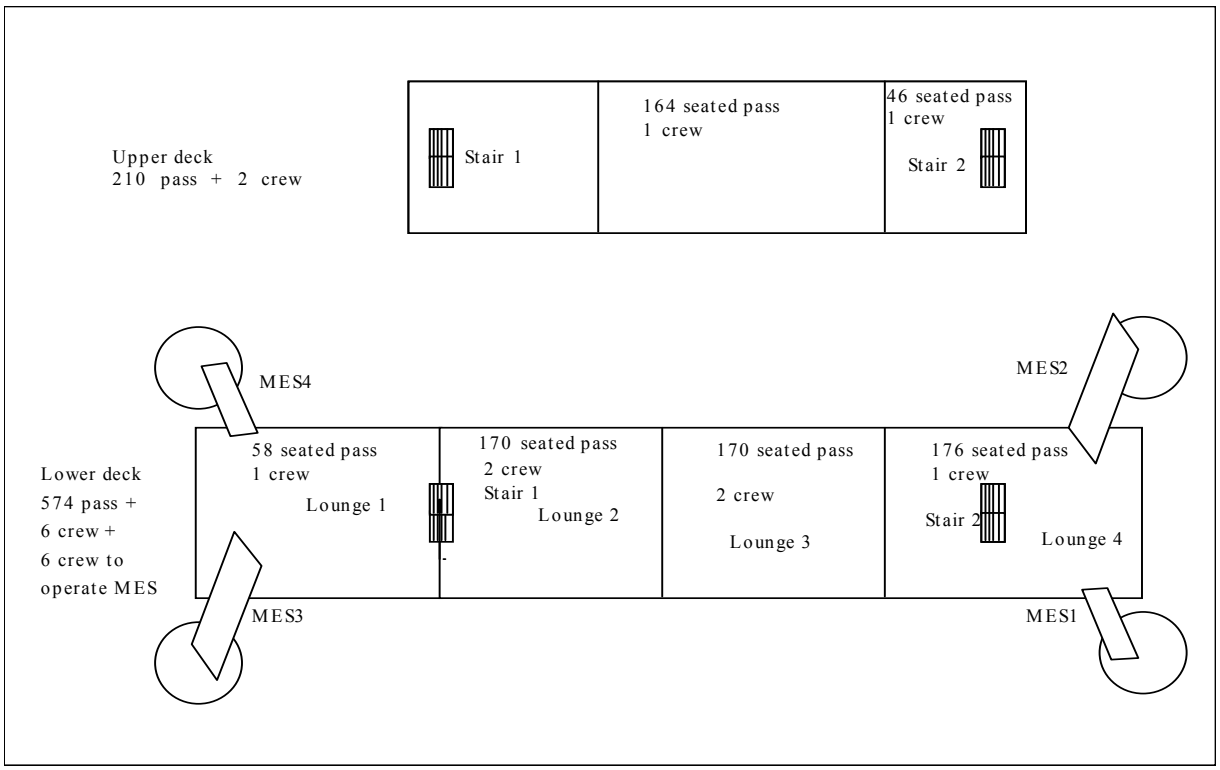

Figure 1 – Sketch of the considered high-speed craft

3 Description of the system

.1 Identification of assembly stations

Assembly stations coincide with the public spaces where passengers are located (seated). Passengers are wearing life jackets.

.2 Identification of embarkation stations, MES and liferafts

.1 Embarkation stations (4, one for each MES) are located at the lower deck.

.2 Each MES consists of an inflatable slide with an attached platform.

.3 Liferafts (8), 135 persons capacity each, are stowed in racks on the lower decks, in the proximity of the MES. The aggregate capacity of liferafts is therefore 1,080 persons, or of 810 persons if one embarkation station is not available in accordance with the 2000 HSC Code.

.4 Two rescue boats are available for marshalling the liferafts.

.3 Description of the evacuation procedure

.1 When the order to abandon the craft is given, crew members start operating the MES (total 6 crew members), the rescue boats (1 crew member per boat) and to direct the passengers (as shown in figure 1: two crew members on the upper deck and 6 crew members on the lower deck); all these activities progress in parallel.

.2 PHASE 1: For each MES, the slide is inflated and the first liferaft launched, inflated and connected to the slide's platform. In the mean time the first 4 groups of passengers are formed and directed to the 4 MES, each group is assisted by 1 crew member, for a total of 400 persons, as follows (see figure 2):

- 164 passengers, marshalled by 1 crew member, move from upper deck through stair 1 down to the lower deck and join with 34 passengers and 1 crew member coming from lounge 2. They then move along the central aisle of lounge 1 (corridor 2); at the end of corridor 2 two groups are formed, each composed by 99 passengers and 1 crew member, and move to MES 3 and 4 through doors 2A and 2B respectively;

- 46 passengers marshalled by 1 crew member move from upper deck, through stair 2, down to lower deck, where they merge with 152 passengers and 1 crew member; two groups are then formed, each composed by 99 passengers and 1 crew member, and move to MES 1 and 2 respectively;

- in the meantime the remaining passengers stay in lounges 1 to 4 assisted by 4 crew members.

