



SUB-COMMITTEE ON FIRE PROTECTION  
54th session  
Agenda item 25

FP 54/25  
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## REPORT TO THE MARITIME SAFETY COMMITTEE

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## 1 GENERAL

### Introduction

1.1 The Sub-Committee held its fifty-fourth session from 12 to 16 April 2010 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	MALAYSIA
ANGOLA	MALTA
ARGENTINA	MARSHALL ISLANDS
BAHAMAS	MEXICO
BELGIUM	MOROCCO
BRAZIL	NETHERLANDS
CANADA	NIGERIA
CHILE	NORWAY
CHINA	PANAMA
COOK ISLANDS	PERU
CROATIA	PHILIPPINES
CUBA	POLAND
CYPRUS	REPUBLIC OF KOREA
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	RUSSIAN FEDERATION
DENMARK	SAUDI ARABIA
EGYPT	SINGAPORE
FINLAND	SOUTH AFRICA
FRANCE	SPAIN
GERMANY	SWEDEN
GREECE	TURKEY
INDONESIA	TUVALU
IRAN (ISLAMIC REPUBLIC OF)	UKRAINE
IRELAND	UNITED KINGDOM
ITALY	UNITED STATES
JAPAN	URUGUAY
KUWAIT	VANUATU
LIBERIA	VENEZUELA (BOLIVARIAN REPUBLIC OF)
LIBYAN ARAB JAMAHIRIYA	

and by the following Associate Members of IMO:

HONG KONG, CHINA	FAROE ISLANDS (DENMARK)
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1.3 The session was also attended by observers from the following intergovernmental organizations:

EUROPEAN COMMISSION (EC)  
MARITIME ORGANIZATION FOR WEST AND CENTRAL AFRICA (MOWCA)

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

INTERNATIONAL CHAMBER OF SHIPPING (ICS)  
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)  
INTERNATIONAL UNION OF MARINE INSURANCE (IUMI)  
COMITÉ INTERNATIONAL RADIO-MARITIME (CIRM)  
INTERNATIONAL ASSOCIATION OF PORTS AND HARBORS (IAPH)  
INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)  
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)  
INTERNATIONAL FEDERATION OF SHIPMASTERS' ASSOCIATIONS (IFSMA)  
INTERNATIONAL ASSOCIATION OF INDEPENDENT TANKER OWNERS  
(INTERTANKO)  
CRUISE LINES INTERNATIONAL ASSOCIATION (CLIA)  
INSTITUTE OF MARINE ENGINEERING, SCIENCE AND TECHNOLOGY (IMarEST)  
INTERNATIONAL PARCEL TANKERS ASSOCIATION (IPTA)  
THE INTERNATIONAL MARINE CONTRACTORS ASSOCIATION (IMCA)  
THE ROYAL INSTITUTION OF NAVAL ARCHITECTS (RINA)  
INTERNATIONAL TRANSPORT WORKERS' FEDERATION (ITF)  
THE NAUTICAL INSTITUTE (NI)

#### **Secretary-General's opening address**

1.5 The Secretary-General welcomed participants and delivered his opening address, the full text of which is reproduced in document FP 54/INF.7.

#### **Chairman's remarks**

1.6 The Chairman, thanking the Secretary-General, stated that the Secretary-General's words of encouragement as well as his advice and requests would be given every consideration and taken into account under relevant agenda items, and that his helpful guidance on the subjects to be considered by the Sub-Committee was very much appreciated, in particular concerning the further work on the comprehensive review of the Fire Test Procedures Code, the measures to prevent explosions on oil and chemical tankers transporting low-flashpoint cargoes, and also the ongoing work on performance testing and approval standards for fire safety systems.

#### **Tragic death of the President of Poland**

1.7 Before turning to matters related to the Sub-Committee's work, the Secretary-General drew the Sub-Committee's attention to the devastating news of the tragic death of the President of Poland, Mr. Lech Kaczynski, his wife and many dignitaries of the Polish political and military élite, which filled all with sadness, grief and a feeling of personal loss. It is most unfortunate that the proud Polish nation that has, in its long history over the centuries, suffered so much, had to endure another trauma of unimaginable dimensions. The Secretary-General, on behalf of the entire membership and staff, expressed deep condolences, sympathy and, above all, solidarity to the Polish people, the families and friends of the President and his entourage. He emphasized that thoughts and prayers should go out to those who perished in that tragic accident and requested the Polish delegation to convey sentiments of utter despair and dismay to their Government and countrymen.

1.8 The delegation of Poland informed the Sub-Committee that the Polish nation was plunged in deep grief and sorrow, after the tragic death of their President, his wife and all persons on board the plane, which crashed on Saturday, 10 April 2010, leaving no survivors.

The Polish delegation said that the condolences and words of sympathy from those who shared their grief were of the greatest value and brought them support and consolation. The delegation pointed out that the spirit of solidarity with, and compassion for, those going through hard experiences has always been present in this Organization, and has yet another time demonstrated on this extremely sad occasion by the Secretary-General and the Chairman, as well as by many colleagues who approached the delegation with words of sympathy. The delegation of Poland took the opportunity to wholeheartedly thank all for the condolences and commiserations, which they wished would bring support to the families and friends of those who perished in that tragic accident, and to all people of Poland.

1.9 The delegation of the Russian Federation stated that the Russian people, like the Polish people, have been shocked by an appalling tragedy: the death of the President of the Polish Republic, Mr. Lech Kaczynski, his wife and all the other Polish citizens on board the flight that crashed near Smolensk on 10 April. They informed that President Kaczynski had flown to Russia to honour the memory of Polish officers who perished in totalitarian times. They emphasized that all Russians shared the grief and mourning of the Polish people in connection with this tragedy. The delegation informed the Sub-Committee that the Russian and Polish authorities are working closely together to investigate the causes of the crash and all the circumstances of this tragedy. The delegation extended its deepest and most sincere condolences to the Polish people and expressed its sympathy and support for the relatives and friends of the deceased, pointing out that Monday, 12 April was declared a national day of mourning in the Russian Federation.

1.10 The Sub-Committee, following the request of the delegation of the Russian Federation, observed a minute's silence in memory of those lost in the tragic accident.

### **Earthquake in China**

1.11 At the opening of the meeting on Wednesday, 14 April 2010, the Chairman informed the Sub-Committee of an earthquake that hit the town of Yushu in Qinghai province of China, and expressed sympathy and compassion for the victims of the earthquake and requested the Chinese delegation to convey feelings of deep sorrow and anguish for the tragic event. The Sub-Committee joined the Chairman in the expression of the above sentiments.

### **Adoption of the agenda and related matters**

1.12 The Sub-Committee adopted the agenda (FP 54/1) and agreed to be guided in its work, in general, by the annotations contained in documents FP 54/1/1. The agenda, as adopted, with the list of documents considered under each agenda item, is set out in document FP 54/INF.8.

## **2 DECISIONS OF OTHER IMO BODIES**

### **General**

2.1 The Sub-Committee noted the decisions and comments pertaining to its work made by BLG 13, DE 52, FSI 17, MSC 86, NAV 55, DSC 14, SLF 52, BLG 14 and DE 53, as reported in documents FP 54/2, FP 54/2/1 and FP 54/2/2, and took them into account in its deliberations when dealing with relevant agenda items.

### **Outcome of the twenty-sixth session of the Assembly**

2.2 The Sub-Committee noted that the twenty-sixth session of the Assembly had adopted the Strategic Plan for the Organization (for the six-year period 2010 to 2015) (resolution A.1011(26)), the High-level Action Plan of the Organization and priorities for

the 2010-2011 biennium (resolution A.1012(26)) and the Guidelines on the application of the Strategic Plan and the High-level Action Plan of the Organization (resolution A.1013(26)) and that the effect this has on the agenda management procedure and the work programme of the Sub-Committee would be further discussed under agenda item 22 (Work programme and agenda for FP 55).

### **3 PERFORMANCE TESTING AND APPROVAL STANDARDS FOR FIRE SAFETY SYSTEMS**

#### **General**

3.1 The Sub-Committee recalled that, at FP 53, it had approved the revised action plan identifying the priorities, time frames and objectives for each priority category prepared by the working group established on the matter (FP 53/WP.1, annex 19).

3.2 The Sub-Committee also recalled that, at FP 53, it had re-established the Correspondence Group on Performance Testing and Approval Standards for Fire Safety Systems and approved terms of reference, as set out in paragraph 3.38 of document FP 53/23, and had instructed the group to submit a report to FP 54.

3.3 The Sub-Committee had for its consideration under this agenda item documents submitted by Japan (FP 54/3/3), the Republic of Korea (FP 54/3/4), Sweden (FP 54/3/2), the United States (FP 54/3 and FP 54/3/1), and the Secretariat (FP 54/2/2 and FP 54/3/5). In the context of this item, the Sub-Committee also considered documents FP 54/24/1 and FP 54/INF.3 by the Republic of Korea.

#### **Report of the working group (part 2) established at FP 53**

3.4 The Sub-Committee considered part 2 of the report of the Working Group on Performance Testing and Approval Standards for Fire Safety Systems established at FP 53 (FP 54/3) and, having approved it in general, noted that the group's report had been considered in detail by the correspondence group (FP 54/3/1) established at FP 53.

#### **Report of the correspondence group**

3.5 The Sub-Committee considered the report of the Correspondence Group on Performance Testing and Approval Standards for Fire Safety Systems (FP 54/3/1) together with the documents referred to in paragraph 3.3 and, having approved it in general:

- .1 agreed, in principle, to the draft amendments to chapter 5 of the FSS Code to delete reference to gaseous products of fuel combustion as fixed gas fire-extinguishing systems for further consideration by the working group with a view to submission to MSC 88 for approval and subsequent adoption;
- .2 decided to instruct the working group to consider if the foam system application rates for helidecks in SOLAS regulation II-2/18 should be harmonized with the foam system application rates for helidecks in the MODU Code;
- .3 noted that the IACS interpretation UI SC 216 on water-based fire-extinguishing systems applies to passengers and cargo ships, and agreed to instruct the working group to harmonize the outcome of the relevant correspondence groups on matters related to IACS UI SC 216;

- .4 agreed that only amendments, which were considered strictly necessary, to the Guidelines for the maintenance and inspections of fixed carbon dioxide fire-extinguishing systems (MSC.1/Circ.1318) should be prepared. In light of the above, the Sub-Committee agreed that the words "national and international standards acceptable to the Administration" should be considered for inclusion in paragraph 6.1.2 of the Guidelines, as well as matters related to the inspection of pressure cylinders, if the Guidelines are amended; and
- .5 agreed on the need to revise paragraph 3.2.6 of the draft Revised Guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces (FP 54/3/1, annex 8), as the text in square brackets is a carriage requirement, and therefore, should not be contained in the Revised Guidelines.

3.6 In considering documents FP 54/24/1 and FP 54/INF.3 (Republic of Korea), providing information and results of tests to confirm the fire-fighting capability of water-based local application fire-fighting system in accordance with SOLAS regulation II-2/10.5.6, the Sub-Committee, bearing in mind that the documents refer to the unified interpretations of SOLAS chapter II-2 (MSC.1/Circ.1276), prepared by FP 52, based on IACS UI SC 217, noted that it was not the intention of the submitter to propose amendments to MSC.1/Circ.1276, but to provide information to shipowners and classification societies regarding systems already installed. The Sub-Committee also noted the opinion of the Republic of Korea that the unified interpretation in paragraph 6 of document FP 54/24/1 improves the fire-extinguishing capability of the single row system. However, this should not be construed to mean that the conventional single row systems have a poor fire-extinguishing capability.

#### **Information by the delegation of the Bahamas regarding "Oscar Wilde" casualty**

3.7 In the context of the item, the Sub-Committee noted the information provided by the delegation of the Bahamas regarding a casualty on the Bahamas-registered passenger ferry **Oscar Wilde**. In particular, on 2 February 2010, a fire broke out in the auxiliary machinery space on board the aforementioned ship, which was sailing from Falmouth (United Kingdom) after completing her annual docking. The seat of the fire was in way of a diesel alternator fuel supply module and quickly spread across the compartment. As part of the fire-fighting effort, the fixed total flooding system (high-expansion foam) was activated but did not extinguish the fire. Although all the foam solution in the system was deployed into the engine-room, no foam was produced. The fire burned fiercely for over an hour before it was extinguished by the ship's crew. The high-expansion foam system was type-approved and had been maintained and tested in accordance with the manufacturer's instructions and current IMO guidance. The technical investigation identified that:

- .1 eighty per cent (80%) of the foam generator nozzles within the auxiliary engine-room were blocked by debris and about 50% of the nozzles in the other protected spaces on board were also clogged;
- .2 the distribution pipework for the foam solution contained debris and was corroded; and
- .3 there were several sections of the system's distribution pipes in which water or foam solution could have been trapped following the testing of the system.

3.8 In light of the above, the Sub-Committee agreed to instruct the working group to consider the information above and advise as appropriate.

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## Outcome of BLG 14

### *Use of alcohol resistant foams when carrying ethanol/gasoline blends*

3.9 In considering document FP 54/2/2 (Secretariat), on the outcome of BLG 14, regarding matters related to the use of alcohol resistant foams when carrying ethanol/gasoline blends, related to fire protection requirements of SOLAS regulations II-2/1.6.1 and II-2/1.6.2, the Sub-Committee agreed to refer the document to the working group for further consideration of the matter.

### *Draft amendments to chapter 14 of the FSS Code regarding fixed deck foam systems*

3.10 In the course of consideration of document FP 54/3/5 (Secretariat) on the outcome of BLG 14 related to the draft amendments to chapter 14 of the FSS Code regarding fixed deck foam systems, the Sub-Committee noted that the BLG Sub-Committee had:

- .1 considered that the proposed draft amendments to chapter 14 of the FSS Code regarding fixed deck foam systems could imply a new carriage requirement for such a system for those ships carrying substances listed in chapters 17 and 18 of the IBC Code, taking into account that chapter 18 lists substances to which the IBC Code does not apply and that ships carrying such substances need not normally apply the provisions of the IBC Code;
- .2 acknowledged that the aforementioned proposed amendments may give rise to confusion, on the grounds that the proposed text contains references to the IBC Code and raises potential contradictions with both SOLAS and the IBC Code;
- .3 agreed that the FSS Code should not introduce any requirements concerning the carriage of chemicals covered by the IBC Code and, if there is a need to change the carriage requirements for chemicals covered by the IBC Code, this should only be done by amending respective requirements of the IBC Code;
- .4 invited the Sub-Committee to hold the inclusion of amendments relating to the IBC Code in the proposed amendments to chapter 14 of the FSS Code until such time as the BLG Sub-Committee would have considered the matter in detail, and requested the Sub-Committee to supply relevant information regarding the testing of high-flashpoint chemicals with regard to foam application rates; and
- .5 noting that this work would be better done under a separate agenda item, invited MSC 87 to include an unplanned output in the biennial agenda of the BLG Sub-Committee and provisional agenda for BLG 15, taking into account the associated justification.

3.11 Consequently, the Sub-Committee decided, as requested by BLG 14, to hold the amendments relating to the IBC Code in the proposed amendments to chapter 14 of the FSS Code in abeyance pending the advice of the BLG Sub-Committee and the relevant decision by MSC 87 on the matter. In the meantime, the Sub-Committee invited Member Governments and international organizations to supply relevant information regarding the testing of high-flashpoint chemicals with regard to foam application rates.

### **Establishment of the working group**

3.12 Recalling its relevant decision at FP 53 regarding a working group, the Sub-Committee established the Working Group on Performance Testing and Approval Standards and, taking into account the comments and decisions made in plenary, instructed it to:

- .1 continue work on the medium-term priorities identified in annex 19 to document FP 53/WP.1, taking into account part 2 of the report of the working group established at FP 53 (FP 54/3), the report of the correspondence group (FP 54/3/1), and documents FP 54/3/2, FP 54/3/3 and FP 54/3/4 and, in particular, to:
  - .1.1 finalize the draft revised chapter 6 of the FSS Code (FP 54/3/1, annex 1);
  - .1.2 finalize the draft Guidelines for testing and approval of fixed high-expansion foam systems (FP 54/3/1, annex 2); and
  - .1.3 harmonize the outcome of the correspondence groups regarding IACS interpretation UI SC 216 on water-based extinguishing systems, taking into account paragraph 8 of, and annex 4 to, document FP 54/3/1 and paragraphs 13 and 14 of, and annex 3 to, document FP 54/8;
- .2 continue work on the long-term priorities identified in annex 19 to document FP 53/WP.1, taking into account part 2 of the report of the working group established at FP 53 (FP 54/3) and the report of the correspondence group (FP 54/3/1);
- .3 consider the use of alcohol resistant foams when carrying ethanol/gasoline blends, related to fire protection requirements of SOLAS regulations II-2/1.6.1 and II-2/1.6.2, taking into account part of document FP 54/2/2 relevant to this item, and advise the Sub-Committee accordingly;
- .4 update the Revised plan for the harmonization, or new development, of performance testing and approval standards for fire safety systems contained in annex 19 to document FP 53/WP.1, taking into account the progress made to date, and prepare a revised plan identifying the priorities, time frames and objectives for each category, with a view to finalization at FP 55; and
- .5 consider whether there is a need to re-establish the correspondence group and, if so, prepare the terms of reference for the group, for consideration by the Sub-Committee.

### **Report of the working group**

3.13 Having received the report of the working group (FP 54/WP.1), the Sub-Committee approved it in general and took action as outlined hereunder.

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***Maintenance and inspections of fixed carbon dioxide fire-extinguishing systems***

3.14 With regard to the proposed modifications to paragraph 6.1 of the Guidelines for the maintenance and inspections of fixed carbon dioxide fire-extinguishing systems (MSC.1/Circ.1318), concerning the periodical inspection intervals for the high-pressure cylinders, the Sub-Committee endorsed the group's view that there is no essential need to amend the Guidelines at this stage.

***Fixed gas and water-spraying fire-extinguishing systems for vehicle spaces, ro-ro spaces, container and general cargo spaces***

3.15 Regarding fixed gas and water-spraying fire-extinguishing systems for vehicle, ro-ro, container and general cargo spaces, the Sub-Committee agreed to the draft amendments to chapters 5 and 7 of the FSS Code, and the draft amendments to SOLAS regulation II-2/20, set out in annexes 1 and 2, respectively, for submission to MSC 88 for approval and subsequent adoption.

***Amendments to chapter 6 of the FSS Code and the draft Guidelines for testing and approval of fixed high-expansion foam systems***

3.16 The Sub-Committee agreed to the draft amendments to chapter 6 of the FSS Code and the draft Guidelines for testing and approval of fixed high-expansion foam systems together with the associated draft MSC circular, set out in annexes 1 and 3, respectively, for submission to MSC 88 for approval, and subsequent adoption as appropriate.

3.17 With regard to paragraphs 3.2.2.2 and 3.3.2.2 of annex 3 to document FP 54/WP.1, the Sub-Committee noted the view of the delegation of Japan that the original text developed by the correspondence group, rather than modifications done by the working group, should be kept since the current text, which allows the applied filling rate to be lower than the tested design filling rate as an exception, may cause safety risks, and had urged careful consideration on this matter.

***Scientific methods on scaling of test volume for fire test on water-mist fire-extinguishing systems***

3.18 The Sub-Committee agreed to the draft Scientific methods on scaling of test volume for fire test on water-mist fire-extinguishing systems, together with the associated draft MSC circular, set out in annex 4, for submission to MSC 88 for approval.

***IACS Unified Interpretation UI SC 216 on water-based fire-extinguishing systems***

3.19 The Sub-Committee noted the group's consideration of IACS UI SC 216 (Unified interpretation of SOLAS regulation II-2 on water-based fire-extinguishing systems), and agreed not to develop interpretations on the subject.

3.20 In this regard, the Sub-Committee agreed to the draft amendments to the Revised Guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms (MSC/Circ.1165), concerning redundant means of pumping and ceiling and bilge nozzles (paragraph 17 of, and paragraph 1.3 of appendix B to, the annex to the Revised Guidelines) and associated draft MSC circular, set out in annex 5, for submission to MSC 88 for approval.

***Extinguishing systems for control stations***

3.21 The Sub-Committee agreed to the draft amendments to chapter 8 of the FSS Code, concerning alternative extinguishing systems for control stations, set out in annex 1, for submission to MSC 88 for approval and subsequent adoption.

***Revised Guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces (MSC/Circ.913)***

3.22 The Sub-Committee agreed to the draft Revised Guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces (MSC/Circ.913) and the associated draft MSC circular, set out in annex 6, for submission to MSC 88 for approval.

3.23 The Sub-Committee also agreed to the draft amendments to SOLAS regulation II-2/10.5.6.3.1, set out in annex 2, for submission to MSC 88 for approval and subsequent adoption.

***Revised Guidelines on maintenance and inspection of fire protection systems and appliances (MSC/Circ.850)***

3.24 The Sub-Committee agreed that the Revised Guidelines on maintenance and inspection of fire protection systems and appliances (MSC/Circ.850) need to be further revised and updated as necessary to take account of the latest technologies, as one of the long-term priorities.

***Fixed deck foam extinguishing systems***

3.25 The Sub-Committee endorsed the group's view regarding fixed deck foam extinguishing systems (FP 54/WP.1, paragraph 18) and requested the Secretariat to forward the view to BLG 15 for consideration and comment.

**Revised plan of action**

3.26 The Sub-Committee approved the revised plan of action, as set out in annex 10 to document FP 54/WP.1.

**Re-establishment of the correspondence group**

3.27 The Sub-Committee re-established the correspondence group, under the coordination of the United States\*, and instructed the group (see also paragraph 10.7), taking into account the relevant information contained in document FP 54/3/1 and the outcome of the working group outlined in part 1 (FP 54/WP.1) and part 2 of its report, to:

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\*

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- .1 further consider the draft Guidelines for the approval of helicopter facility fire-fighting appliances;
  - .2 further consider long-term priority systems listed in annex 10 to document FP 54/WP.1; and
  - .3 submit a report to FP 55.

## **4 COMPREHENSIVE REVIEW OF THE FIRE TEST PROCEDURES CODE**

### **General**

4.1 The Sub-Committee recalled that, at FP 53, it had established the Working Group on Comprehensive Review of the Fire Test Procedures Code and, having approved the report in general, agreed, in principle, to the draft International Code for the Application of Fire Test Procedures, 2010 (2010 FTP Code) for submission to MSC 86 for approval, in principle, and subsequent adoption.

4.2 It was also recalled that, at FP 53, the Sub-Committee had agreed to the draft amendments to SOLAS chapter II-2, which would make the aforementioned 2010 FTP Code mandatory, for submission to MSC 86 for approval and subsequent adoption, in conjunction with the adoption of the 2010 FTP Code.

4.3 The Sub-Committee noted that MSC 86 had agreed to invite Member Governments and international organizations to submit comments on the draft 2010 FTP Code to FP 54, and that MSC 87 would consider the draft Code, as prepared by FP 53 (FP 53/23/Add.1, annex 14) together with any modifications to the draft Code prepared by FP 54, with a view to approval and subsequent adoption at MSC 88. In this context, MSC 86 approved the draft amendments to SOLAS chapter II-2, which would make the 2010 FTP Code mandatory, with a view to adoption, at MSC 88, in conjunction with the adoption of the draft Code.

### **Proposed modifications to the draft 2010 FTP Code**

4.4 The Sub-Committee had for its consideration the following documents:

- .1 FP 54/4 (Chairman of the working group at FP 53), providing a list of necessary corrections to the draft 2010 FTP Code, which were prepared by the Chairman of the working group established at FP 53, in consultation with some members of the group. The document also included an addition to part 5 of the draft Code regarding test of plastic pipes;
- .2 FP 54/4/1 (Norway), containing proposed amendments to the Guidelines for the application of plastic pipes on ships (resolution A.753(18)), to provide for an extension of the application to synthetic rubber pipes. It recalls that FP 51 agreed that the Guidelines should be amended to accommodate fire safety requirements for synthetic rubber pipes; however, this matter was not yet finalized; and
- .3 FP 54/4/2 (Finland), commenting on the draft 2010 FTP Code, which was considered acceptable, in general. The comments were made in order to improve the draft text and to harmonize the use of some test methods.

## Establishment of the drafting group

4.5 Following consideration of the documents submitted, the Sub-Committee, recalling its relevant decision at FP 53, established the Drafting Group on Comprehensive Review on the Fire Test Procedures Code and instructed it, taking into account the comments and decisions made in plenary, to finalize the editorial modifications to the draft 2010 FTP Code, based on the text prepared by the working group, established at FP 53 (FP 53/23/Add.1, annex 14), taking into account documents FP 54/4 and FP 54/4/2.

## Amendments to the Guidelines for the application of plastic pipes on ships (resolution A.753(18))

4.6 In the context of this item, after a brief discussion of document FP 54/4/1 (Norway), the Sub-Committee, in recalling its decision that the test procedures contained in the Guidelines (resolution A.753(18)) should be amended to accommodate fire safety requirements for synthetic rubber pipes (FP 51/19, paragraph 4.8), and noting that the Guidelines are not contained in the FTP Code, agreed to request a group of experts to prepare a final text of the draft amendments to the Guidelines for the application of plastic pipes on ships, provided in document FP 54/4/1, for consideration by the Sub-Committee.

4.7 Having considered the outcome of the group of experts (FP 54/WP.6), the Sub-Committee agreed to the following revisions of paragraph 1.2.3 of the above Guidelines:

"1.2.3 These Guidelines are applicable to ~~[plastic pipes]~~ ~~[non-metallic piping systems]~~ piping systems made predominantly of other materials than metal only. ~~[Further, these Guidelines apply to flexible pipes and hoses and couplings which are accepted for use in metallic piping systems.]~~ [The use of flexible pipes and hoses and mechanical and flexible couplings which are accepted for use in metallic piping systems is not addressed in these Guidelines.]"

and, subsequently, agreed to the draft amendments to the Guidelines for the application of plastic pipes on ships (resolution A.753(18)) and the associated draft MSC resolution, set out in annex 7, for submission to MSC 88 for adoption.

## Report of the drafting group

4.8 Having received the report of the drafting group (FP 54/WP.7), the Sub-Committee approved it in general and, in particular, having agreed to the modifications to the draft 2010 FTP Code, set out in annex 8, invited the Committee to approve the draft International Code for the Application of Fire Test Procedures, 2010 (2010 FTP Code) and the associated draft MSC resolution, as prepared by FP 53 (FP 53/23/Add.1, annex 14), taking into account the aforementioned modifications, with a view to adoption at MSC 88.

## 5 FIRE RESISTANCE OF VENTILATION DUCTS

### General

5.1 The Sub-Committee recalled that, at FP 52, it had agreed to the draft amendments to SOLAS regulation II-2/9.7 on matters related to fire resistance of ventilation ducts, which were approved by MSC 84 and subsequently adopted by resolution MSC.269(85), noting that the amendments are due to enter into force on 1 July 2010 and shall be applied to new ships only.

5.2 It was also recalled that, at FP 53, the Sub-Committee, in considering document FP 53/6 (United States) containing proposed amendments to SOLAS regulation II-2/9.7 to clarify and harmonize the SOLAS ventilation system requirements, had noted the views of some delegations that more detailed consideration was necessary since the fitting of automatic fire dampers in all "A" class divisions would be very costly for passenger ships and was not technically proven to substantially improve safety.

5.3 The Sub-Committee noted that, at FP 53, it had agreed to invite the Committee to extend the target completion date of the item to 2010 and had invited Member Governments and international organizations to submit relevant comments and proposals to FP 54.

### **Harmonization of ventilation system requirements**

5.4 Following consideration of document FP 54/5 (United States), providing further clarifications of the draft amendments to SOLAS regulation II-2/9.7 contained in the annex to document FP 53/6, the Sub-Committee agreed that the following issues should be further considered:

- .1 clarify vague expressions, such as "remotely controlled from the onboard safety centre";
- .2 determine the minimum cross-sectional area of ducts that would be required to fit automatic fire dampers;
- .3 address concerns regarding steel penetrations, insulation and the existence of various unified interpretations on this matter; and
- .4 improve the draft text of the draft amendments set out in the annex to document FP 54/5.

### **Establishment of the correspondence group**

5.5 Subsequently, the Sub-Committee established the Correspondence Group on Fire Resistance of Ventilation Ducts, under the coordination of the United States\*, to progress the work on this issue and instructed the group, based on the annex to document FP 54/5, to:

- .1 incorporate outstanding IMO unified interpretations related to the draft amendments to SOLAS regulation II-2/9.7 with a view towards harmonization;
- .2 validate the need and proposed size cut-offs for automatic fire dampers to be installed for ducts passing through "A" class boundary penetrations;
- .3 further consider the provisions for "B" class penetrations, closing appliances and galley ventilation ducts;

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- .4 clarify the draft provisions related to smoke control/management systems;
- .5 prepare a comprehensive set of draft amendments to SOLAS regulation II-2/9 for consideration by the Sub-Committee; and
- .6 submit a report to FP 55.

### **Extension of the target completion year**

5.6 In view of the above developments, the Sub-Committee invited the Committee to extend the target completion year for this output to 2011.

## **6 MEASURES TO PREVENT EXPLOSIONS ON OIL AND CHEMICAL TANKERS TRANSPORTING LOW-FLASH POINT CARGOES**

### **General**

6.1 The Sub-Committee recalled that, at FP 53, it had agreed that new oil tankers of below 20,000 tonnes deadweight should be fitted with inert gas systems (IGS), and that the need for application of a lower limit should be further considered based on the proposals of [4,000] [6,000] [8,000] tonnes deadweight, recognizing that such requirements could be introduced by suitably modifying the provisions of SOLAS regulation II-2/4.5.5.

6.2 It was also recalled that, at FP 53, the Sub-Committee had agreed that requirements should be developed for the installation of inert gas systems on new chemical tankers, and that, since chemical tankers presented much more complex problems than oil tankers, separate requirements may need to be developed to cover them, which would necessarily also include modifications to SOLAS regulation II-2/4.5.5.2.

6.3 The Sub-Committee noted that, at FP 53, it had decided to establish a working group at this session to progress the matter and had urged Member Governments and international organizations to submit proposals for amendments to relevant IMO instruments and any other information regarding the matter to FP 54 for consideration and action, as appropriate.

6.4 The Sub-Committee had the following documents for consideration under this agenda item:

- .1 FP 54/6 (ICS and IPTA), providing relevant information from their members, with the data being primarily on the operation of chemical tankers, in many different issues considered at FP 53, e.g., impact on turnaround time in ports and port congestion, increased fuel consumption and related environmental emissions/costs associated with running IG/N<sub>2</sub> plant, and increase in ship building costs;
- .2 FP 54/6/1 (IPTA), seeking clarification on the precise meaning of the expression "the property-based approach" in the context of the current discussions, referring to the definition of "property-based approach" presented by Norway (FP 52/20/2, paragraph 13);
- .3 FP 54/6/2 (Norway and OCIMF), proposing amendments to SOLAS regulation II-2/4.5.5 to require the inerting of tanks on new tankers carrying low-flashpoint cargoes, which would apply to all tankers of 500 gross tonnage and above, regardless of the size of the ship or the size of the tanks;

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- .4 FP 54/6/3 (China), providing comments and recommendations for the installation of IGSs on new oil and chemical tankers of less than 20,000 tonnes deadweight, in which the lower deadweight limit should be 8,000 tonnes, as the FSA study from Japan (FP 51/10/1 and FP 52/INF.2) indicated that installation of IGSs on oil tankers of less than 8,000 tonnes deadweight would not be cost-effective, in addition to the feasibility of the design and installation on smaller tankers; and
  - .5 FP 54/INF.5 (Japan), presenting results of the follow-up study of the cost benefit assessment on application of requirement of IGSs to tankers, in particular, the results of the follow-up study indicating that the mandatory application of the requirement of IGS on oil tankers up to 8,000 tonnes deadweight and chemical tankers up to 20,000 tonnes deadweight cannot be justified from the gross costs of averting a fatality (GCAF) and the net costs of averting a fatality (NCAF) standpoints. In addition, the study showed that the mandatory application of the requirement of IGSs for oil tankers of 8,000 to 20,000 tonnes deadweight can be justified from the NCAF standpoint, but not from the GCAF standpoint.

6.5 Having considered the above documents and after an extensive discussion on the matter, the Sub-Committee noted the following views expressed during the debate:

- .1 that the term "property-based approach" needs to be clearly defined as it is vague with regard to the application of IGS to oil and chemical tankers;
- .2 while some delegations felt the supply of inert gas from the shore is always available upon request, other delegations indicated that shore supply is not available in some ports;
- .3 in addition to the above views on shore supply, some delegations observed that the potential for over pressurization of cargo tanks is possible if shore-supplied inerting is made mandatory;
- .4 agenda item 17 (Revision of the Recommendations for entering enclosed spaces aboard ships) needs to also be considered within the context of this item because the carriage of chemical cargoes entails a relatively high level of tank preparation (see also paragraph 17.11);
- .5 taking into account the above view, some delegations pointed out the need for increased training and drills related to enclosed space entry procedures with a greater emphasis on developing a safety culture, in particular, awareness by seafarers that cargo tanks should always be treated as an unsafe area;
- .6 while delegations agreed that safety factors should be the basis of any recommendations agreed by the Sub-Committee, issues such as cost effectiveness, operational profile and environmental protection should also be considered as far as practicable, taking into account the FSA studies submitted on this issue as well as the merits and disadvantages associated with the application of IGS on board oil and chemical tankers; and
- .7 some delegations expressed the view that the fitting of IGS on small-sized oil and chemical tankers would be difficult, while other delegations felt this issue was only relevant to the application of IGS for existing oil and chemical tankers, which the Sub-Committee has not been instructed by the Committee to consider at this stage.

6.6 Noting the length and extent of the debate and the divergent views on the issue, the Chairman recalled the words of the Secretary-General that this would not be the easiest task given the complexity of the issue; however, by working together in the usual IMO spirit of cooperation, and in the knowledge that the work would ensure the best interests of both safety and environmental protection, the Sub-Committee would be able to successfully resolve any difficulties that it may encounter in the process.

6.7 In summarizing the debate, the Chairman, having emphasized that the Sub-Committee had only been tasked with preparing recommendations for new tankers and recalling the basic agreement reached at FP 53 (paragraphs 6.1 and 6.2), noted that many of the above views could not be resolved quickly and that the working group would therefore need to further consider the above comments in detail and advise the Sub-Committee accordingly.

### **Establishment of the working group**

6.8 Recalling its relevant decision at FP 53 regarding a working group, the Sub-Committee established the Working Group on Measures to Prevent Explosions on Oil and Chemical Tankers Transporting Low-Flashpoint Cargoes and instructed it, taking into account the comments and decisions made in plenary, to:

- .1 define the lower size limit for new oil and chemical tankers to which the requirement of inerting would apply, taking into account documents FP 54/6, FP 54/6/1, FP 54/6/2, FP 54/6/3, FP 54/INF.5, FP 53/5/3, FP 51/10/1 and FP 52/INF.2;
- .2 prepare draft amendments to SOLAS regulation II-2/4.5.5 for the installation of inert gas systems and use of inert gas on new oil tankers of below 20,000 tonnes deadweight, taking into account documents FP 54/6, FP 54/6/1, FP 54/6/2, FP 54/6/3 and FP 54/INF.5; and
- .3 prepare draft amendments to SOLAS regulation II-2/4.5.5.2 for the installation of inert gas systems and use of inert gas on new chemical tankers, taking into account documents FP 54/6, FP 54/6/1, FP 54/6/2, FP 54/6/3 and FP 54/INF.5.