.3 PHASE 2: Once the first liferaft is ready for boarding, the first group for each MES descends to the liferaft using the slide and platform. When boarding is completed, the liferaft is detached from the slide and floated away by the rescue boat. In the mean time, the second liferaft is launched, inflated and connected to the platform and the second 4 groups of persons move to the embarkation stations.

.4 PHASE 3: Once the second liferaft is ready for boarding, the second group for each MES descents to the liferaft through the slide and platform. Finally, the 6 crew members operating the MES board. When boarding is completed, the liferaft is detached from the slide. The evacuation is now completed.

.4 Identification of groups and their escape routes

In total 8 groups, each composed of 100 persons, are considered. Their (primary) escape routes are shown in figure 2 for the first 4 groups and in figure 3 for the second 4 groups.

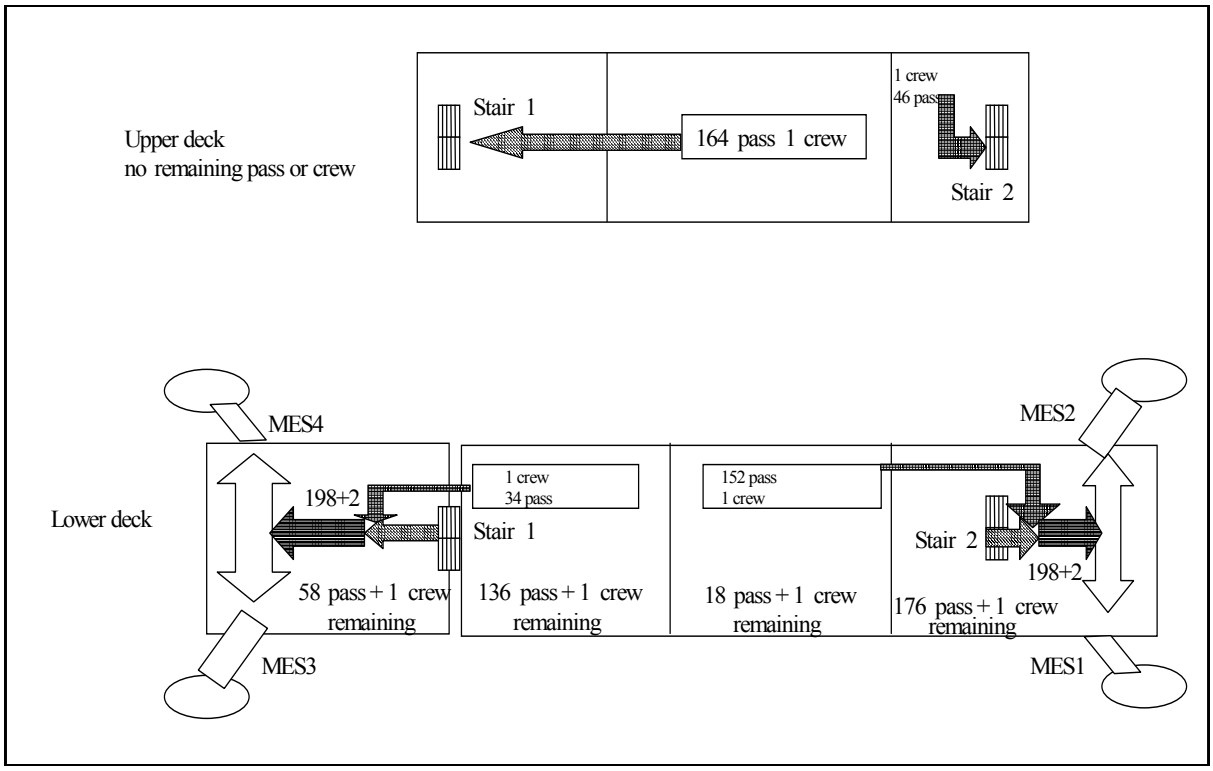

Figure 2 – First 4 groups of persons

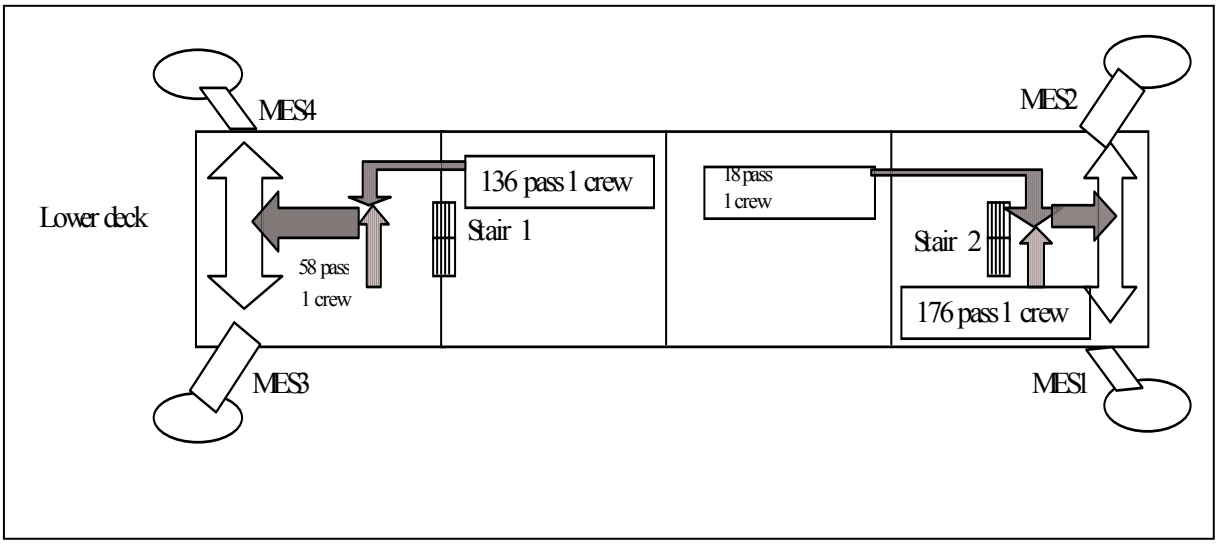

Figure 3 – Second 4 groups of persons

4 Calculation of t_E and of t_M

.1 Embarkation time t_E

According to the evacuation procedure, each MES is used by 200 persons, if all four MES are available. Based on full scale trials on craft having similar arrangements and using the same MES and same number of crew, the total time needed to deploy, inflate and mooring the liferaft and to embark 100 persons is 330 s (5 min and 30 s). Accordingly, the total embarkation time is 660 s (11 min).

.2 Deployment time t_M

Based on full scale trials on craft having similar arrangements and using the same MES, the total time needed to deploy and inflate an MES is 150 s (2 min and 30 s).

5 Calculation of t_I