### **Report of the working group**

6.9 Having received the report of the working group (FP 54/WP.2), the Sub-Committee approved it in general and took action as outlined hereunder.

#### ***Lower size limit for new oil and new chemical tankers***

6.10 The Sub-Committee agreed that the lower limit should be set only for the fitting of IGS and that, because the availability of shore supplied inert gas (IG) could not be guaranteed on all trades, the issue of separate requirements for the use of IG without requiring the fitting of IGS was not the subject of the discussions and would, therefore, not be considered in the context of the draft amendments to SOLAS regulation II-2/4.5.5 under preparation.

6.11 The Sub-Committee noted that the FSA study submitted by Japan (FP 54/INF.5) did not support the fitting of IGS to new tankers of less than 8,000 tonnes deadweight, whereas the FSA study submitted by Norway (FP 53/5/3) supported a figure of 4,000 tonnes deadweight. However, several delegations stated that the purpose of FSA studies was to assist and guide decisions to be taken and that the results needed to be looked at holistically, which could result in decisions on size limits different from those recommended by such FSA studies.

6.12 The Sub-Committee noted that the group had initially been divided between setting the lower limit at the inherent limit applicable to SOLAS chapter II-2 of 500 gross tonnage and establishing a higher limit based on deadweight, with a focus on consideration of 5,000 and 8,000 tonnes deadweight, noting in this connection document FP 54/6, which indicated that below 5,000 tonnes deadweight the difficulties associated with fitting and operating of IGS on chemical tankers become acute; and further noted that it had been pointed out in the group that, where safe operating procedures are followed correctly, a non-inerted tank does not equate to an unsafe tank.

6.13 The Sub-Committee noted that the group had agreed to apply the requirement for IGS to ships intended for the carriage of liquid having a flashpoint not exceeding 60°C.

6.14 After discussion of the recommendation of the group that the requirement to fit IGS should only apply to new oil tankers and new chemical tankers of 5,000 tonnes deadweight and above carrying low-flashpoint cargoes, the Sub-Committee decided to further debate the lower limit for IGS application at FP 55, carrying forward the two potential limits of 5,000 and 8,000 tonnes deadweight, and invited Member Governments and international organizations to reflect on the aforementioned proposed limits so that the matter could be resolved at the next session.

#### ***Draft amendments to SOLAS regulation II-2/4.5.5***

6.15 The Sub-Committee noted that the group had prepared draft amendments to SOLAS regulation II-2/4.5.5, as set out in the annex to document FP 54/WP.2, and agreed that the draft amendments should be further considered at FP 55, taking into account its earlier decision to further debate, at the next session, the lower size limit.

6.16 The Sub-Committee also noted that the group had:

- .1 agreed that the requirements for, and application of, inert gas systems on oil and chemical tankers when carrying cargoes having a flashpoint not exceeding 60°C (closed cup test) should be similar, except that regulations for chemical tankers also needed to take account of their unique operating profiles and the concerns relative to chemical cargoes;
- .2 noted the functional requirement in SOLAS regulation II-2/4.1.6 that the atmosphere in the cargo tanks shall be maintained out of the explosive range, and the requirement in the Regulations for inert gas systems on chemical tankers (resolution A.567(14)) that IGS be designed and operated so as to render and maintain the atmosphere in cargo tanks non-flammable at all times, except when such tanks are required to be maintained empty and gas free; had considered the operating profiles presented in document FP 54/6, noting that the atmosphere in the ullage of a full tank is often above the flammable range, and recalled that fire and explosions primarily occurred during discharge, tank cleaning and maintenance; and had agreed that cargo tanks of chemical tankers would not need to be inerted during the loading process, but would be required to be inerted prior to commencing discharge and to remain inerted throughout discharge and tank cleaning until the tank is gas free;
- .3 noted that certain inerting agents might introduce the risk of electrostatic discharge and had agreed that these agents should be avoided when the atmosphere could be flammable, e.g., when inerting a loaded tank on a chemical tanker;

- .4 noted that, in the application of inert gas to a chemical tanker, any unfavourable chemical reaction should be avoided; and
- .5 concerning proposed amendments to paragraph 5.5.2 of SOLAS regulation II-2/4, agreed that the following alternative draft text proposals needed further careful consideration, and that they could be contained within the IBC Code rather than SOLAS:

"For chemical tankers and gas carriers built on or after [date] when carrying [low-flashpoint] [flammable] cargoes from the list of products in chapters 17 and 18 of the IBC Code or in annexes 1 to 4 to the MEPC.2 circulars, the application of inert gas may take place after the tank has been loaded but before [the ship leaves the berth of loading or in the event of loading at anchorage] [arrival at the discharge port] [prior to commencing of discharge], before the ship leaves the anchorage position. Only nitrogen is acceptable as inert gas under this provision."

or

"For chemical tankers and gas carriers built on or after [date] when carrying, in specific cargo tanks, products which have a flashpoint of less than 60°C, as contained in the list of products in chapters 17 and 18 of the IBC Code or in the annexes 1 to 4 to the MEPC.2 circulars, the application of inert gas to render the cargo tank non-flammable, may take place after that cargo tank has been loaded, but before commencement of discharge and must be continued to be applied until that cargo tank is gas free. Only nitrogen is acceptable as inert gas under this provision."

6.17 Noting that SOLAS regulation II-2/4.5.5 makes reference to the FSS Code, which is currently focused on systems used on oil tankers and may not be fully applicable to systems on chemical tankers, the Sub-Committee agreed that the design, performance and operational requirements for all inert gas systems, regardless of ship type, should be contained in one document and that a thorough review of chapter 15 of the FSS Code should be undertaken to determine its applicability to chemical tankers, with the possibility of amendments to the Code.

6.18 The Sub-Committee invited the Committee to note that IMO regulations and guidelines regarding inert gas are frequently complex and located in a variety of locations within different instruments, and invited it to consider the need to update, revise and consolidate references to inert gas in appropriate IMO instruments.

6.19 The Sub-Committee invited Member Governments and international organizations to submit, to FP 55, comments and proposals regarding the draft amendments set out in the annex to document FP 54/WP.2, and described in the paragraphs above; the applicability of the FSS Code to chemical tankers; and amendments to chapter 15 of the FSS Code and/or the Regulations on inert gas systems on chemical tankers (resolution A.567(14)).

6.20 The Sub-Committee noted that the group, despite having reached agreement on many of the issues, had noted that the existing regulations were quite complex and the interrelationships between SOLAS chapter II-2, the FSS and IBC Codes and the Regulations on inert gas systems on chemical tankers (resolution A.567(14)) should be explored before suitable amendments can be proposed.

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## Input from other sub-committees

6.21 Recalling the instruction of MSC 83 that the Sub-Committee should cooperate, if found necessary, with the BLG and DE Sub-Committees in the work on the matter, the Sub-Committee agreed that no input from the DE Sub-Committee was required at this point in time, but that comments from the BLG Sub-Committee should be requested with respect to the proposed draft SOLAS amendments set out in the annex to document FP 54/WP.2.

6.22 In particular, the Sub-Committee requested the BLG Sub-Committee to:

- .1 consider that the proposed draft SOLAS amendments may impact chapters 9 and 11 of the IBC Code;
- .2 evaluate the impacts of applying inert gas to specific cargoes; and
- .3 consider that column "h" in chapter 17 of the IBC Code indicates which cargoes require inerting under that Code and the potential confusion this could cause for seafarers, Administrations and chemical tanker operators, as the criteria for inerting provided in paragraph 21.4.8.1 of the Code are based on environmental control considerations, including a flashpoint of 23°C, and are different from the criteria in the proposed draft SOLAS amendments.

6.23 The Sub-Committee noted that the group had recalled that in the tank-related fire and explosions investigated by the IIWG (MSC 81/8/1), failure to follow established procedures was observed in a significant number of incidents and that FP 53 had invited the STW Sub-Committee to urgently consider document STW/ISWG 1/5/12 in the context of the revision of the STCW Convention. The Sub-Committee also noted the view of the group that document STW/ISWG 1/5/12 concerning the cargo-specific element of the training for chemical tanker endorsements, including the specifics of hazardous chemicals and matters related to the carriage of low-flashpoint cargoes, had not been considered by the STW Sub-Committee in the context of its work on the revised STCW Convention and Code. In this context, the Committee was invited to consider the above matter and take action as appropriate.

## **7 CLARIFICATION OF SOLAS CHAPTER II-2 REQUIREMENTS REGARDING INTERRELATION BETWEEN CENTRAL CONTROL STATION AND SAFETY CENTRE**

### **General**

7.1 The Sub-Committee recalled that, at FP 53, it had established the drafting group on the clarification of SOLAS chapter II-2 and instructed the group to prepare draft clarifications of SOLAS chapter II-2 requirements regarding interrelation between central control stations and safety centres based on document FP 53/8 (CLIA).

7.2 It was also recalled that, at FP 53, the Sub-Committee, having agreed to refer the matter to the Correspondence Group on Explanatory Notes for the Application of the Safe Return to Port Requirements, had approved terms of reference for the group, as set out in paragraph 8.9 of document FP 53/23, and instructed the group to submit a report to FP 54.

### **Report of the correspondence group**

7.3 In considering the relevant part of the report of the correspondence group (FP 54/8 and Add.1), in particular whether there may be an inconsistency between SOLAS regulations II-2/8.5 and II-2/23.6.15 in respect of availability of the functionality of atrium

smoke extraction system at the safety centre, the Sub-Committee agreed that the above regulations were not in conflict since the functions of the safety centre are not the same as the central control station.

### **Instructions to the working group**

7.4 The Sub-Committee, recognizing the necessity to make progress on this item, instructed the working group on the Explanatory Notes for the Application of the Safe Return to Ports Requirements, established under agenda item 8, to finalize the text of the draft Clarifications of SOLAS chapter II-2 requirements regarding interrelation between central control stations and safety centres and the associated MSC circular, based on annexes 4 and 5 to the report of the correspondence group (FP 54/8), for consideration by the Sub-Committee.

### **Report of the working group**

7.5 Having considered the part of the report of the working group (FP 54/WP.3) relating to the item, the Sub-Committee:

- .1 agreed to the draft Interim Clarifications of SOLAS chapter II-2 requirements regarding interrelation between the central control station, navigation bridge and safety centre and the associated draft MSC circular, set out in annex 9, for submission to MSC 87 for approval; and
- .2 requested the Secretariat to inform the STW and NAV Sub-Committees of the outcome on this item for their consideration and action as appropriate.

## **8 EXPLANATORY NOTES FOR THE APPLICATION OF THE SAFE RETURN TO PORT REQUIREMENTS**

8.1 The Sub-Committee recalled that, at FP 53, it had agreed to refer matters related to the Explanatory Notes for the application of the safe return to port requirements to the Drafting Group on Clarification of SOLAS chapter II-2 Regarding the Interrelation between Central Control Station and Safety Centre, and had instructed the group to prepare a consolidated text of the draft Explanatory Notes based on the annex to document FP 53/18/1 (Italy and CLIA).

8.2 It was also recalled that, at FP 53, the Sub-Committee had established the Correspondence Group on Explanatory Notes for the Application of the Safe Return to Port Requirements, and approved terms of reference, as set out in paragraph 18.12 of document FP 53/23, having instructed the group to submit a report to FP 54.

### **Report of the correspondence group**

8.3 The Sub-Committee considered the relevant part of the report of the aforementioned correspondence group (FP 54/8 and Add.1), together with document FP 54/8/1 (Secretariat) on the outcome of SLF 52 and, having approved it in general:

- .1 concurred with the group's view that the ship systems' capabilities should be included in the List of operational limitations issued in accordance with SOLAS regulation V/30 and that the quantities of operational parameters, arrangements and procedures to be applied in respect of the possible different areas of operation of the ship should be described in detail in the ship's safety management manual;

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- .2 agreed that the "Document of approval", set out in appendix 2 to the annex to document FP 54/8, should not be included in the draft Explanatory Notes since it would be an unnecessary additional burden for Administrations;
  - .3 decided to remove the interpretations that should be reviewed by the SLF and NAV Sub-Committees so that the draft Explanatory Notes could be finalized at this session for submission to MSC 87 for approval, and forward those interpretations to those Sub-Committees for finalization and submission to the subsequent session of the Committee for approval and issuing as an addendum to the Explanatory Notes; and
  - .4 agreed that the Working Group on Performance Testing and Approval Standards for Fire Safety Systems, established under agenda item 3, should consider the comments of the group in respect to the suitability of IACS UI SC 216 in the light of the safe return to port requirements, taking into account annex 3 to document FP 54/8, and advise the Sub-Committee accordingly (see paragraphs 3.5.3, 3.12 and 3.19).

### **Outcome of SLF 52**

8.4 In considering document FP 54/8/1 (Secretariat), reporting on the outcome of SLF 52 for matters related to the draft Explanatory Notes for the assessment of passenger ship systems' capabilities, the Sub-Committee, having noted that SLF 52 had recommended to delete, from the Explanatory Notes, interpretation 15 (of SOLAS regulation II-2/21.3.2) as being redundant since SOLAS regulation II-2/21.3.2 addresses the flooding of any single watertight compartment, and interpretation 69 (of SOLAS regulation II-1/18) as it contradicts SOLAS regulation II-1/8-1 and would therefore constitute an amendment to the Convention, agreed to the recommendations of SLF 52.

### **Establishment of the working group**

8.5 Recalling its relevant decision at FP 53 regarding a working group, the Sub-Committee established the Working Group on Explanatory Notes for the Application of the Safe Return to Port Requirements and instructed it, taking into account the comments and decisions made in plenary, to finalize the draft Explanatory Notes for the assessment of passenger ship systems' capabilities after a fire or flooding casualty, and the associated draft MSC circular, based on document FP 54/8 and Add.1, taking into account the relevant comments and decisions made by the Sub-Committee and document FP 54/8/1.

### **Report of the working group**

8.6 Having considered the report of the working group (FP 54/WP.3), the Sub-Committee approved the report in general and took action as indicated hereunder.

8.7 In the course of discussion of paragraph 5.2.3 of the Explanatory Notes prepared by the working group, the delegation of the United Kingdom pointed out that SOLAS regulation II-2/21.4 lists the systems essential for the safe return to port and that these systems are to "... *remain operational* ..." following damage not exceeding the casualty threshold. This regulation applies to ships with three or more main vertical zones to ensure that sufficient space is available to provide the necessary redundancy and separation of essential equipment. However, the concept of a "critical system" is not found in any regulation and it allows for any or all systems *not* to remain operational, but to be considered satisfactory if they can be brought into service within one hour from the occurrence of the casualty with the aid of manual intervention. The delegation considered this to be an unacceptable time delay,

particularly in the case of both propulsion and steering systems, and, in their opinion, there is no technical reason why these systems cannot be brought into service in a near seamless fashion in the same way that emergency electrical power is supplied without manual intervention following failure of the primary source of electrical power.

8.8 In this context, the Sub-Committee also noted the background information provided by the Secretariat regarding the "design" aspect of the improved survivability concept agreed at MSC 72 and, in this respect, pointed out that the concept for "critical systems" is in conflict with the purpose of the new SOLAS regulations since it allows manual actions (i.e. damage control actions) to be accepted in lieu of the meeting the design requirements.

8.9 Having considered the above views and the concerns expressed by other delegations, the Sub-Committee decided to add the word "Interim" in the title of the draft MSC circular and, consequently:

- .1 agreed to the draft Interim Explanatory Notes for the assessment of passenger ship systems' capabilities after a fire or flooding casualty and the associated draft MSC circular, set out in annex 10, for submission to MSC 87 for approval; and
- .2 invited the Committee to instruct the COMSAR, NAV and SLF Sub-Committees to consider the draft interpretations, set out in annex 4 to document FP 54/WP.3, that fall under their purview and provide the outcome of their considerations to the FP Sub-Committee for coordination purposes with a view to revising the Interim Guidelines for submission to the Committee for approval (see also paragraph 8.3.3).

## **9 RECOMMENDATION ON EVACUATION ANALYSIS FOR NEW AND EXISTING PASSENGER SHIPS**

### **General**

9.1 The Sub-Committee recalled that, at FP 53, it had agreed that a correspondence group should be established to develop alternative scenarios and to discuss the mandatory nature of the Guidelines for evacuation analysis for new and existing passenger ships (MSC.1/Circ.1238), taking into account that the Guidelines are a design tool. FP 53 had also agreed that the proposal by the United States, contained in document FP 53/9/1, on the need to establish uniform life safety criteria to be applied when performing computer fire modelling in connection with evacuation analyses, should be further considered by the aforementioned group.

9.2 It was also recalled that, at FP 53, the Sub-Committee had established the Correspondence Group on Evacuation Analysis for New and Existing Passenger Ships and approved terms of reference, as set out in paragraph 9.5 of document FP 53/23, and instructed the group to submit a report to FP 54.

### **Report of the correspondence group**

9.3 Having considered the report of the correspondence group (FP 54/9 and FP 54/INF.6), the Sub-Committee noted that the group had:

- .1 not reached consensus regarding the mandatory nature of the Guidelines (MSC.1/Circ.1238);
- .2 agreed that amending the scenarios for evacuation analysis could be useful for the implementation of the Guidelines (MSC.1/Circ.1238); and

- .3 agreed that the Guidelines on alternative design and arrangements for fire safety (MSC/Circ.1002) should be amended to include life safety criteria.