.1 For the purposes of this example, it is assumed that calculations have been carried out for all the 8 groups of people into which the evacuation is organized, according to the evacuation procedure described in paragraph 3.3 above. It is further assumed that the highest travel time is obtained for the group of people moving (phase 1) from the afterward passenger area in the upper deck down to MES 3 and 4 respectively on the lower deck.

.2 The schematization of the escape route is shown in figure 4. As it may be seen, the elements composing the escape path are 2 doors, 2 corridors and 1 stairway.

.3 The characteristics of the escape path's elements are as follows:

Table 5.3

Element	L (m)	W_c (m)	F_s	S (m/s)	F_c (p/s)	N people
Door 1	N.A.	1.4	1.3	N.A.	1.82	165
Corridor 1	14	4.2	1.3	0.67	5.46	165
Stairway 1	4.7	3.5	1.1	0.55	3.85	165
Corridor 2	14	3.0	1.3	0.67	3.90	200
Door 2A	N.A	1.4	1.3	N.A	1.82	100
Door 2B	N.A	1.4	1.3	N.A	1.82	100

The values of specific flow (F_s) and speed (S) are taken from table 3.6 of the guidelines; the value of calculated flow (F_c) is obtained by $F_c = F_s W_c$ (see paragraph 3.6.1.4 of the guidelines).

.4 The resulting walking time (t_w) and flow time (t_F), calculated according to paragraphs 3.6.1.5 and 3.6.1.6 of the guidelines are as follows:

Table 5.4

Element	L (m)	W_c (m)	N people	t_w (s)	t_F (s)
Door 1	N.A.	1.4	165	N.A.	91
Corridor 1	14	4.2	165	21	30
Stairway 1	4.7	3.5	165	9	43
Corridor 2	14	3.0	200	21	51
Door 2A	N.A	1.4	100	N.A	55
Door 2B	N.A	1.4	100	N.A	55

The resulting total walking time is the sum of the walking time of each element in the escape path and totals 51 s. The flow time is the highest among all the elements in the escape path and corresponds to 91 s.

Accordingly, the ideal travel time is where, t_I = 142 s.

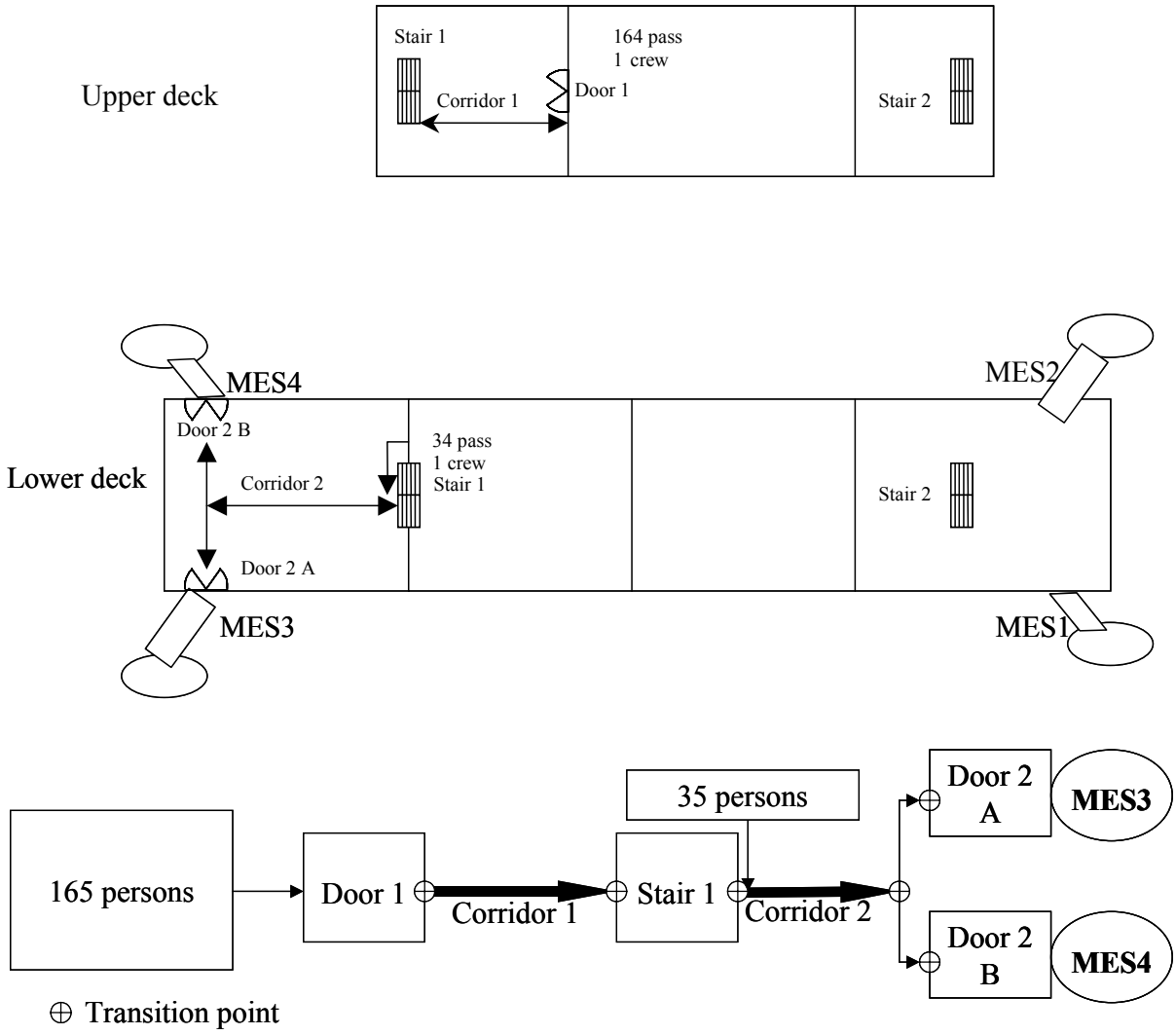

Figure 4 – Sketch of the evacuation path and its schematisation

6 Performance standard

The calculated overall evacuation time: $t_M + t_E = 150 + 660 \leq \frac{SFP - 7}{3}$ min = 1059 s

$t_I + t_E = 142 + 660 \leq \frac{SFP - 7}{3}$ min = 1059 s

The requirements are fulfilled.

***

ANNEX 9

DRAFT AMENDMENTS TO RESOLUTION A.673(16) *

3.9 Fire-fighting requirements

3.9.1 For the carriage of flammable liquids identified in appendix 1, the requirements for tankers in chapter II-2 of the 1974 SOLAS Convention, as amended, should apply to vessels covered by the Guidelines, irrespective of tonnage, including vessels of less than 500 gross tonnage, except that:

.1 regulations ~~60, 61, 62 and 63~~ 4.5.5, 10.8 and 10.9 should not be applied;

.2 regulation ~~56.1~~ 4.5.1.1 (i.e., positioning of machinery spaces aft of cargo tanks, slop tanks, cargo pump-rooms and cofferdams), regulation ~~56.2~~ 4.5.1.2 (i.e., the requirements for location of the main cargo control station), regulations ~~56.4~~ 4.5.1.4 and ~~56.8~~ 4.5.2.1 to 4.5.2.3 need not be applied. Additionally, regulation ~~56.7~~ 9.2.4.2.5 need not be applied provided that the exterior boundaries of superstructures and deckhouses enclosing accommodation and including any overhanging decks which support such accommodation are spaced at least 7 m~~etres~~ away from the cargo area. The insulation of such boundaries should however be to the satisfaction of the Administration;

.3 with regard to regulation ~~57.1~~ 9.2.4.1, the Administration may permit use of a method other than IC as defined in regulation ~~42.5.1~~ 9.2.3.1.1.1 where considered appropriate;

.4 the requirements of regulation ~~44~~ 9.2.3 may be applied in lieu of those in regulation ~~58~~ 9.2.4.2, where considered appropriate by the Administration;

.5 the provisions of regulations ~~59~~ 4.5.3, 4.5.4 and 4.5.6 to 4.5.8 need be applied only where considered appropriate by the Administration, taking into account the requirement in 3.6.2 of the Guidelines that cargo tank vent systems should meet the relevant requirements of the International Bulk Chemical Code;

.6 regulations ~~4,~~ 10.2, 10.4 and 10.5, except regulation 10.5.6, ~~as applicable to cargo ships, and regulation 7~~ should apply as they would apply to tankers of 2,000 gross tonnage and over;

.7 the provisions of 3.9.2.3 should be applied in lieu of regulation ~~61~~ 10.8; and

.8 the provisions of 3.9.2.5 should be applied in lieu of regulation ~~63~~ 10.9.

3.9.2 The following provisions also apply for the carriage of flammable liquids identified in appendix 1:

* Struck-out text indicates proposed deletions and the shaded text shows proposed additions or changes.