9.4 In light of the above, and bearing in mind that there was no concrete proposal for amendments to the Guidelines for evacuation analysis for new and existing passenger ships (MSC.1/Circ.1238), the Sub-Committee noted that many delegations did not support the proposal for the above Guidelines to become a mandatory instrument; and invited Member Governments and international organizations to submit detailed proposals to FP 55, which should not address the mandatory nature of the Guidelines as this matter should be considered after the draft amendments are agreed by the Sub-Committee.

9.5 In view of the above development, the Sub-Committee agreed to invite the Committee to extend the target completion year of this planned output to 2011.

9.6 In this context, the delegation of France informed the Sub-Committee of a project being carried out by the European Union on this matter, named SAFEGUARD, that could be useful in the further development of this matter. Additionally, the delegation stated their intention to submit a preliminary report on the project to FP 55.

## 10 CONSIDERATION OF IACS UNIFIED INTERPRETATIONS

### General

10.1 The Sub-Committee recalled that FP 53, in considering document FP 53/12 (IACS), seeking, in the context of the clarification on the application of SOLAS regulation II-2/7.5.5 on control stations, clarification on which of the three protection methods (IC, IIC, IIIC) should be used in a control station, the Sub-Committee had agreed that the three protection methods required fixed fire detectors and that fire alarm systems should be installed in control stations. The fire-extinguishing system should be compatible with the equipment and protection method used in the accommodation spaces. In this context, the observer from IACS had informed the Sub-Committee that it intended to submit an IACS UI on this matter to this session.

10.2 The Sub-Committee also recalled that FP 53, in considering document FP 53/12/2 (IACS) containing updates to two IACS unified interpretations (UI SC 42 and UI SC 43) related to the implementation of SOLAS regulation II-2/20.3, had agreed with them, in principle. However, having recognized that the IEC standard was addressed in MSC/Circ.1120, the Sub-Committee had invited IACS to undertake a complete review of MSC/Circ.1120 in the context of this IEC standard and submit a document on this matter to FP 54.

10.3 It was further recalled that, at FP 53, the Sub-Committee, having considered a proposal by the Secretariat (FP 53/WP.8), based on the IACS Unified Interpretations contained in document FP 51/9/9, and the proposed modifications in document FP 53/12/3, and having noted that:

- .1 several delegations were of the opinion that the text was technically appropriate; and
- .2 the majority of the delegations expressed some concerns regarding the transitory exemptions in the ship water ballast exchange and its berthing condition,

could not agree to the draft Unified interpretations of the FSS Code. However, noting that there was support for the proposal, the Sub-Committee had decided to further consider document FP 53/WP.8, and invited Member Governments and international organizations to submit comments and proposals on this matter to this session.

### **Location of the fire main isolation valves in tankers**

10.4 In considering document FP 54/10 (IACS), seeking, in the context of the application of SOLAS regulation II-2/10.2.1.4.4, clarification on the determination of what should constitute a "protected position" of the isolation valve used to preserve the integrity of the fire main system in case of fire or explosion, the Sub-Committee agreed that a fire in the cargo area could render the valve inaccessible/inoperable and that the valve itself, as well as the means to access the valve, should be protected to the same extent as that afforded by the poop front bulkhead, in which case the valve would need to be located within the accommodation space, but within the general area of the front of the deckhouse structure. In this context, the Sub-Committee invited IACS to submit a unified interpretation on this matter to FP 55.

### **Fitting of fixed local application fire-fighting systems**

10.5 The Sub-Committee considered a proposal by IACS (FP 54/10/1) for an interpretation of SOLAS regulation II-2/10.5.6.3.1, in particular, for the extent that diesel engine-driven hydraulic power packs, used solely for cargo operations, are required to be protected by a fixed local application fire-fighting system and, noting that IACS UI SC 176 contains an interpretation of SOLAS regulation II-2/10.5.6 on fixed local application of fire-extinguishing systems, agreed that regardless of its use, internal combustion machinery (located in a category A machinery space greater than 500 m<sup>3</sup>) is required to be protected by a fixed local application fire-fighting system. In light of the above, the Sub-Committee invited IACS to submit a document on this matter to FP 55.

### **Suction piping of emergency fire pumps**

10.6 In considering document FP 54/10/2 (IACS), seeking assistance in the finalizing of a unified interpretation on suction piping of emergency fire pumps, which are run through the machinery space, the Sub-Committee agreed to the interpretations contained in paragraph 3 of the document, and invited IACS to submit a document on this issue to FP 55.

### **Sources of power supply for fixed fire detection and fire alarm systems**

10.7 The Sub-Committee considered document FP 54/10/3 (IACS), containing IACS UI SC 35 (revision 2) relevant to paragraph 9.2.2 of the FSS Code, related to sources of power supply for fixed fire detection and fire alarm systems. The original version of this unified interpretation provided an interpretation of SOLAS regulation II-2/13.1.3 before these provisions were transferred to paragraph 9.2.2 of the FSS Code. The Sub-Committee, noting that FP 53 had prepared amendments to chapter 9 of the FSS Code, with a view to approval at MSC 87, and considering the actual need for the aforementioned interpretation, agreed that they were necessary for the existing chapter 9 of the FSS Code. Further to the above, the Sub-Committee agreed that the issue of use of batteries needed substantive consideration and, taking into account that this matter was within the scope of the correspondence group established under item 3 (Performance testing and approval standards of fire safety systems) (see also paragraph 3.27), instructed the group to further consider IACS UI SC 35 (revision 2), and advise the Sub-Committee accordingly.

### **Emergency fire pumps in cargo ships**

10.8 In considering document FP 54/10/4 (IACS), providing a revised draft of a part of the unified interpretation that was developed at FP 53 (FP 53/WP.8) on paragraph 2.2.1.3 of chapter 12 of the FSS Code, which took into account the comments raised at that session, the Sub-Committee agreed to the draft Unified interpretation of chapter 12 of the FSS Code, and the associated draft MSC circular, set out in annex 11, for submission to MSC 88 for approval.

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## Pending matters

10.9 In recalling that FP 53 had:

- .1 noted that IACS intended to submit a unified interpretation on the application of SOLAS regulation II-2/7.5.5 on control stations (FP 53/12) to FP 54;
- .2 invited IACS to undertake a complete review of MSC/Circ.1120, in the context of IEC standard (FP 53/12/2), and submit a document on this matter to this session; and
- .3 noted that IACS intended to submit a document on matters related to pump-rooms intended solely for ballast transfer or fuel oil transfer (FP 51/9/10) to FP 54 (FP 53/23, paragraph 12.11),

the Sub-Committee noted information provided by the IACS observer that the unified interpretation on the application of SOLAS regulation II-2/7.5.5 on control stations would be submitted to FP 55, and that IACS had included in its work programme a complete review of MSC/Circ.1120, which was not finalized to date. In this context, IACS reiterated their intention to submit a document on matters related to pump-rooms intended solely for ballast transfer or fuel oil transfer to FP 55.

## 11 FIXED HYDROCARBON GAS DETECTION SYSTEMS ON DOUBLE-HULL OIL TANKERS

### General

11.1 The Sub-Committee recalled that MSC 84, having considered document MSC 84/22/7 (France, Finland and Germany), had agreed to expand the Sub-Committee's existing work programme item on "Fixed hydrocarbon gas detection systems on double-hull oil tankers" to also consider means to avoid explosions in double spaces of double-hull oil tankers after gas detection, in cooperation with the BLG Sub-Committee.

11.2 The Sub-Committee also recalled that, at FP 53, it had instructed the Correspondence Group on Performance Testing and Approval Standards for Fire Safety Systems to further consider the matter and to submit a report to FP 54, and had approved relevant terms of reference, as set out in paragraph 13.13 of document FP 53/23.

### Report of the correspondence group

11.3 In considering the relevant part of the report of the Correspondence Group on Performance Testing and Approval Standards for Fire Safety Systems, as contained in document FP 54/11 (United States), together with document FP 54/11/1 (Japan), the Sub-Committee:

- .1 endorsed the group's view that duplicate extraction pumps should be provided, but that the carriage of onboard spares could be accepted by the Administration as equivalent;
- .2 supported, in general, the modifications to the draft Guidelines contained in document FP 54/11/1;
- .3 in noting that standard IEC 60079-29-1 (Gas detectors – Performance requirements of detectors for flammable gases) referred to in paragraph 2.2.1.1 of the draft Guidelines, applies to gas detectors and not

gas analysis, agreed to appropriate editorial modifications to paragraph 2.2.1 of the draft Guidelines; and

- .4 agreed to delete the last sentence of paragraph 1.1 of the draft Guidelines, as the SOLAS Convention contains provisions for the application of the draft SOLAS regulation II-2/4.5.7 (Gas measurement and detection), which was approved by MSC 86 with a view to adoption at MSC 87.

#### **Instructions to the drafting group**

11.4 Recognizing the need to finalize the aforementioned draft Guidelines for the design, construction and testing of fixed hydrocarbon gas detection systems, for submission to MSC 87 for approval in conjunction with the adoption of the draft amendments to SOLAS regulation II-2/4.5.7 and the new chapter 16 (Fixed hydrocarbon gas detection systems) of the FSS Code, the Sub-Committee instructed the Drafting Group on Comprehensive Review on the Fire Test Procedures Code, established under agenda item 4, to finalize the draft Guidelines and associated draft MSC circular, based on the report of the correspondence group (FP 54/11), taking into account comments and decisions made in plenary and document FP 54/11/1.

#### **Report of the drafting group**

11.5 Having considered the part of the report of the drafting group (FP 54/WP.7) relating to this item, the Sub-Committee agreed to the draft Guidelines for the design, construction and testing of fixed hydrocarbon gas detection systems and the associated draft MSC circular, set out in annex 12, for submission to MSC 87 for approval.

#### **Completion of the output**

11.6 Subsequently, the Committee was invited to note that the work on this output had been completed.

## **12 HARMONIZATION OF THE REQUIREMENTS FOR THE LOCATION OF ENTRANCES, AIR INLETS AND OPENINGS IN THE SUPERSTRUCTURES OF TANKERS**

#### **General**

12.1 The Sub-Committee recalled that, at FP 51, it had decided that a new item should be established in the Sub-Committee's work programme to consider a single comprehensive approach to harmonize the admissible distances required in SOLAS chapter II-2 and the IBC and IGC Codes for entrances, air inlets and openings in the superstructures of tankers, taking into account standard IEC 60092-502, the unified interpretations contained in MSC/Circ.474, MSC/Circ.1120 and MSC/Circ.1203 and document FP 51/9/4 (IACS), and had agreed to a justification for the proposal for a new work programme item (FP 51/19, annex 6) for consideration by MSC 83.

12.2 It was also recalled that, at MSC 83, the Committee had endorsed the proposal by FP 51 and had decided to include, in the Sub-Committee's work programme, a high-priority item on "Harmonization of the requirements for the location of entrances, air inlets and openings in the superstructures of tankers", with two sessions needed to complete the item.

12.3 The Sub-Committee further recalled that, at FP 53, it had invited Member Governments and international organizations to submit comments and proposals to FP 54.

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## Options for harmonizing the existing requirements

12.4 The Sub-Committee had for its consideration under this agenda item document FP 54/12 (Argentina), presenting two different options for harmonizing the requirements that exist in various IMO instruments and other international standards with regard to ignition of flammable gases or vapours that can enter through separate openings to a ship's working or accommodation spaces, as follows:

- .1 to refine the current prescriptive approach, by producing a comparative table of all requirements in various IMO instruments before proceeding to harmonize all of them in comparison with other international standards; or
- .2 to amend the FSS Code by introducing a new chapter containing the harmonized requirements. Subsequently, the IBC and IGC Codes and the SOLAS Convention would need to be amended to refer to the new chapter of the FSS Code.

12.5 In considering the above proposal, the Sub-Committee noted the view of the delegation of France that the application of the provisions of standard IEC 600092-502 to avoid the ignition of gases coming from the cargo area in tankers would mean a reduction of the current IMO safety level. In this context, the Sub-Committee also noted that several delegations considered that it was not appropriate to achieve the harmonization proposed in document FP 54/12 by developing a new chapter to the FSS Code, taking into account the inclusion of provisions for chemical and gas tankers.

12.6 The delegation of the United States expressed the view that, if language excerpted from the IEC standard was inserted into the FSS Code, this may cause conflicts for Administrations that have higher standards for hazardous area protection. Depending on the arrangement of the vessel and the availability of natural or mechanical ventilation, the proposed new area classifications could result in a lower level of safety than that currently contained in the SOLAS Convention and the IBC and IGC Codes. Another consideration was that standard IEC 60092-502 is focused on electrical sources of ignition, which is only one element of the hazard. They informed the Sub-Committee that the ISGOTT safety guide, for instance, discusses many other sources of ignition, such as open flames, sparks, heated surfaces and static discharge that need to be considered. In concluding, the delegation pointed out that, in addition to the risk of ignition, the toxicity of petroleum and chemical vapours should be taken into account when considering the location of entrances and air inlets to the accommodations.

12.7 The Sub-Committee noted the opinion of the delegation of Argentina that the safety requirements contained in IEC standards were, in general, superior to those contained in similar IMO regulations, as presented in its document FP 54/12. The delegation of Argentina also highlighted that all chapters of the FSS Code are applicable to chemical and gas carriers, except when the relevant Codes establish a different requirement. In case of cargoes producing inflammable gases, there would not be any technical reason to establish different safety distances to avoid the ignition of those gases just because of the type of ship.

12.8 Having considered the above views, the Sub-Committee agreed on the need to further consider the matter with a view to taking a broader approach than the aforementioned IEC standard, and invited Member Governments and international organizations to submit pertinent comments and proposals to FP 55.

## Extension of the target completion year

12.9 In view of the above, the Sub-Committee invited the Committee to extend the target completion year for the output to 2011.

### **13 AMENDMENTS TO SOLAS CHAPTER II-2 RELATED TO THE RELEASING CONTROLS AND MEANS OF ESCAPE FOR SPACES PROTECTED BY FIXED CARBON DIOXIDE SYSTEMS**

13.1 The Sub-Committee recalled that, at FP 51, it had prepared a justification for the proposal for a new work programme item (FP 51/19, annex 3), which requested an extended review of safety matters relating to the installation of total flooding carbon dioxide systems, including system discharge control arrangements and criteria for lighting and marking of the means of escape from the protected space.

13.2 The Sub-Committee noted that MSC 83 had endorsed the proposal by FP 51 and had decided to include, in the Sub-Committee's work programme, a high-priority item on "Amendments to SOLAS chapter II-2 related to the releasing controls and means of escape for spaces protected by fixed carbon dioxide systems" with two sessions needed to complete the item.

13.3 It was also recalled that FP 53, having noted that no documents had been submitted to that session, and recognizing the need to progress this matter, had invited Member Governments and international organizations to submit relevant comments and proposals to FP 54.

13.4 Having noted that no documents had been submitted to this session, the Sub-Committee, taking into account that releasing controls for fixed CO<sub>2</sub> systems had already been addressed under agenda item 3 (Performance testing and approval standards for fire safety systems) and that escape from machinery spaces will be addressed under agenda item 14 (Means of escape from machinery spaces), invited the Committee to note that the work on this output had been completed.

### **14 MEANS OF ESCAPE FROM MACHINERY SPACES**

#### **General**

14.1 The Sub-Committee recalled that FP 53, in considering document FP 53/16 (Denmark, Norway and Sweden), proposing amendments to SOLAS regulations II-2/13.4.1 and II-2/13.4.2 to introduce requirements on independent means of escape from enclosed working spaces, had agreed, in principle, to the proposed SOLAS amendments and had invited Member Governments and international organizations to submit comments and proposals to FP 54.

#### **Consideration of the draft amendments**

14.2 In considering document FP 54/14 (Chile, Denmark, Norway and Sweden), proposing draft amendments to SOLAS regulations II-2/13.4.1 and II-2/13.4.2 on means of escape from machinery control rooms and other enclosed spaces within machinery spaces of cargo and passenger ships, the Sub-Committee, taking into account comments made at FP 53, agreed, in principle, to the draft amendments and proposed that the draft amendments should apply to new ships only.

14.3 Recognizing that there is a need to further consider the above draft amendments, in particular to clarify terms, including that of "such ladders", "enclosed spaces" and "continuous fire shelter", and to address the exception for small ships; and noting concerns raised regarding paragraph 10 of document FP 54/14 on hardware on board "left to the discretion of the Administration", which would require the development of a unified interpretation in the future, the Sub-Committee invited Member Governments and international organizations to submit comments and proposals to FP 55.

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## Investigation into casualty of the "Rio Blanco"

14.4 In this context, the delegation of Chile, highlighting the importance of the item, informed the Sub-Committee of the accident report triggered by the investigation into a fire on the Chilean-flagged pure car carrier **Rio Blanco**, at the port of Santos, Brazil. The investigation was conducted in accordance with the Code for Investigation of Marine Casualties and Incidents (resolution A.849(20)).

14.5 The Sub-Committee was further informed that, at 21:40 h on 16 February 2008, during the dismantling of two diesel-oil system valves located in the engine-room, some oil sprayed on to the crew member who was carrying out the work, and then on to a generator which was in operation, leading to a large-scale fire. The initial scale of the accident was such that no one in the vicinity was able to control the fire with portable extinguishers and the order was given to abandon the engine-room. Within a few minutes this action was made more difficult by the high temperature and smoke being generated, and by a black-out which left the ship with only emergency lighting. As to the people remaining in the engine-room, the crew member who had been dismantling the valves was caught up in the flames at the beginning of the fire, and could not be helped. Those who had not managed to leave the engine-room at the first attempt, by fore or aft escape routes, joined those who were in the engine control room and tried unsuccessfully to abandon ship via the stern. Unable to see because of the smoke, they then used various escape routes up to the main deck. However, two engineering officers went back to the engine control room, from where, despite the efforts of crew members and fire-fighters, it proved impossible to recover them alive.