.1 During cargo transfer, water pressure should be maintained on the fire main system.

.2 Fire hoses, fitted with approved dual-purpose nozzles (i.e. spray/jet type with a shutoff), should be attached to each fire hydrant in the vicinity of the flammable liquid to be carried.

.3 Either a fixed deck foam system or a fixed fire-extinguishing system of the dry chemical type complying with the following ~~should be provided~~:

.3.1 the system should be located to protect the deck within the cargo area;

.3.2 the system should be capable of covering the deck within the cargo area without being moved;

.3.3 when a fixed deck foam system is provided, it should comply with the requirements of 11.3.3 to 11.3.12 of the International Bulk Chemical Code. Only foam suitable for the products carried should be used.

.3.4 Administrations may approve a fixed fire-extinguishing system provided that:

.3.4.1 on a deck area of 45 m^2 or less, there are two or more dry chemical extinguishers whose total capacity is not less than 135 kg;

.3.4.2 on a deck area of more than 45 m^2, there are three or more dry chemical extinguishers whose total capacity of extinguishing agent is not less than:

$$C = 3A \text{ kg}$$

where A is the deck area (in square metres);

.3.4.3 the minimum rate of supply of the extinguishing agent is not less than 3 kg/min/m^2 ~~per square metre~~.

.4 An alternative to the systems required in 3.9.2.3 above may be approved in accordance with the procedures contained in SOLAS regulation II-2/~~22~~ 17 ~~of the 1974 SOLAS Convention, as amended~~.

.5 The cargo pump-room, where flammable liquids are handled, should be provided with a fixed fire-extinguishing system in accordance with 11.2 of the International Bulk Chemical Code.

3.9.3 For vessels which carry only liquids identified as non-flammable in appendix 1, the fire-fighting requirements should be to the satisfaction of the Administration.

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ANNEX 10

DRAFT MSC CIRCULAR

FUNCTIONAL REQUIREMENTS AND PERFORMANCE STANDARDS FOR THE ASSESSMENT OF EVACUATION GUIDANCE SYSTEMS

1 The Maritime Safety Committee, at its seventy-fifth session (15 to 24 May 2002) recognized the need for the development of guidelines on the assessment of evacuation guidance systems.

2 The Committee, at its [eightieth session (11 to 20 May 2005)], having considered a proposal by the forty-ninth session of the Sub-Committee on Fire Protection, approved the Guidelines on the assessment of evacuation guidance systems as set out in the annex.

3 Member Governments are invited to bring the annexed Guidelines to the attention of ship designers, owners, operators, shipbuilders and other parties involved in the design, construction, testing, approval and maintenance of evacuation guidance systems.

ANNEX

FUNCTIONAL REQUIREMENTS AND PERFORMANCE STANDARDS FOR THE ASSESSMENT OF EVACUATION GUIDANCE SYSTEMS

1 Purpose

1.1 The purpose of these guidelines is to provide functional requirements and performance standards applicable to all evacuation guidance systems.

2 Functional requirements

2.1 The systems must readily identify the routes of escape when the normal emergency lighting is less effective due to smoke.

2.2 The systems shall be such that, in case one exit may not be used, persons are still able to easily find their way towards another exit.

2.3 Systems relying on external power sources, including those that are automatically activated or continuously operating, should be capable of being manually activated by a single action from a continuously manned central control station.

2.4 Electrically powered systems should be connected to the emergency switchboard required by regulation II-1/42 of the 1974 SOLAS Convention, as amended, so as to be powered by the main source of electrical power under normal circumstances and also by the emergency source of electrical power when the latter is in operation.

2.5 All electrically powered systems should be arranged so that the failure of any single device, or battery will not result in the system being ineffective.

2.6 The systems should not prevent effective communication between the fire-fighting parties and the continuously manned control station.

2.7 The performances of the systems shall not be impeded by the simultaneous functioning of any other systems, expected to be used in normal or under emergency conditions (e.g. public address systems, emergency lighting systems, etc.).

3 Performance standards

3.1 Electrical powered systems should meet the requirements for vibration and electromagnetic interference in accordance with IEC 60945.

3.2 Electrically powered systems should provide a minimum degree of ingress protection of at least IP 55 in accordance with IEC 60520.

3.3 The systems should be tested, approved and maintained in accordance with guidelines.

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ANNEX 11

DRAFT MSC CIRCULAR

INTERIM GUIDELINES FOR THE TESTING, APPROVAL AND MAINTENANCE OF EVACUATION GUIDANCE SYSTEMS USED AS AN ALTERNATIVE TO LOW-LOCATION LIGHTING SYSTEMS

1 The Maritime Safety Committee, at its seventy-fifth session (15 to 24 May 2002) recognized the need for the development of Guidelines for the testing and approval and maintenance of evacuation guidance systems used as an alternative to low-location lighting systems required by SOLAS chapter II-2 and the FSS Code.

2 The Committee, at its [eightieth session (11 to 20 May 2005)], having considered a proposal by the forty-ninth session of the Sub-Committee on Fire Protection, approved the Interim Guidelines for the testing and approval and maintenance of evacuation guidance systems alternative to the low-location lighting systems as set out in the annex.

3 Member Governments are invited to apply the annexed Interim Guidelines and submit to the Sub-Committee on Fire Protection information on experience gained in the implementation of the Interim Guidelines and on any progress made in the development of the testing and approval and maintenance of evacuation guidance systems.

4 Member Governments are also invited to bring the annexed Interim Guidelines to the attention of ship designers, owners, operators, shipbuilders and other parties involved in the design, construction, testing, approval and maintenance of evacuation guidance systems.

ANNEX

INTERIM GUIDELINES FOR THE TESTING, APPROVAL AND MAINTENANCE OF EVACUATION GUIDANCE SYSTEMS USED AS AN ALTERNATIVE TO LOW-LOCATION LIGHTING SYSTEMS

1 Scope

The purpose of these Guidelines is to provide standards for the testing, approval and maintenance for alternative systems to low-location lighting systems required by SOLAS regulation II-2/13.3.2.5.1 and chapter 11 of the FSS Code.

2 Testing

2.1 Test for corridors should be performed in reduced visibility using theatrical (white) smoke with an Optical Density at least OD 0.5 m^{-1}*. Measuring equipment should conform to a standard acceptable to the Administration.

2.2 If the system is to be installed in public spaces the test should be performed in reduced visibility using theatrical (white) smoke with an Optical Density at least OD 0.1 m^{-1}**.**

2.3 Test for stairway enclosures should be performed in clear (no smoke) conditions.

2.4 A minimum 80 % of the participants should reach the pre-designated exit with a speed of movement of at least 0.7 m/s calculated using the distance measurement of the optimum route. Participants achieving a speed of movement of less than 0.7 m/s should be deemed to have failed. There is no speed of movement criterion applied to stairway enclosure tests.

2.5 The maximum percentage of participants choosing failed exits should not exceed the value of 2% for public spaces and 5% for accommodation areas, corridors and stairway enclosures.

2.6 In the public space configuration when testing with two correct exits, no more than 15% of the participants may choose the more distant exit.

2.7 There should be a minimum of 60 participants for each test - being at least 8 and not more than 12 of each age group 16-25, 26-35, 36-45, 46-55, 56-65, 66-75 with an average of 45-55% male/female of the entire group.

2.8 A "control" test should be performed with no guidance system in operation in order to demonstrate that there is no significant inherent bias to favour the pre-designated exit. Participants of the "control" test should not participate in any previous or subsequent tests.

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* Refer to the United Kingdom Government's Health and Safety Executive (HSE) 1998 report: OTH 533 Emergency Way Guidance Lighting Systems (http://www.hse.gov.uk/research/othpdf/500-599/oth533.pdf).

2.9 For the purpose of this section:

.1 a "correct exit" is an exit to which the EGS intentionally guides participants;

.2 participants arriving at any of the "fail exits" are deemed to have "failed" the test and should be stopped at that point;

.3 only one participant should be in the test at a time in order to preclude any crowd behavioural influence;

.4 the test area should be illuminated by the emergency lighting as required by SOLAS; and

.5 during the test signage other than those being part of the test should not be used.

3 Test facility design

Public spaces

3.1 If the system is intended to be installed in public spaces, the test facility should be designed so that participants are required to navigate to a pre-designated exit across a public space, where the shortest distance to that exit is not along a wall. A minimum of two exits should be provided to test the ability of participants to identify and proceed to an exit within an open space. An additional fail exit should be located 2 to 3 m from each correct exit.

3.2 The test room should be not less than 15 m by 10 m with the start point and pre-designated exit being on the long sides, diagonally opposite each other, such that the distance around the walls is approximately equal in either direction. The density of the smoke should be great enough to prevent a participant from being able to see no more than half to two-thirds of the distance to the nearest exit OD 0.1 m^{-1}. Direct distance between start and a correct exit should be not less than 12 m.

Accommodation areas and corridors

3.3 The test layout should be such that participants should be required to navigate correctly their way to a pre-designated exit via at least four decision points including at least two cross-junctions and at least one T-junction**.** It should not be possible to navigate the correct route by remaining attached to one continuous wall. The correct route should include the placement of a non-exit door within 2 to 3 m of the correct exit door. A non-exit door is a fail exit. The total distance travelled over the correct route should be not less than 25 m, with the distance between decision points being not less than 5 m.

Stairway enclosures

3.4 Participants should be required to use the stairway enclosures to a pre-designated floor. The participants should enter the stairway enclosures from a mid-point where each will be instructed by the guidance system to proceed either up or down. The option of up or down should be randomly chosen.

4 Participant briefing

Participants to be briefed on the purpose of the test and the technology to be tested, using the proposed briefing technique that would be used in the implementation on board ship, e.g. the briefing given during lifeboat drill, instructions on backs of cabin doors or via the ship's public address system, etc. No briefing should be given on the route, test layout or numbers of exits.

5 Approval

All systems should be approved by the Administration for compliance with the Performance standards for evacuation guidance systems (MSC/Circ....) as developed by the Organization and, for electrically powered systems, IEC 60092 *Electrical Installations in Ships*. Installation requirements should be included in the approval procedures and individual on-board arrangements should be verified accordingly.

6 Maintenance

6.1 All elements of the system should be visually examined and checked at least once per week, and a record thereof should be kept. All missing, damaged or inoperable elements should be replaced.