14.6 The Sub-Committee noted the view expressed by the delegation of Chile that if the engine control room of the **Rio Blanco** had been equipped with escape routes, the two officers who died from asphyxiation would have met a kinder fate. The delegation considered SOLAS chapter II-2 to be inconsistent in that it stipulates escape routes from enclosed machinery spaces for passenger ships, but not for other types of ship. Since engine-room crew members all perform similar tasks, the Sub-Committee considered it important to pursue the development of the draft amendments that were proposed by the co-sponsors of document FP 54/14 (see paragraph 14.2).

## 15 REVIEW OF FIRE PROTECTION REQUIREMENTS FOR ON-DECK CARGO AREAS

15.1 The Sub-Committee recalled that MSC 83, having considered document MSC 83/25/5 (Germany), proposing to review the fire protection requirements of SOLAS chapter II-2 to address fire risks related to on-deck cargo areas, had agreed to include, in the Sub-Committee's work programme, a high-priority item on "Review of fire protection requirements for on-deck cargo areas", with three sessions needed to complete the item, in cooperation with the DSC Sub-Committee as necessary and when requested by the Sub-Committee.

15.2 The Sub-Committee also recalled that, at FP 53, having considered documents FP 53/17 and FP 53/INF.2 (Germany), presenting an overview of the ongoing Formal Safety Assessment (FSA) on fire safety of deck containers carried out by Germany, which summarized results from the first step of the FSA study, and providing the key data relating to the existing risk level, it had agreed to further consider this matter at FP 54, taking into account the aforementioned FSA study, and invited Member Governments and international organizations to submit relevant comments and proposals to FP 54.

15.3 Following consideration of documents:

- .1 FP 54/15 (Germany), providing a summary of the results of the FSA study on Container fire on deck carried out by Germany, along with proposals for improving fire safety of on-deck cargo areas; and
- .2 FP 54/INF.2 (Germany), presenting further details of the FSA study on Container fire on deck, as contained in document FP 54/15,

the Sub-Committee noted the view on the need for monitors and thermal cameras on deck for detecting containers that may be on fire or at risk.

15.4 To progress the work on this matter, the Sub-Committee established the Correspondence Group on Review of Fire Protection Requirements for on-Deck Cargo Areas, under the coordination of Germany\*, and instructed the group, taking into account relevant information contained in documents FP 54/15 and FP 54/INF.2, to:

- .1 consider the information on fire risks related to on-deck cargo areas contained in documents FP 54/15 and FP 54/INF.2;
- .2 consider matters related to the need for monitors and thermal cameras on deck for detecting containers that may be on fire or at risk;
- .3 prepare draft amendments to SOLAS chapter II-2 to address fire risks related to on-deck cargo areas for consideration by the Sub-Committee; and
- .4 submit a report to FP 55.

## 16 ANALYSIS OF FIRE CASUALTY RECORDS

### General

16.1 The Sub-Committee recalled that FP 53, having considered document FP 53/19/1 (Denmark and Faroe Islands), providing information on the very serious fire that occurred in April 2007 on the Faroese fishing factory vessel **Hercules**, had noted that:

- .1 the lamp fixtures of poor quality had caused the fire; and
- .2 fire-fighting and the search for crew members in the accommodation was transitory due to the lack of air supply in the smoke divers' air breathing apparatuses,

and had further noted the related proposed draft amendments to SOLAS chapter II-2 annexed to the aforementioned document.

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16.2 It was also recalled that FP 53, in light of the above, had invited Denmark to submit a proposal to the Committee for a new work programme item, in accordance with the Guidelines on the organization and method of work (MSC-MEPC.1/Circ.2), and had requested the Secretariat to forward document FP 53/19/1 to FSI 17 for further consideration.

### **Fire casualty on board the fishing factory vessel "Hercules"**

16.3 In considering document FP 54/16 (Secretariat) on matters related to the very serious fire that occurred in April 2007 on the Faroese fishing factory vessel **Hercules**, the Sub-Committee noted, in particular, that:

- .1 FSI 17 had referred document FP 53/19/1 to its Working Group on Casualty Analysis, noting that the investigation report had been included into GISIS and was also available on the homepages of the Faroese Maritime Authority and Danish Maritime Authority. Based on a preliminary consideration of the report, FSI 17 found some important safety issues, such as poor communication among crew members, inadequate instructions and drills, technical aspects of the electrical installations and provision of an air compressor on board, and referred the investigation report to the FP, DE and STW Sub-Committees for consideration;
- .2 MSC 86, noting that Denmark and the Faroe Islands had submitted proposals for two new high-priority work programme items on "General requirements on electrical installations" and "Means for recharging air bottles for air breathing apparatuses" for the DE and FP Sub-Committees, respectively, agreed to refer the investigation report on the fire on the fishing factory vessel **Hercules** to the FP, DE and STW Sub-Committees for consideration;
- .3 with regard to the proposals for relevant new work programme items contained in documents MSC 86/23/14 and MSC 86/23/15 (Denmark and Faroe Islands), MSC 86 had agreed:
  - .1 concerning the proposal to develop amendments to SOLAS regulation II-2/10.10.2 regarding requirements for fire-fighters' breathing apparatuses, to include in the work programme of the Sub-Committee and the provisional agenda for FP 54, a high-priority item on "Means for recharging air bottles for air breathing apparatus", with a target completion date of 2011; and
  - .2 concerning the proposal to develop amendments to SOLAS regulation II-1/40.2 regarding general requirements on electrical installations, to include in the work programme of the DE Sub-Committee, a high-priority item on "General requirements on electrical installations", with two sessions needed to complete the item.

16.4 Taking into account that the outcome of FSI 17 on issues related to breathing apparatus will be considered under agenda item 21 (Means for recharging air bottles for air breathing apparatus), the Sub-Committee noted that the **Hercules** had not been certified under the SOLAS Convention and, for this reason, any conclusion on this casualty should take into account that the consequences of the same fire on a SOLAS certified ship would likely have a different outcome and that any of the lessons learnt would also be different.

16.5 In this context and based on the evidence contained in the investigation report, the Chairman highlighted that requiring new safety equipment to mitigate the consequences of a fire on a non-SOLAS certified ship with a deficient ship safety management system, would not necessarily represent a safety improvement. In the **Hercules** casualty, for example, the fire alarm and fire detection system failed; the air breathing apparatus failed; and the speed of the fire grew quickly due to ineffective fire-resistant divisions, which increased the smoke generation and propagation, seriously reducing visibility and increasing toxic gases within the ship.

16.6 Subsequently, the Sub-Committee requested the Secretariat to forward the above views to FSI 18.

## **17 REVISION OF THE RECOMMENDATIONS FOR ENTERING ENCLOSED SPACES ABOARD SHIPS**

### **General**

17.1 The Sub-Committee recalled that MSC 85 had considered a proposal by DSC 13 to review and revise, as necessary, the specific provisions of the Recommendations for entering enclosed spaces aboard ships (resolution A.864(20)) and had agreed to include, in the work programmes of the BLG, DSC, FP and STW Sub-Committees and the provisional agenda for DSC 14, a high-priority item on "Revision of the Recommendations for entering enclosed spaces aboard ships", with a target completion date of 2010, assigning the DSC Sub-Committee as coordinator. As further instructed by MSC 85, FP 53 gave preliminary consideration to the matter and included the item in the provisional agenda for FP 54.

17.2 The Sub-Committee further recalled that, at FP 53, having noted the decisions of MSC 85 on this issue, and having considered that there were no documents submitted to the session, it had invited Member Governments and international organizations to submit comments and proposals on this matter to FP 54.

### **Outcome of DSC 14**

17.3 In considering document FP 54/17 (Secretariat), the Sub-Committee noted that DSC 14 had:

- .1 identified three issues to be discussed with regard to this work, namely:
  - .1 the Marine Accident Investigators' International Forum (MAIIF) on entry into enclosed spaces;
  - .2 proposals for amendments to the Recommendations for entering enclosed spaces aboard ships (resolution A.864(20)); and
  - .3 a proposal for amendments to SOLAS regulation III/19 to mandate enclosed space entry and rescue procedure drills, which has been submitted to MSC 87 for consideration;
- .2 noted that MAIIF had identified various areas of concern regarding the inadequacies in safety management systems, training and drills related to the procedures for safe entry and safe rescue from enclosed spaces;
- .3 agreed to take the information provided by MAIIF into account when preparing amendments to the Recommendations (resolution A.864(20)) and requested the Secretariat to issue document DSC 14/INF.9 so that it would be available for consideration at STW 41, BLG 15 and FP 54;

- .4 agreed, in principle, to a proposal from Sweden (DSC 14/16) related to the risks associated with the transporting oxygen-depleting cargoes and materials; and
- .5 established a correspondence group to progress the work on this issue and instructed it to submit a report to DSC 15.

### **Outcome of STW 41**

17.4 Being informed of the outcome of STW 41 on this matter, the Sub-Committee noted that STW 41 had agreed to request the Committee to decide whether any additional training was necessary for entry into enclosed spaces after consideration of the reports of sub-committees concerned with this issue and, if so, invite the STCW Conference to include additional training measures in the proposed amendments to the STCW Convention and STCW Code.

### **Outcome of BLG 14**

17.5 With regard to the outcome of BLG 14 on this matter, the Sub-Committee noted that the BLG Sub-Committee had not proposed any amendments to the Recommendations at this stage, had considered the work on the item completed and had invited the Committee to note the outcome. However, having recognized the importance of the issue, BLG 14 welcomed further work on areas where it had special expertise, if such needs were identified by the Committee. The Sub-Committee also noted that BLG 14 had encouraged Member Governments and international organizations to take part in the work of the correspondence group established at DSC 14 (see paragraph 17.3.5).

### **Discussion**

17.6 The Sub-Committee had the following documents for consideration under this agenda item:

- .1 FP 54/17/1 (IPTA), proposing the development of guidelines for tank entry on chemical tankers;
- .2 FP 54/17/2 (United States), proposing comprehensive amendments to the Recommendations (resolution A.864(20)), based on this Administration's experiences with entry into shipboard enclosed spaces; and
- .3 FP 54/17/3 (OCIMF), commenting on document FP 54/17/1 regarding guidance on enclosed space entry specifically for chemical tankers.

17.7 Having considered the above documents, the Sub-Committee noted that the proposals contained in document FP 54/17/2 had also been submitted to the aforementioned correspondence group established at DSC 14 for consideration. Consequently, the Sub-Committee, in order to avoid a duplication of work, decided to await the outcome of DSC 15's consideration of the aforementioned group's report.

17.8 With regard to documents FP 54/17/1 and FP 54/17/3, the Sub-Committee, in noting that the development of separate guidelines specific to oil and chemical tankers, as proposed in document FP 54/17/1, was outside the scope of this item, recalled that it was instructed to review and revise, as necessary, the specific provisions of the Recommendations for entering enclosed spaces aboard ships (resolution A.864(20)), taking into account the health and safety of personnel on board entering enclosed spaces.

17.9 Notwithstanding the above, the Sub-Committee noted the views of some delegations on the need to have specific IMO recommendations to deal with the risks associated with cargo spaces protected by inert gas systems. In this context, the Sub-Committee also noted the views of the majority of delegations who spoke that two sets of recommendations could cause confusion in the industry and, therefore, the existing general approach of the Recommendations (resolution A.864(20)) should be maintained to cover the risks for entering enclosed spaces from a global perspective (i.e. applicable to entry into any enclosed space), bearing in mind that some spaces present higher risks than others.

17.10 In summarizing the discussion, the Chairman highlighted the areas of general agreement; in particular, he pointed out that the vast majority of those that spoke on the issue agreed that:

- .1 only one set of general recommendations should be developed by IMO to provide guidance to the industry on the risks associated with entering enclosed spaces aboard ships;
- .2 the provisions of the ISM Code should be strengthened to promote awareness regarding the need to follow established safety procedures for enclosed space entry and rescue; and
- .3 that some of the proposals contained in the submission by IPTA (FP 54/17/1) should be considered in the context of revision of the Recommendations.

17.11 In light of the above and taking into account the related comments referred to in paragraphs 6.5.4 and 6.5.5, the Sub-Committee decided to instruct the Working Group on Measures to Prevent Explosions on Oil and Chemical Tankers Transporting Low-Flashpoint Cargoes, established under agenda item 6 (see paragraph 6.8), to consider document FP 54/17/1 and advise the Sub-Committee on whether any of the proposals contained in the annex to the above document can be incorporated in the Recommendations for entering enclosed spaces aboard ships (resolution A.864(20)), from a generic perspective (i.e. applicable to all inert spaces regardless of the inert gas used).

### **Report of the working group**

17.12 Having considered the part of the report of the working group (FP 54/WP.2) related to this item, the Sub-Committee took action as outlined hereunder.

17.13 The Sub-Committee noted that the group had considered document FP 54/17/1, with a view to determining which specific aspects of the proposed guidance for tank entry on chemical tankers contained in the annex to the document should be considered by the DSC Sub-Committee, in the context of their work on the revision of the Recommendations for entering enclosed spaces aboard ships (resolution A.864(20)) and, having considered the outcome of the group, agreed that the entire guidance be referred to the DSC Sub-Committee for comments, taking into account its applicability to all tankers.

17.14 In this regard, the Sub-Committee also agreed that section 2 (Use of nitrogen) of the aforementioned proposed guidance should be specifically considered by the DSC Sub-Committee, with a view to including relevant provisions in the revised Recommendations for entering enclosed spaces aboard ships and encouraged Member Governments and international organizations to take part in the DSC Correspondence Group on the matter.

17.15 In this context, the Sub-Committee, recognizing that the expertise on such tanker-related issues lies within the BLG Sub-Committee and that it may be beneficial if the draft guidance contained in the annex to document FP 54/17/1 was also brought to the attention of that Sub-Committee for its expert consideration, taking into account its applicability to all tankers, agreed to refer the draft guidance also to the BLG Sub-Committee.

17.16 The Sub-Committee requested the Secretariat to inform the BLG and DSC Sub-Committees of the outcome of this item and, in view of the above consideration (see paragraph 17.7), invited the Committee to extend the target completion year of the planned output to 2011.

#### **Statement by the observer from IPTA**

17.17 The observer from IPTA advised the Sub-Committee that IPTA members, in sharing their concerns about the potential for an increase in tank entry incidents associated with a mandatory provision for inert gas on chemical tankers, had suggested that a single set of tank entry guidelines that would be familiar to all personnel working on chemical tankers would be a useful way of avoiding any potential confusion arising from the various sets of procedures within individual Safety Management Systems. In their view, such guidelines could be adapted as universal tank entry procedures for use across all sectors of the tanker industry.

### **18 FIRE INTEGRITY OF BULKHEADS AND DECKS OF RO-RO SPACES ON PASSENGER AND CARGO SHIPS**

18.1 The Sub-Committee recalled that, at MSC 85, the Committee had considered document MSC 85/23/3 by China, proposing to amend SOLAS chapter II-2 requirements on fire integrity of boundary bulkheads and decks of ro-ro spaces for passenger ships carrying not more than 36 passengers and cargo ships, with a view to classifying both special spaces and ro-ro cargo spaces of ro-ro passenger ships as high-fire risk spaces, and had agreed to include, in the work programme of the Sub-Committee, a high-priority item on "Fire integrity of bulkheads and decks of ro-ro spaces on passenger and cargo ships", with two sessions needed to complete the item.

18.2 In considering document FP 54/18 (China), proposing amendments to SOLAS regulation II-2/9, tables 9.3 and 9.4 and, consequently, deletion of regulations II-2/9.6.2 and II-2/9.6.3 on fire integrity of bulkheads and decks separating adjacent spaces of ro-ro spaces for passenger ships carrying not more than 36 passengers and cargo ships, the Sub-Committee, having decided that the amendments should apply to new ships only, agreed to the draft amendments, with minor modifications, set out in annex 13, for submission to MSC 88 for approval and subsequent adoption.

18.3 In the course of the discussion, the Sub-Committee, having noted the concern expressed by the delegation of Japan that requiring class "A-30", as proposed in document FP 54/18, might not be appropriate in some cases for decks between ro-ro spaces or vehicle spaces of cargo ships, agreed to take no action at this stage.

18.4 Subsequently, the Committee was invited to note that the work on this output had been completed.

## 19 REQUIREMENTS FOR SHIPS CARRYING HYDROGEN AND COMPRESSED NATURAL GAS VEHICLES

19.1 The Sub-Committee recalled that, at MSC 85, the Committee had considered document MSC 85/23/5 (Japan), proposing to develop appropriate safety requirements in SOLAS chapter II-2 for ships carrying hydrogen vehicles (HFCVs) and compressed natural gas vehicles (CNGVs), and had agreed to include, in the work programme of the Sub-Committee, a high-priority item on "Requirements for ships carrying hydrogen and compressed natural gas vehicles", with two sessions needed to complete the item.

19.2 The Sub-Committee also recalled that, at MSC 85, the Committee, having noted the views of several delegations that this work item should be expanded to cover other types of vehicles not currently addressed in the provisions of SOLAS chapter II-2, had invited Member Governments and international organizations to submit relevant proposals to the Committee, in accordance with the Guidelines on the organization and method of work.