6.2 All systems should have their signal tested at least once every five years. Readings should be taken on site. Should any reading be found to be outside manufacturer's tolerances then that element of the system should be replaced.

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ANNEX 12

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-2

1 The Maritime Safety Committee, at its [eightieth session (11 to 20 May 2005)], with a view to providing more specific guidance for vague expressions such as "to the discretion of the Administration", which are open to different interpretations contained in IMO instruments, approved the unified interpretations of SOLAS chapter II-2 prepared by the Sub-Committee on Fire Protection, as set out in the annex.

2 Member Governments are invited to use the annexed unified interpretations as guidance when applying relevant provisions of SOLAS chapter II-2 to fire protection construction, installation, arrangements and equipment to be installed on board ships on or after [*date of approval of the circular*] and to bring the unified interpretations to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-2

Regulation II-2/4.5.3.3 – Safety devices in venting systems

1 Ullage openings do not include cargo tank openings that are fitted with standpipe arrangements with their own manually operated shutoff valves.

2 Examples include the common 2.54 cm (1") and 5.08 cm (2") diameter standpipe arrangements that are used for sampling, monitoring or measuring of ullage/temperature/interface, oxygen, liquid and hand dipping in the cargo tank.

Regulation II-2/9.7.1.1 – Ventilation systems

1 Combustible gaskets in flanged ventilation duct connections are not permitted within 600 mm of an opening in an "A" or "B" class divisions and in ducts required to be of "A" class construction.

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ANNEX 13

JUSTIFICATION FOR PROPOSED NEW WORK PROGRAMME ITEM (In accordance with MSC/Circ.1099-MEPC/Circ.366)

DIFFERENT APPLICATION FOR EXISTING SHIPS IN IMO INSTRUMENTS REGARDING REQUIREMENTS FOR FIRE PROTECTION

1 Scope of the proposal

1.1 Examine and recommend amendments to SOLAS regulation II-2/15 (previous version of SOLAS chapter II-2 as amended by resolution MSC.31(63) and MSC.57(67)).

1.2 Consider the issues raised in annex 12 to document MSC 78/22/1 (IACS) regarding the retroactive application of the provisions related to the protection of lubricating oil and other flammable oil system arrangements, as set out in SOLAS regulations II-2/15.3 and 15.4 (SOLAS Consolidated Edition, 2001).

2 Compelling need

A new work programme item is necessary to enable the Sub-Committee to appropriately address ambiguities for the application of SOLAS regulations II-2/15.3 and 15.4 to existing ships with regard to the requirements for lubricating oil arrangements, which have led to different interpretations with regard to their application by Administrations. IACS Unified Interpretation SC 177, as contained in document MSC 78/22/1 (annex 12), states that these arrangements only apply to ships built after 1 July 1998, with the view that an inadvertent error was made when developing the aforementioned requirements. However, the regulation, as adopted, appears to apply to ships built after 1992, taking into account the application guidance provided under the heading of the aforementioned regulation.

3 Analysis of the issues involved, having regard to the costs to the maritime industry and global legislative and administrative burdens

The purpose of this effort would be primarily to correct and/or clarify the existing requirements so that they are uniformly applied by Administrations, and not to impose new ones, so the costs to the maritime industry are anticipated to be minimal. The administrative burdens to the Organization and to Member States would are anticipated to be minimal as well.

4 Benefits

Administrations, and recognized organizations acting on their behalf, will apply the aforementioned requirements in a uniform manner and manufacturers of lubricating oil equipment will benefit by being provided with consistent and unambiguous requirements. It will also assist port State control officers by providing clear guidance on the application of the provisions.

5 Priority and target completion date

This matter should have a high priority since the issues have been an ongoing cause of concern for Administrations, recognized organizations and manufacturers. It is expected that only one session will be needed to properly deal with this matter.

6 Specific indication of the action required

In addition to the actions highlighted in paragraph 1, an MSC circular should be issued to inform the parties concerned that action is being taken to rectify the matter, if the Committee agrees that SOLAS regulations II-2/15.3 and 15.4 only apply to ships constructed on or after 1 July 1998.

7 Remarks on the criteria for general acceptance

.1 Is the subject of the proposal within the scope of IMO's objectives? Yes.

.2 Do adequate industry standards exist? No, this is a matter of clarification for existing IMO instruments.

.3 Do the benefits justify the proposed action? Yes.

8 Identification of which subsidiary bodies are essential to complete the work

The work should be able to be accomplished by the Sub-Committee on Fire Protection exclusively.

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ANNEX 14

DRAFT MSC CIRCULAR

APPLICATION OF SOLAS REGULATION II-2/15 FOR LUBRICATING OIL AND OTHER FLAMMABLE OIL ARRANGEMENTS FOR SHIPS BUILT BEFORE 1 JULY 1998

1 The Maritime Safety Committee (MSC), at its [eightieth session (11 to 20 May 2005)], recalled that, at its sixty-third session, it had adopted, by resolution MSC.31(63), amendments to SOLAS regulation II-2/15, prescribing additional requirements to oil fuel arrangements, lubricating oil arrangements and arrangements for other flammable oils as well as the application of these requirements. The amendments entered into force on 1 July 1998.

2 The amendments to SOLAS regulation II-2/15, in particular the requirements for oil fuel systems, applied to all ships constructed before, on or after 1 July 1998 because the above amendments stipulated to do so. However, the Committee agreed that the amendments to SOLAS regulations II-2/15.3 and II-2/15.4 were not intended to apply to existing ships constructed before 1 July 1998. The Committee, therefore, clarified that paragraphs 3 and 4 of SOLAS regulation II-2/15, in terms of compliance with the provisions of paragraphs 2.10 and 2.11 of SOLAS regulation II-2/15, should only be applied to ships constructed on or after 1 July 1998.

3 The Committee noted that an editorial correction of SOLAS regulation II-2/15 [by means of procès-verbal of rectification, has been initiated to clarify the application of the aforementioned provisions][is being considered by the Sub-Committee on Fire Protection with a view to clarifying the application of the aforementioned provisions.]

4 Member Governments are invited to bring the above information to the attention of all parties concerned.

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ANNEX 15

PROPOSED REVISED WORK PROGRAMME OF THE SUB-COMMITTEE AND PROVISIONAL AGENDA FOR FP 50

PROPOSED REVISED WORK PROGRAMME OF THE SUB-COMMITTEE

		Target completion date/number of sessions needed for completion	Reference
1	**Analysis of fire casualty records**	Continuous	MSC 75/24, paragraph 22.18; FP 49/17, section 11
2	**Consideration of IACS unified interpretations**	Continuous	MSC 78/26, paragraph 22.12; FP 49/17, section 13
H.1	**Passenger ship safety**	2006	MSC 74/24, paragraph 21.4; FP 49/17, section 3
H.2	**Performance testing and approval standards for fire safety systems**	~~2005~~ 2009	MSC 74/24, paragraph 21.12; FP 49/17, section 4
~~H.3~~	~~**Review of the fire protection provisions of the LHNS Guidelines**~~	~~2006~~	~~MSC 75/24, paragraph 22.4; FP 48/19, section 8~~
~~H.4~~	~~**Performance standards for evacuation guidance systems**~~	~~2006~~	~~MSC 75/24, paragraph 22.19~~
~~H.5~~	~~**Review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code**~~	~~2005~~	~~MSC 76/23, paragraphs 8.19 and 20.4; FP 48/19, section 10~~
H.6 H.3	**Amendments to resolution A.754(18) relating to performance criteria for fire doors**	~~2005~~ 2006	MSC 77/26, paragraph 23.12; FP 49/17, section 7

Notes: 1 "H" means a high priority item and "L" means a low priority item. However, within the high and low priority groups, items have not been listed in any order of priority.
2 Struck-out text indicates proposed deletions and the shaded text shows proposed additions or changes.
3 Items printed in bold letters have been selected for the provisional agenda for FP 50 shown in annex 2.

		Target completion date/number of sessions needed for completion	Reference
~~H.7~~ H.4	**Amendments to resolution A.653(16) relating to the preparation of specimens for sealants and mastics***	~~2005~~ 2006	MSC 77/26, paragraph 23.13; FP 49/17, section 6
~~H.8~~ H.5	**Recommendation on evacuation analysis for new and existing passenger ships**	~~2005~~ 2006	MSC 73/21, paragraph 4.16; FP 48/19, section 12
~~H.9~~ H.6	**Review of the SPS Code** (co-ordinated by DE)	~~2 sessions~~ 2007	MSC 78/26, paragraph 24.9; FP 49/17, paragraph 14.1.3
~~H.10~~ H.7	**Development of provisions for gas-fuelled ships** (co-ordinated by DE)	2007	MSC 78/26, paragraph 24.19
~~H.11~~ H.8	**Measures to prevent fires in engine-rooms and cargo pump-rooms**	~~4 sessions~~ 2009	MSC 79/23, paragraph 20.11; FP 49/17, paragraph 14.1.3
L.1	Smoke control and ventilation	2 sessions	FP 39/19, section 9; FP 46/16, section 4

* Item may be deleted if MSC 80 approves inclusion of new work programme on the comprehensive review of the FTP Code (MSC 80/21/5).

PROPOSED PROVISIONAL AGENDA FOR FP 50*

Opening of the session

1 Adoption of the agenda

2 Decisions of other IMO bodies

3 Passenger ship safety

4 Performance testing and approval standards for fire safety systems

5 Recommendation on evacuation analysis for new and existing passenger ships

6 Development of provisions for gas-fuelled ships

7 Measures to prevent fires in engine-rooms and cargo pump-rooms

8 Review of the SPS Code

9 Amendments to resolution A.754(18) relating to performance criteria for fire doors

[10 Amendments to resolution A.653(16) relating to the preparation of specimens for sealants and mastics]**

11 Consideration of IACS unified interpretations***

12 Analysis of fire casualty records***

13 Work programme and agenda for FP 51

14 Election of Chairman and Vice-Chairman for 2007

15 Any other business

16 Report to the Maritime Safety Committee

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* Agenda item numbers do not necessarily indicate priority.

** Item can be deleted if MSC 80 approves inclusion of the Proposed new work item on the comprehensive review of the FTP Code (MSC 80/21/5).

*** Item under continuous review.