19.3 In considering documents FP 54/19 and FP 54/INF.4 (Japan), containing information on the features of hydrogen fuel cells and compressed natural gas vehicles, in order to provide a common understanding on the characteristics of the aforementioned vehicles to make possible the consideration of the requirements for cargo spaces intended for the carriage of those vehicles, the Sub-Committee agreed to progress the matter intersessionally, taking into account that vehicle batteries are an important issue and should be included in the work to be undertaken.

19.4 Subsequently, the Sub-Committee established the Correspondence Group on Requirements for Ships Carrying Hydrogen and Compressed Natural Gas Vehicles, under the coordination of Japan\*, and instructed the group, taking into account the relevant information contained in documents FP 54/19 and FP 54/INF.4, to:

- .1 consider the information on HFCVs and CNGVs contained in documents FP 54/19 and FP 54/INF.4;
- .2 identify hazards involved in the carriage of hydrogen and compressed natural gas vehicles, including high voltage and large capacity batteries;
- .3 clarify necessary safety requirements for cargo spaces intended for carriage of hydrogen and compressed natural gas vehicles;
- .4 prepare draft amendments to SOLAS chapter II-2 and/or related guidelines, as appropriate, for consideration by the Sub-Committee; and
- .5 submit a report to FP 55.

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## **20 GUIDELINES FOR A VISIBLE ELEMENT TO GENERAL EMERGENCY ALARM SYSTEMS ON PASSENGER SHIPS**

20.1 The Sub-Committee recalled that, at MSC 86, the Committee had considered documents MSC 86/23/10 and MSC 86/INF.2 (United States and CLIA), proposing to develop non-mandatory guidelines regarding a visible element to the general emergency alarm on passenger ships to accommodate passengers who are deaf or hard of hearing, and agreed to include, in the work programmes of the FP and DE Sub-Committees and provisional agendas for FP 54 and DE 53, a high-priority item on "Guidelines for a visible element to general emergency alarm systems on passenger ships", with a target completion date of 2012, assigning the DE Sub-Committee as coordinator.

20.2 In considering document FP 54/20 (Secretariat) on the outcome of DE 53 on this matter, the Sub-Committee noted that DE 53 had considered documents DE 53/20 (United States) and DE 53/20/1 (CLIA), both proposing draft Guidelines for the design and installation of a visible element to the general emergency alarm on passenger ships to accommodate passengers who are deaf or hard of hearing and, having noted that both proposals were supported and had many similarities that could be easily harmonized, had invited the delegation of the United States to submit consolidated draft Guidelines to DE 54, taking into account the comments made at DE 53.

20.3 In view of the decision of DE 53, and taking into account that DE 54 will take place before FP 55, the Sub-Committee agreed to postpone consideration of this matter until the outcome of DE 54 could be considered, and invited Member Governments and international organizations to submit relevant comments and proposals to FP 55, taking into account the outcome of DE 54.

## **21 MEANS FOR RECHARGING AIR BOTTLES FOR AIR BREATHING APPARATUSES**

21.1 The Sub-Committee recalled that, at MSC 86, the Committee had considered document MSC 86/23/15 (Denmark and Faroe Islands), proposing to develop amendments to SOLAS regulation II-2/10.10.2 concerning requirements for fire-fighters' breathing apparatuses, and agreed to include, in the work programme of the Sub-Committee and the provisional agenda for FP 54, a high-priority item on "Means for recharging air bottles for air breathing apparatuses", with a target completion date of 2011.

21.2 In noting that no documents had been submitted to this session, and recognizing the need to progress this matter, the Sub-Committee invited Member Governments and international organizations to submit relevant comments and proposals to FP 55.

## **22 WORK PROGRAMME AND AGENDA FOR FP 55**

### **General**

22.1 Having noted the adoption of the High-level Action Plan of the Organization and priorities for the 2010-2011 biennium (resolution A.1012(26)), the Sub-Committee further noted that the Assembly, recognizing the need for a uniform basis for the application of the Strategic Plan and the High-level Action Plan throughout the Organization, and for the strengthening of existing working practices through the provision of enhanced planning and management procedures, had adopted the Guidelines on the application of the Strategic Plan and the High-level Action Plan (resolution A.1013(26)). In particular, the Sub-Committee noted that the Assembly had requested the Committee to review and revise, during

the 2010-2011 biennium, the Committee's Guidelines on the organization and method of work (MSC-MEPC.1/Circ.2) with a view to bringing them in line with the Guidelines on the application of the Strategic Plan and the High-level Action Plan.

22.2 The Sub-Committee was informed that, in pursuance of the above request, the Secretariat, in consultation with the MSC and MEPC Chairmen, had prepared draft revised Committee's Guidelines for consideration by MSC 87 (MSC 87/23), which also took account of the provisions of the Migration Plan approved by the Council. In this regard, the Sub-Committee noted that the former format for "work programme" had been replaced by a new format for "biennial agenda" and "post-biennial agenda", the former format for the reporting on the status of planned outputs had also been replaced by a new format, and that the Committee Chairmen had agreed to implement the use of the aforementioned new formats from the start of 2010, as set out in annexes 1 and 4 to document FP 54/WP.4.

### **Biennial agenda and provisional agenda for FP 55**

22.3 Taking into account the progress made during this session, the decisions of MSC 86 and the provisions of the agenda management procedure, the Sub-Committee prepared the biennial agenda of the Sub-Committee and the provisional agenda for FP 55 (FP 54/WP.4), based on the work programme approved by MSC 86 (FP 54/2, annex), as set out in annexes 14 and 15, respectively, for consideration by MSC 87. While reviewing the biennial agenda, the Sub-Committee agreed to invite the Committee:

- .1 to note that the work on the following outputs has been completed:
  - .1.1 output 2.0.1.1 – Comprehensive review of the Fire Test Procedures Code;
  - .1.2 output 2.0.1.7 – Clarification of SOLAS chapter II-2 requirements regarding interrelation between central control station and safety centre;
  - .1.3 output 2.0.1.10 – Fixed hydrocarbon gas detection systems on double-hull oil tankers;
  - .1.4 output 2.1.1.6 – Explanatory notes for the application of the safe return to port requirements;
  - .1.5 output 5.2.1.7 – Amendments to SOLAS chapter II-2 related to the releasing controls and means of escape for spaces protected by fixed carbon dioxide systems; and
  - .1.6 output 5.2.1.11 – Fire integrity of bulkheads and decks of ro-ro spaces on passenger and cargo ships; and
- .2 to extend the target completion year of the following planned outputs:
  - .2.1 output 5.1.1.11 – Recommendation on evacuation analysis for new and existing passenger ships, to 2011;

- .2.2 output 5.2.1.2 – Fire resistance of ventilation ducts, to 2011;
- .2.3 output 5.2.1.6 – Means of escape from machinery spaces, to 2011;
- .2.4 output 5.2.1.9 – Harmonization of the requirements for the location of entrances, air inlets and openings in the superstructures of tankers, to 2011; and
- .2.5 output 5.2.1.25 – Revision of the Recommendations for entering enclosed spaces aboard ship, to 2011.

### **Status of planned outputs**

22.4 The Sub-Committee prepared the report of the status of the planned outputs of the High-level Action Plan of the Organization and priorities for the 2010-2011 biennium relevant to the Sub-Committee (FP 54/WP.4, annex 4), as set out in annex 16, which the Committee was invited to consider and take action as appropriate.

### **Arrangements for the next session**

22.5 The Sub-Committee agreed to establish, at its next session, working groups on the following subjects:

- .1 performance testing and approval standards for fire safety systems;
- .2 measures to prevent explosions on oil and chemical tankers transporting low-flashpoint cargoes; and
- .3 requirements for ships carrying hydrogen and compressed natural gas vehicles,

and a drafting group on fire resistance of ventilation ducts.

22.6 The Sub-Committee established correspondence groups on the following subjects, due to report to FP 55:

- .1 performance testing and approval standards for fire safety systems;
- .2 fire resistance of ventilation ducts;
- .3 requirements for ships carrying hydrogen and compressed natural gas vehicles; and
- .4 review of fire protection requirements for on-deck cargo areas.

### **Urgent items for consideration at MSC 89**

22.7 Noting the close proximity between FP 55 (February 2011) and MSC 89 (May 2011), the Sub-Committee invited MSC 87 to agree that, in addition to its biennial agenda and provisional agenda for FP 55, the outcome of FP 55 on the following items should be urgent matters to be considered at MSC 89:

- .1 performance testing and approval standards for fire safety systems;
- .2 measures to prevent explosions on oil and chemical tankers transporting low-flashpoint cargoes; and
- .3 revision of the Recommendations for entering enclosed spaces aboard ships.

### **Date of the next session**

22.8 The Sub-Committee noted that its fifty-fifth session had been tentatively scheduled to take place from 21 to 25 February 2011.

## **23 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2011**

23.1 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 2011.

## **24 ANY OTHER BUSINESS**

### **Emergency escape breathing devices**

24.1 In considering document FP 54/24 (United Kingdom), proposing an amendment to SOLAS regulation II-2/13.3.4 concerning the storage location and use of emergency escape breathing devices within accommodation spaces, the Sub-Committee, noting that the above proposal is outside the scope of the Sub-Committee's work programme, invited the delegation of the United Kingdom to submit an appropriate proposal to the Committee in accordance with the Guidelines on the organization and method of work.

### **Fire-fighting capability of a water-based fire-fighting system with nozzles in a single row arrangement**

24.2 The Sub-Committee recalled that documents FP 54/24/1 and FP 54/INF.3 (Republic of Korea) had been considered under agenda item 3 (Performance testing and approval standards for fire safety systems) (see paragraph 3.6).

### **Arrangement of foam-type fire extinguishers**

24.3 The Sub-Committee considered document FP 54/24/2 (China), proposing to review the requirement for the arrangement of 45 litre and 135 litre foam-type fire extinguishers in the engine-rooms of cargo ships and, having agreed that this proposal should be considered as a new output, 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.

### **Safety provisions applicable to tenders operating from passenger ships**

24.4 The Sub-Committee noted that MSC 84 had considered a proposal by the United Kingdom and IACS (MSC 84/22/8) to develop provisions for the design, equipment and operation of tenders carrying passengers and crew from passenger ships to shore, to ensure that a consistent approach is adopted, together with document MSC 84/22/24 (CLIA), in which CLIA pointed out that its members have conducted, without serious incident, numerous tender vessel operations each year involving tens of thousands of passengers and that, for these reasons, CLIA could not support the proposal without details of tender vessel casualties and more specific guidance as to the scope of the work to be undertaken, bearing in mind that the proposal might result in over-regulation of an already safe operation.

24.5 The Sub-Committee also noted that, following the above discussion, MSC 84 had agreed to include in the work programmes of the FP, COMSAR, NAV, DE, SLF and STW Sub-Committees, a high-priority item on "Safety provisions applicable to tenders operating from passenger ships", with three sessions needed to complete the item, assigning the DE Sub-Committee as coordinator.

24.6 In considering document FP 54/24/3 (Secretariat), on the outcome of DE 53 on this issue, the Sub-Committee noted that DE 53 had:

- .1 established a drafting group to prepare consolidated draft Guidelines for passenger ship tenders, on the basis of documents DE 53/14 (CLIA) and DE 53/14/1 (United Kingdom), and to prepare a draft list of other matters to be addressed by DE 54;
- .2 agreed that the Guidelines should represent a level of international best practice, but should not include the requirements of the individual coastal States that might otherwise be applicable, and to include a relevant statement in the preamble text of the Guidelines to this effect;
- .3 agreed that, since "tendering" is deemed limited to the transfer of passengers from a passenger ship to shore and back, the provisions of the LSA Code provided an acceptable level of safety for tender operations; and
- .4 noted the view of the group that fuel used in propulsion systems in lifeboats is required to have a flashpoint of more than 43°C (LSA Code, paragraph 4.4.6.1), while fuel used in propulsion systems for SOLAS passenger ships is required to have a flashpoint of more than 60°C (SOLAS regulation II-2/4.2.1), and that the group had agreed to include a provision for fuels used on tenders under the heading of propulsion and manoeuvrability in section 3 of the draft Guidelines, but was not able to determine whether to use either lifeboat or passenger ship flashpoint requirements. Consequently, the DE Sub-Committee agreed to refer the matter to FP 54 for comments (refer to paragraph 8 of document DE 53/WP.3),

and, bearing in mind that this item will be included in the agenda for FP 55, agreed to invite Member Governments and international organizations to submit comments and proposals to FP 55, taking into account the outcome of DE 54.

#### **Test laboratories recognized by the Administrations**

24.7 The Secretariat informed the Sub-Committee that the latest annual FP circular on Test laboratories recognized by the Administrations had been issued as FP.1/Circ.39 on 8 January 2010.

#### **Halon banking and reception facilities**

24.8 The Sub-Committee noted information provided by the Secretariat that the latest annual FP circular on Halon banking and reception facilities had been issued as FP.1/Circ.40 on 8 January 2010.

## **25 ACTION REQUESTED OF THE COMMITTEE**

25.1 The Maritime Safety Committee, at its eighty-seventh session, is invited to:

- .1 approve the draft International Code for the Application of Fire Test Procedures, 2010 (2010 FTP Code) and the associated draft MSC resolution, as prepared by FP 53 (FP 53/23/Add.1, annex 14), taking into account the proposed modifications prepared by FP 54, with a view to adoption at MSC 88 (paragraph 4.8 and annex 8);
- .2 note the Sub-Committee's discussion regarding measures to prevent explosions on oil and chemical tankers transporting low-flashpoint cargoes and, in particular, to:
  - .1 note that IMO regulations and guidelines regarding inert gas are frequently complex and located in a variety of locations within different instruments; consider the need to update, revise and consolidate references to inert gas in appropriate IMO instruments; and take action as appropriate (paragraph 6.18); and
  - .2 consider the matter of the cargo-specific element of the training for chemical tanker endorsements, including the specifics of hazardous chemicals, including low-flashpoint cargoes, as an urgent matter in the context of the work on the revised STCW Convention and Code, and take action as appropriate (paragraph 6.23);
- .3 approve the draft MSC circular on Interim Clarifications of SOLAS chapter II-2 requirements regarding interrelation between the central control station, navigation bridge and safety centre (paragraph 7.5.1 and annex 9);
- .4 approve the draft MSC circular on Interim Explanatory Notes for the assessment of passenger ship systems' capabilities after a fire or flooding casualty (paragraph 8.9.1 and annex 10);
- .5 approve the draft MSC circular on Guidelines for the design, construction and testing of fixed hydrocarbon gas detection systems (paragraph 11.5 and annex 12);
- .6 note the biennial agenda of the Sub-Committee (paragraph 22.3 and annex 14);
- .7 approve the proposed provisional agenda for FP 55 (paragraph 22.3 and annex 15);
- .8 note the report on the status of the planned outputs of the High-level Action Plan of the Organization and priorities for the 2010-2011 biennium relating to the work of the Sub-Committee (paragraph 22.4 and annex 16); and
- .9 agree to the urgent items emanating from FP 55 for consideration at MSC 89 (paragraph 22.7).

25.2 The Maritime Safety Committee, at its eighty-eighth session, is invited to:

- .1 approve the draft amendments to chapters 5 to 8 of the FSS Code (paragraphs 3.5.1, 3.15, 3.16 and 3.21 and annex 1);

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- .2 approve the draft amendments to SOLAS regulation II-2/20, regarding fixed gas and water-spraying fire-extinguishing systems for vehicle, ro-ro, container and general cargo spaces, with a view to subsequent adoption (paragraph 3.15 and annex 2);
  - .3 approve the draft MSC circular on Guidelines for testing and approval of fixed high-expansion foam systems (paragraph 3.16 and annex 3);
  - .4 approve the draft MSC circular on Scientific methods on scaling of test volume for fire test on water-mist fire-extinguishing systems (paragraph 3.18 and annex 4);
  - .5 approve the draft MSC circular on Amendments to the Revised Guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms (MSC/Circ.1165), concerning redundant means of pumping and ceiling and bilge nozzles (paragraph 3.20 and annex 5);
  - .6 approve the draft MSC circular on Revised Guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces (MSC/Circ.913) (paragraph 3.22 and annex 6);
  - .7 approve the draft amendments to SOLAS regulation II-2/10.5.6.3.1, with a view to subsequent adoption (paragraph 3.23 and annex 2);
  - .8 adopt the draft MSC resolution on Amendments to the Guidelines for the application of plastic pipes on ships (resolution A.753(18)) (paragraph 4.7 and annex 7);
  - .9 instruct the COMSAR, NAV and SLF Sub-Committees to consider the draft interpretations, set out in annex 4 to document FP 54/WP.3, that fall under their purview and provide the outcome of their considerations to the FP Sub-Committee for coordination purposes (paragraph 8.9.2);
  - .10 approve the draft MSC circular on Unified interpretation of chapter 12 of the FSS Code (paragraph 10.8 and annex 11);
  - .11 note the Sub-Committee's consideration of matters related to the recommendations for entering enclosed spaces aboard ships and its request to extend the target completion year for this planned output (paragraph 17.16);
  - .12 approve the draft amendments to SOLAS regulation II-2/9, concerning fire integrity of bulkheads and decks separating adjacent spaces of ro-ro spaces for passenger ships carrying not more than 36 passengers and cargo ships, with a view to subsequent adoption, and note that the amendments should apply to new ships only (paragraph 18.2 and annex 13); and
  - .13 approve the report in general.

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## ANNEX 1

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

#### CHAPTER 5 FIXED GAS FIRE-EXTINGUISHING SYSTEMS

1 The following new paragraph 2.2.1.2 is inserted after the existing paragraph 2.2.1.1 and the subsequent paragraphs are renumbered accordingly:

"2.2.1.2 For vehicle spaces and ro-ro spaces which are not special category spaces, the quantity of carbon dioxide available shall be at least sufficient to give a minimum volume of free gas equal to 45% of the gross volume of the largest such cargo space which is capable of being sealed, and the arrangements shall be such as to ensure that at least two-thirds of the gas required for the relevant space shall be introduced within 10 min. Carbon dioxide systems shall not be used for the protection of special category spaces."

2 The following new paragraph 2.2.1.7 is added after the renumbered paragraph 2.2.1.6:

"2.2.1.7 For container and general cargo spaces (primarily intended to carry a variety of cargoes separately secured or packed) the fixed piping system shall be such that at least two-thirds of the gas can be discharged into the space within 10 min. For solid bulk cargo spaces the fixed piping system shall be such that at least two-thirds of the gas can be discharged into the space within 20 min. The system controls shall be arranged to allow one-third, two-thirds or the entire quantity of gas to be discharged based on the loading condition of the hold."

3 The existing text of section 2.4 is deleted and section 2.5 is renumbered accordingly.

#### CHAPTER 6 FIXED FOAM FIRE-EXTINGUISHING SYSTEMS

4 The existing text of the chapter is replaced by the following:

##### "1 APPLICATION

This chapter details the specifications for fixed foam fire-extinguishing systems for the protection of machinery spaces in accordance with SOLAS regulation II-2/10.4.1.1.2 of this Convention, cargo spaces in accordance with regulation II-2/10.7.1.1, cargo pump-rooms in accordance with regulation II-2/10.9.1.2 and vehicle, special category and ro-ro spaces in accordance with regulation II-2/20.6.1.3. This chapter does not apply to cargo pump-rooms of chemical tankers carrying liquid cargoes referred to in regulation II-2/1.6.2 of the Convention, unless the Administration specifically accepts the use of these systems based on additional tests with alcohol-based fuel and alcohol resistant foam. Unless expressly provided otherwise, the requirements of this chapter shall apply to ships constructed on or after [*date of entry into force*].

## 2 DEFINITIONS

- 2.1 *Design filling rate* is at least the minimum nominal filling rate used during the approval tests.
- 2.2 *Foam* is the extinguishing medium produced when foam solution passes through a foam generator and is mixed with air.
- 2.3 *Foam solution* is a solution of foam concentrate and water.
- 2.4 *Foam concentrate* is a liquid which, when mixed with water in the appropriate concentration forms a foam solution.
- 2.5 *Foam delivery ducts* are supply ducts for introducing high-expansion foam into the protected space from foam generators located outside the protected space.
- 2.6 *Foam mixing rate* is the percentage of foam concentrate mixed with water forming the foam solution.
- 2.7 *Foam generators* are discharge devices or assemblies through which high-expansion foam solution is aerated to form foam that is discharged into the protected space. Foam generators using inside air typically consist of a nozzle or set of nozzles and a casing. The casing is typically made of perforated steel/stainless steel plates shaped into a box that enclose the nozzle(s). Foam generators using outside air typically consist of nozzles enclosed within a casing that spray onto a screen. An electric, hydraulic or pneumatically driven fan is provided to aerate the solution.
- 2.8 *High-expansion foam fire-extinguishing systems* are fixed total flooding extinguishing systems that use either inside air or outside air for aeration of the foam solution. A high-expansion foam system consists of both the foam generators and the dedicated foam concentrate approved during the fire testing specified in 3.1.3.
- 2.9 *Inside air foam system* is a fixed high-expansion foam fire-extinguishing system with foam generators located inside the protected space and drawing air from that space.
- 2.10 *Nominal flow rate* is the foam solution flow rate expressed in l/min.
- 2.11 *Nominal application rate* is the nominal flow rate per area expressed in l/min/m<sup>2</sup>.
- 2.12 *Nominal foam expansion ratio* is the ratio of the volume of foam to the volume of foam solution from which it was made, under non-fire conditions, and at an ambient temperature of e.g., ± 20°C.
- 2.13 *Nominal foam production* is the volume of foam produced per time unit, i.e. nominal flow rate times nominal foam expansion ratio, expressed in m<sup>3</sup>/min.
- 2.14 *Nominal filling rate* is the ratio of nominal foam production to the area, i.e. expressed in m/min.

2.15 *Nominal filling time* is the ratio of the height of the protected space to the nominal filling rate, i.e. expressed in minutes.

2.16 *Outside air foam system* is a fixed high-expansion foam system with foam generators installed outside the protected space that are directly supplied with fresh air.

### **3 FIXED HIGH-EXPANSION FOAM FIRE-EXTINGUISHING SYSTEMS**

#### **3.1 Principal performance**

3.1.1 The system shall be capable of manual release, and shall be designed to produce foam at the required application rate within 1 minute of release. Automatic release of the system shall not be permitted unless appropriate operational measures or interlocks are provided to prevent any local application systems required by regulation II-2/10.5.6 of the Convention from interfering with the effectiveness of the system.

3.1.2 The foam concentrates shall be approved by the Administration based on the guidelines developed by the Organization\*. Different foam concentrate types shall not be mixed in a high-expansion foam system.

3.1.3 The system shall be capable of fire extinction and manufactured and tested to the satisfaction of the Administration based on the guidelines developed by the Organization\*\*.

3.1.4 The system and its components shall be suitably designed to withstand ambient temperature changes, vibration, humidity, shock, clogging and corrosion normally encountered on ships. Piping, fittings and related components inside the protected spaces (except gaskets) shall be designed to withstand 925°C.

3.1.5 System piping, foam concentrate storage tanks, components and pipe fittings in contact with the foam concentrate shall be compatible with the foam concentrate and be constructed of corrosion resistant materials such as stainless steel, or equivalent. Other system piping and foam generators shall be full galvanized steel or equivalent. Distribution pipework shall have self draining capability.

3.1.6 Means for testing the operation of the system and assuring the required pressure and flow shall be provided by pressure gauges at both inlets (water and foam concentrate supply) and at the outlet of the foam proportioner. A test valve shall be installed on the distribution piping downstream of the foam proportioner, along with orifices which reflect the calculated pressure drop of the system. All sections of piping shall be provided with connections for flushing, draining and purging with air. All nozzles shall be able to be removed for inspection in order to prove clear of debris.

3.1.7 Means shall be provided for the crew to safely check the quantity of foam concentrate and take periodic control samples for foam quality.

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\* Refer to the Guidelines for the performance and testing criteria and surveys of high-expansion foam concentrates for fixed fire-extinguishing systems (MSC/Circ.670).  
\*\* Refer to the Guidelines for the approval of fixed high-expansion foam systems (MSC.1/Circ....).

3.1.8 Operating instructions for the system shall be displayed at each operating position.

3.1.9 Spare parts shall be provided based on the manufacturer's instruction.

3.1.10 If an internal combustion engine is used as a prime mover for the seawater pump for the system, the fuel oil tank to the prime mover shall contain sufficient fuel to enable the pump to run on full load for at least 3 h and sufficient reserves of fuel shall be available outside the machinery space of category A to enable the pump to be run on full load for an additional 15 h. If the fuel tank serves other internal combustion engines simultaneously, the total fuel tank capacity shall be adequate for all connected engines.

3.1.11 The arrangement of foam generators and piping in the protected space shall not interfere with access to the installed machinery for routine maintenance activities.

3.1.12 The system source of power supply, foam concentrate supply and means of controlling the system shall be readily accessible and simple to operate, and shall be arranged at positions outside the protected space not likely to be cut off by a fire in the protected space. All electrical components directly connected to the foam generators shall have at least an IP 54 rating.

3.1.13 The piping system shall be sized in accordance with a hydraulic calculation technique\* to ensure availability of flows and pressures required for correct performance of the system.

3.1.14 The arrangement of the protected spaces shall be such that they may be ventilated as the space is being filled with foam. Procedures shall be provided to ensure that upper level dampers, doors and other suitable openings are kept open in case of a fire. For inside air foam systems, spaces below 500 m<sup>3</sup> need not comply with this requirement.

3.1.15 Onboard procedures shall be established to require personnel re-entering the protected space after a system discharge to wear breathing apparatus to protect them from oxygen deficient air and products of combustion entrained in the foam blanket.

3.1.16 Installation plans and operating manuals shall be supplied to the ship and be readily available on board. A list or plan shall be displayed showing spaces covered and the location of the zone in respect of each section. Instructions for testing and maintenance shall be available on board.

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\* 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:

<i>Pipe type</i>	<i>C</i>
Black or galvanized mild steel	100
Copper or copper alloys	150
Stainless steel	150

3.1.17 All installation, operation and maintenance instructions/plans for the system shall be in the working language of the ship. If the working language of the ship is not English, French, nor Spanish, a translation into one of these languages shall be included.

3.1.18 The foam generator room shall be ventilated to protect against overpressure, and shall be heated to avoid the possibility of freezing.

3.1.19 The quantity of foam concentrate available shall be sufficient to produce a volume of foam equal to at least five times the volume of the largest protected space enclosed by steel bulkheads, at the nominal expansion ratio, or enough for 30 min of full operation for the largest protected space, whichever is greater.

3.1.20 Machinery spaces, cargo pump-rooms, vehicle spaces, ro-ro spaces and special category spaces shall be provided with audible and visual alarms within the protected space warning of the release of the system. The alarms shall operate for the length of time needed to evacuate the space, but in no case less than 20 s.

## **3.2 Inside air foam systems**

### **3.2.1 *Systems for the protection of machinery spaces and cargo pump-rooms***

- .1 the system shall be supplied by both main and emergency sources of power. The emergency power supply shall be provided from outside the protected space;
- .2 sufficient foam-generating capacity shall be provided to ensure the minimum design filling rate for the system is met and in addition shall be adequate to completely fill the largest protected space within 10 min;
- .3 the arrangement of foam generators shall in general be designed based on the approval test results. A minimum of two generators shall be installed in every space containing combustion engines, boilers, purifiers, and similar equipment. Small workshops and similar spaces may be covered with only one foam generator; and
- .4 foam generators shall be uniformly distributed under the uppermost ceiling in the protected spaces including the engine casing. The number and location of foam generators shall be adequate to ensure all high risk areas are protected in all parts and at all levels of the spaces. Extra foam generators may be required in obstructed locations. The foam generators shall be arranged with at least 1 m free space in front of the foam outlets, unless tested with less clearance. The generators shall be located behind main structures, and above and away from engines and boilers in positions where damage from an explosion is unlikely.

### **3.2.2 *Systems for the protection of vehicle, ro-ro, special category and cargo spaces***

- .1 the system shall be supplied by the ship's main power source. An emergency power supply is not required;

- .2 sufficient foam-generating capacity shall be provided to ensure the minimum design filling rate for the system is met and in addition shall be adequate to completely fill the largest protected space within 10 min, except that, for systems for the protection of vehicle and ro-ro spaces and special category spaces with the deck height of 3 metres or less, the filling rate shall be not less than two thirds of the design filling rate and in addition sufficient to fill the largest protected space within 10 min;
- .3 the system may be divided into sections, however, the capacity and design of the system shall be based on the protected space demanding the greatest volume of foam. Adjacent protected spaces need not be served simultaneously if the boundaries between the spaces are "A" class divisions;
- .4 the arrangement of foam generators shall in general be designed based on the approval test results. The number of generators may be different, but the minimum design filling rate determined during approval testing shall be provided by the system. A minimum of two generators shall be installed in every space. The foam generators shall be arranged to uniformly distribute foam in the protected spaces, and the layout shall take into consideration obstructions that can be expected when cargo is loaded on board. As a minimum, generators shall be located on every second deck, including movable decks. The horizontal spacing of the generators shall ensure rapid supply of foam to all parts of the protected space. This shall be established on the basis of full scale tests; and
- .5 the foam generators shall be arranged with at least 1 m free space in front of the foam outlets, unless tested with less clearance.

### **3.3 Systems using outside air**

#### **3.3.1 Systems for the protection of machinery spaces and cargo pump-rooms**

- .1 the system shall be supplied by both main and emergency sources of power. The emergency power supply shall be provided from outside the protected machinery space;
- .2 sufficient foam-generating capacity shall be provided to ensure the minimum design filling rate for the system is met and in addition shall be adequate to completely fill the largest protected space within 10 min;
- .3 the arrangement of foam delivery ducts shall in general be designed based on the approval test results. The number of ducts may be different, but the minimum design filling rate determined during approval testing shall be provided by the system. A minimum of two ducts shall be installed in every space containing combustion engines, boilers, purifiers, and similar equipment. Small workshops and similar spaces may be covered with only one duct;

- .4 foam delivery ducts shall be uniformly distributed under the uppermost ceiling in the protected spaces including the engine casing. The number and location of ducts shall be adequate to ensure all high risk areas are protected in all parts and at all levels of the spaces. Extra ducts may be required in obstructed locations. The ducts shall be arranged with at least 1 m free space in front of the foam delivery ducts, unless tested with less clearance. The ducts shall be located behind main structures, and above and away from engines and boilers in positions where damage from an explosion is unlikely;
- .5 the arrangement of the foam delivery ducts shall be such that a fire in the protected space will not affect the foam-generating equipment. If the foam generators are located adjacent to the protected space, foam delivery ducts shall be installed to allow at least 450 mm of separation between the generators and the protected space, and the separating divisions shall be class "A-60" rated. Foam delivery ducts shall be constructed of steel having a thickness of not less than 5 mm. In addition, stainless steel dampers (single or multi-bladed) with a thickness of not less than 3 mm shall be installed at the openings in the boundary bulkheads or decks between the foam generators and the protected space. The dampers shall be automatically operated (electrically, pneumatically or hydraulically) by means of remote control of the foam generator related to them, and arranged to remain closed until the foam generators begin operating; and
- .6 the foam generators shall be located where an adequate fresh air supply can be arranged.

**3.3.2 Systems for the protection of vehicle and ro-ro spaces and special category and cargo spaces**

- .1 the system shall be supplied by the ship's main power source. An emergency power supply is not required;
- .2 sufficient foam-generating capacity shall be provided to ensure the minimum design filling rate for the system is met and in addition shall be adequate to completely fill the largest protected space within 10 min, except that, for systems for the protection of vehicle and ro-ro spaces and special category spaces with the deck height of 3 m or less, the filling rate shall be not less than two-thirds of the design filling rate and in addition sufficient to fill the largest protected space within 10 min;
- .3 the system may be divided into sections, however, the capacity and design of the system shall be based on the protected space demanding the greatest volume of foam. Adjacent protected spaces need not be served simultaneously if the boundaries between the spaces are "A" class divisions;
- .4 the arrangement of foam delivery ducts shall in general be designed based on the approval test results. The number of ducts may be different, but the minimum design filling rate determined during approval testing shall be provided by the system.

A minimum of two ducts shall be installed in every space. The foam generators shall be arranged to uniformly distribute foam in the protected spaces, and the layout shall take into consideration obstructions that can be expected when cargo is loaded on board. As a minimum, ducts shall be led to every second deck, including movable decks. The horizontal spacing of the ducts shall ensure rapid supply of foam to all parts of the protected space. This shall be established on the basis of full scale tests;

- .5 the system shall be arranged with at least 1 m free space in front of the foam outlets, unless tested with less clearance;
- .6 the arrangement of the foam delivery ducting shall be such that a fire in the protected space will not affect the foam-generating equipment. If the foam generators are located adjacent to the protected space, foam delivery ducts shall be installed to allow at least 450 mm of separation between the generators and the protected space, and the separating divisions shall be class "A-60" rated. Foam delivery ducts shall be constructed of steel having a thickness of not less than 5 mm. In addition, stainless steel dampers (single or multi-bladed) with a thickness of not less than 3 mm shall be installed at the openings in the boundary bulkheads or decks between the foam generators and the protected space. The dampers shall be automatically operated (electrically, pneumatically or hydraulically) by means of remote control of the foam generator related to them, and arranged to remain closed until the foam generators begin operating; and
- .7 the foam generators shall be located where an adequate fresh air supply can be arranged.

### **3.4 Installation testing requirements**

- 3.4.1 After installation, the pipes, valves, fittings and assembled systems shall be tested to the satisfaction of the Administration, including functional testing of the power and control systems, water pumps, foam pumps, valves, remote and local release stations and alarms. Flow at the required pressure shall be verified for the system using orifices fitted to the test line. In addition, all distribution piping shall be flushed with freshwater and blown through with air to ensure that the piping is free of obstructions.
- 3.4.2 Functional tests of all foam proportioners or other foam mixing devices shall be carried out to confirm that the mixing ratio tolerance is within + 30 to -0% of the nominal mixing ratio defined by the system approval. For foam proportioners using foam concentrates of Newtonian type with kinematic viscosity equal to or less than 100 cSt at 0°C and density equal to or less than 1.1 kg/dm<sup>3</sup>, this test can be performed with water instead of foam concentrate. Other arrangements shall be tested with the actual foam concentrate.

### **3.5 Systems using outside air with generators installed inside the protected space**

Systems using outside air but with generators located inside the protected space and supplied by fresh air ducts may be accepted by the Administration provided that these systems have been shown to have performance and reliability equivalent to systems defined in 3.3. For acceptance, the Administration should consider the following minimum design features:

- .1 lower and upper acceptable air pressure and flow rate in supply ducts;
- .2 function and reliability of damper arrangements;
- .3 arrangements and distribution of air delivery ducts including foam outlets; and
- .4 separation of air delivery ducts from the protected space.

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

### **4.1 Quantity and foam concentrates**

4.1.1 The foam concentrates of low-expansion foam fire-extinguishing systems shall be approved by the Administration based on the guidelines adopted by the Organization\*. Different foam concentrate types shall not be mixed in a low-expansion foam system. Foam concentrates of the same type from different manufacturers shall not be mixed unless they are approved for compatibility.

4.1.2 The system shall be capable of discharging through fixed discharge outlets, in no more than 5 min, a quantity of foam sufficient to produce an effective foam blanket over the largest single area over which oil fuel is liable to spread.

### **4.2 Installation requirements**

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

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

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\* Refer to the Revised Guidelines for the performance and testing criteria and surveys of low-expansion foam concentrates for fixed fire-extinguishing systems (MSC.1/Circ.1312).

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

5 The following new paragraphs 2.4 and 2.5 are added after the existing paragraph 2.3:

**"2.4 Fixed pressure water-spraying fire-extinguishing systems for vehicle, ro-ro and special category spaces**

Fixed-pressure water-spraying fire-extinguishing systems for vehicle, ro-ro and special category spaces shall be approved by the Administration based on guidelines developed by the Organization\*.

**2.5 Fixed water-based fire-fighting systems for ro-ro spaces and special category spaces equivalent to that referred to in resolution A.123(V)**

Fixed water-based fire-fighting systems for ro-ro and special category spaces equivalent to that referred to in resolution A.123(V) shall be approved by the Administration based on guidelines developed by the Organization\*\*.

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\* Refer to the Recommendation on fixed fire-extinguishing systems for special cargo spaces adopted by the Organization by resolution A.123(V).

\*\* Refer to the Guidelines for approval of fixed water-based fire-fighting systems for ro-ro spaces and special category spaces equivalent to that referred to in resolution A.123(V) (MSC.1/Circ.1272)."

**CHAPTER 8  
AUTOMATIC SPRINKLER, FIRE DETECTION AND FIRE ALARM SYSTEMS**

6 In paragraph 2.1.1, after the first sentence, the following words are inserted:

"Control stations, where water may cause damage to essential equipment, may also be fitted with dry pipe sprinklers as permitted by regulation II-2/10.6.1.1 of the Convention."

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## ANNEX 2

### DRAFT AMENDMENTS TO SOLAS CHAPTER II-2

#### CHAPTER II-2

#### FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION

##### Regulation 10 – Fire fighting

1 In paragraph 5.6.3, in subparagraph .1, the words "used for the ship's main propulsion and power generation" are deleted.

##### Regulation 20 – Protection of vehicle, special category and ro-ro spaces

2 The existing paragraphs 6.1.1 and 6.1.2 are replaced by the following:

###### "6.1 Fixed fire-extinguishing systems

6.1.1 Vehicle spaces and ro-ro spaces of ships constructed on or after [*date of entry into force*], which are capable of being sealed from a location outside of the cargo spaces shall be fitted with one of the following fixed fire-extinguishing systems:

- .1 a fixed gas fire-extinguishing system complying with the provisions of the Fire Safety Systems Code;
- .2 a fixed high-expansion foam fire-extinguishing system complying with the provisions of the Fire Safety Systems Code;
- .3 an approved fixed pressure water-spraying fire-extinguishing system for manual operation complying with the provisions of the Fire Safety Systems Code and paragraphs 6.1.2.1 to 6.1.2.4; and
- .4 a fixed water-based fire-fighting system for ro-ro spaces and special category spaces equivalent to that referred to in resolution A.123(V) complying with the provisions of the Fire Safety Systems Code.

Ships constructed on or after 1 July 2002 and before [*date of entry into force*] shall comply with the previously applicable requirements of paragraph 6.1.1 adopted by resolution MSC.99(73).

6.1.2 Ro-ro and vehicle spaces of ships constructed on or after [*date of entry into force*], not capable of being sealed shall be fitted with an approved fixed pressure water-spraying fire-extinguishing system for manual operation complying with the provisions of the Fire Safety Systems Code which shall protect all parts of any deck and vehicle platform in such spaces. Ships constructed on or after 1 July 2002 and before [*date of entry into force*] shall comply with the previously applicable requirements of paragraph 6.1.2 adopted by resolution MSC.99(73). Such water spray system shall have:

- .1 a pressure gauge on the valve manifold;
- .2 clear marking on each manifold valve indicating the spaces served;
- .3 instructions for maintenance and operation located in the valve room; and
- .4 a sufficient number of drainage valves."

3 The following new paragraph 6.1.3 is inserted after paragraph 6.1.2 and the subsequent paragraphs are renumbered accordingly:

"6.1.3 Special category spaces of ships constructed on or after [*date of entry into force*] shall be fitted with one of the following fixed fire-extinguishing systems:

- .1 an approved fixed pressure water-spraying fire-extinguishing system for manual operation complying with the provisions of the Fire Safety Systems Code and paragraphs 6.1.2.1 to 6.1.2.4; and
- .2 a fixed water-based fire-fighting system for ro-ro spaces and special category spaces equivalent to that referred to in resolution A.123(V) complying with the provisions of the Fire Safety Systems Code."

\*\*\*

**ANNEX 3**

**DRAFT MSC CIRCULAR**

**GUIDELINES FOR THE TESTING AND APPROVAL  
OF FIXED HIGH-EXPANSION FOAM SYSTEMS**

1 The Maritime Safety Committee at its [eighty-eighth session (24 November to 3 December 2010)], having considered the proposal by the Sub-Committee on Fire Protection, at its fifty-fourth session, approved the Guidelines for testing and approval of fixed high-expansion foam systems, set out in the annex.

2 Member Governments are invited to apply the annexed Guidelines when approving fixed high-expansion foam systems in accordance with the revised chapter 6 of the FSS Code (MSC...(89)), and bring them to the attention of ship designers, shipowners, equipment manufacturers, test laboratories and other parties concerned.

3 This circular supersedes MSC.1/Circ.1271, except that fire and component tests previously conducted in accordance with MSC.1/Circ.1271 remain valid for the approval of new systems.

## ANNEX

### **GUIDELINES FOR THE TESTING AND APPROVAL OF FIXED HIGH-EXPANSION FOAM SYSTEMS**

#### **1 GENERAL**

##### **1.1 Scope**

1.1.1 These Guidelines specify the test procedures for the type approval of fixed high-expansion foam systems. The procedures consist of the following parts:

- .1 appendix 1: fire test procedures for evaluating the fire-extinguishing effectiveness of the foam system;
- .2 appendix 2: component manufacturing test procedures intended to ensure the operability of the system components in the marine environment; and
- .3 appendix 3: procedures for determining the discharge capacity of the high-expansion foam generators.

1.1.2 These Guidelines do not test the performance of high-expansion foam concentrates.

1.1.3 Appendix 4 to the Guidelines is an optional small scale test intended to verify the fire-extinguishing effectiveness of high-expansion foam when made with hot, smoke-laden inside air. This test is recommended for quality control of foam concentrates, and may also be used to compare the extinguishing performance of foam concentrates made with freshwater to those made with seawater.

##### **1.2 Product consistency**

The manufacturer should be responsible for implementing a quality control programme to ensure that production continuously meets the requirements in the same manner as the originally tested samples.

##### **1.3 Application**

1.3.1 These Guidelines should be applied to both inside air foam systems and to systems using outside air.

1.3.2 All foam generators should be subjected to the fire tests and foam generator capacity tests described in appendices 1 and 3.

1.3.3 Only inside air foam generators should be subjected to the component manufacturing tests in appendix 2.

## APPENDIX 1

### FIRE TEST METHOD FOR FIXED HIGH-EXPANSION FOAM SYSTEMS

#### 1 SCOPE

The test method is intended for evaluating the extinguishing performance of high-expansion foam fire-extinguishing systems. System approval should be based on the nominal filling rate, water pressure and other conditions used during the specified tests.

#### 2 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.

#### 3 FIRE TESTS

##### 3.1 Test principles

This test procedure enables the determination of design criteria and the effectiveness of high-expansion foam fire-extinguishing systems against spray and pool fires, which are obstructed by a simulated engine. The test procedures are intended for the approval of foam systems for the protection of machinery spaces, cargo pump-rooms, vehicle and ro-ro spaces, special category spaces and cargo spaces.

##### 3.2 Test description

###### 3.2.1 Test enclosure

3.2.1.1 The tests should be performed in a room having an ambient temperature of 10°C to 25°C at the start of each test. Details of the test hall geometry, the ventilation conditions and environmental conditions should be given in the fire test report.

3.2.1.2 The fire-extinguishing tests of the system should be carried out using the following test compartments:

.1 Test compartment 1

The test should be performed in a 100 m<sup>2</sup> room with 5 m ceiling height and ventilation through a 2 m x 2 m door opening according to figure 2. The engine mock-up should be designed according to figures 1 and 3. The door opening to the test compartment may be covered during the test at the same rate as the foam layer is building up in the compartment to avoid foam leakage through the door opening.

.2 Test compartment 2

The test should be performed in a test compartment having a volume greater than 1,200 m<sup>3</sup>, but not greater than 3,500 m<sup>3</sup>, and a ceiling height exceeding 7.5 m. The ventilation of the test compartment should be achieved by a 2 m x 2 m door opening at floor level (as in test compartment 1) combined with a maximum 20 m<sup>2</sup> total ventilation area, distributed in the

ceiling and/or along the walls, just below the ceiling. The door opening to the test compartment may be covered during the test at the same rate as the foam layer is building up in the compartment to avoid foam leakage through the door opening.

### 3.2.2 **Simulated engine**

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

- .1 a simulated engine\* of size (width x length x height) 1 m x 3 m x 3 m constructed of sheet steel with a nominal thickness of 5 mm. The simulated engine is fitted with two steel tubes of 0.3 m in diameter and 3 m in length, which simulate exhaust manifolds and a grating. At the top of the simulated engine a 3 m<sup>2</sup> tray is arranged (see figures 1 and 3); and
- .2 a floor plate system of 4 m x 6 m and 0.5 m in height surrounding the simulated engine with a tray (4 m<sup>2</sup> in area), underneath (see figure 1).

### 3.2.3 **Test programme**

The fire test should be carried out using the following fire scenarios:

- .1 combination of the following fire programmes (Test fuel: commercial fuel oil or light diesel oil):
  - .1 low-pressure spray on top of the simulated engine centred with nozzle angled upward at a 45° angle to strike a 12 mm to 15 mm diameter rod 1 m away; and
  - .2 fire in trays under (4 m<sup>2</sup>) and on top (3 m<sup>2</sup>) of the simulated engine;
- .2 high-pressure horizontal spray fire on top of the simulated engine. (Test fuel: commercial fuel oil or light diesel oil);
- .3 low pressure concealed horizontal spray fire on the side of the simulated engine with oil spray nozzle positioned 0.1 m in from the end of the simulated engine and 0.1 m<sup>2</sup> tray positioned 1.4 m in from the engine end at the inside of floor plate. (Test fuel: commercial fuel oil or light diesel oil); and
- .4 flowing fire 0.25 kg/s from top of mock-up (see figure 3) (Test fuel: heptane).

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Safety precaution – appropriate drains or overpressure relief capability should be provided to reduce the risk of explosion from fuel leakage inside the engine mock-up.

**Table 1 – Oil Spray Fire Test Parameters**

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

### 3.2.4 **Foam generator installation requirements for tests**

#### 3.2.4.1 *General*

3.2.4.1.1 Foam generators and foam delivery duct outlets should not be installed above the simulated engine in such a way that the foam flow directly hits the test fires. The generators and foam delivery duct outlets should also not be located near the door or ventilation openings.

3.2.4.1.2 The inlet foam solution supply pressure to the foam generators should be maintained within the acceptable range determined in appendix 3, throughout the tests.

3.2.4.1.3 The number and spacing of foam generators and foam delivery duct outlets should be based on the manufacturer's system design and installation manual.

3.2.4.1.4 The mounting arrangement and orientation of the foam generators should be in accordance with the manufacturers' instruction.

#### 3.2.4.2 *Inside air foam systems*

3.2.4.2.1 Foam generators should be installed inside the test room at the uppermost level of the space. The vertical distance between the generators and test room ceiling and floor should be recorded and reflected in the manufacturer's design manual.

#### 3.2.4.3 *Systems using outside air*

3.2.4.3.1 For systems where the foam generators will be located outside the protected space, the test generators should be located outside the test room and arranged to supply foam through ducts of equivalent size or diameter as the foam generator. The length and configuration of the foam delivery ducts should be the maximum length to be used on board as specified by the manufacturer, but in no case less than 5 m vertically and 5 m horizontally. Foam delivery duct outlets should be located near the ceiling, or if located on a side wall, within 1 m of the ceiling. The locations of the foam delivery duct outlets should be recorded and reflected in the manufacturer's design manual.

3.2.4.3.2 For systems where the foam generators will be located inside the protected space and supplied by fresh air ducts, the test generators should be located on the manufacturer's instructions.

## **4 TEST PROCEDURE**

### **4.1 Preparation**

4.1.1 Combination fire (paragraph 3.2.3.1 above): the 4 m<sup>2</sup> fire tray below the engine mock-up should be filled with at least 50 mm fuel on a water base with a freeboard of 150 ± 10 mm. The 3 m<sup>2</sup> fire tray on top of the engine should be filled with at least 50 mm fuel on a water base with a freeboard of 40 ± 10 mm (this requires that the notch on the side of the 3 m<sup>2</sup> fire tray is blocked off by an appropriate means, e.g., steel plate).

4.1.2 Low pressure concealed fire and 0.1 m<sup>2</sup> tray fire (paragraph 3.2.3.3 above): the 0.1 m<sup>2</sup> tray should be filled with at least 50 mm fuel on a water base with a freeboard of 150 ± 10mm.

4.1.3 Flowing fire (paragraph 3.2.3.4 above): the 4 m<sup>2</sup> fire tray below the engine mock-up should be filled with a 50 mm water base and the 3 m<sup>2</sup> fire tray on top of the engine mock-up should be filled with a 40 mm water base. The fuel should be ignited when flowing down the side of the mock-up, approximately 1 m below the notch. The pre-burn time should be measured from the ignition of the fuel.

4.1.4 Freshwater may be used for practical reasons if it is shown that seawater provides the same level of performance. This should be done either by repeating the freshwater test with the longest time to extinguishment with seawater to ensure that the minimum performance requirements are still fulfilled, or to use the small scale test method in appendix 4 to these Guidelines. If the system is tested in more than one test compartment, the seawater test should be performed in test compartment 2.

### **4.2 Measurements**

The following should be measured during the test:

- .1 oil flow and pressure in the oil system;
- .2 foam concentrate flow and pressure, and water flow and pressure in the extinguishing system;
- .3 oxygen concentration in the test compartment. The sampling point should be located 4.5 m from the centre of the engine mock-up on the exhaust pipe side and 2.5 m from floor level (the measurement may be terminated when the foam fills up to the oxygen sampling point);
- .4 temperatures at the fire locations. Thermocouples should be located 1 m in front of the spray nozzles and 0.5 m above the tray fuel surface, to provide additional information about time to extinguishment;
- .5 temperatures at the inside air foam generators. Thermocouples should be located to measure the air temperature at the foam generator air inlet, 0.1 to 0.2 m behind the water/premix nozzles;
- .6 foam solution pressure at the inlet to one of the foam generators; and
- .7 air supply pressure at the inlet to one of the foam generators for outside air systems.

#### **4.3 Pre-burn**

After ignition of all fuel sources, a 2 min pre-burn time is required for the tray fires, and 15 s for the spray fires and flowing heptane fires before the extinguishing agent is discharged.

#### **4.4 Duration of test**

The overall time to extinction should not exceed 15 min. The oil spray and heptane, if used should be shut off 15 s after the fire has been judged extinguished. The foam system should be operated for a minimum of 1 minute after fire extinguishment.

#### **4.5 Observations before the fire test**

Temperature of the test room, fuel and the simulated engine should be measured and recorded.

#### **4.6 Observations during the fire test**

The following observations should be recorded:

- .1 start of ignition procedure;
- .2 start of the test (ignition);
- .3 time when the system is activated;
- .4 time when inside air foam generators begin producing foam;
- .5 foam transit time from outside air generators to the delivery duct outlets;
- .6 time when the fire is extinguished;
- .7 time when the fire is re-ignited, if any;
- .8 time when the oil flow for the spray fire is shut off;
- .9 time when the fire-extinguishing system is shut off; and
- .10 time when the test is finished.

#### **4.7 Observations after fire test**

The following should be recorded:

- .1 damage to any system components; and
- .2 level of fuel in the tray(s) to ensure that no limitation of fuel occurred during the test.

## **5 CLASSIFICATION CRITERIA**

The overall time to extinction should not exceed 15 min, and at the end of discharge of foam and fuel, there should be no re-ignition or fire spread.

## **6 TEST REPORT**

The test report should include the following items:

- .1 name and address of the test laboratory;
- .2 date and identification number of the test report;
- .3 name and address of client, manufacturer and/or supplier of the system;
- .4 purpose of the test;
- .5 name or other identification marks of the product;
- .6 description and specifications of the tested system and foam concentrate;
- .7 date of the test;
- .8 test methods;
- .9 drawing of each test configuration and test compartment;
- .10 identification of the test equipment and instruments used (including type and manufacturer of the foam concentration);
- .11 nominal flow rate, nominal application rate and nominal filling rate;
- .12 foam mixing rate;
- .13 foam expansion;
- .14 water supply pressure;
- .15 foam supply pressure and air supply pressure, if applicable, at inlet to foam generator;
- .16 temperatures at the inside air foam generators;
- .17 ventilation conditions;
- .18 conclusions;
- .19 deviations from the test method, if any;
- .20 test results including observation and measurement before, during and after the test; and
- .21 date and signature.

## 7 APPLICATION OF TEST RESULTS

7.1 Systems that have been successfully tested to the provisions of section 3 may be installed in different size spaces according to the following:

- .1 the extinguishing system configuration and filling rate used for the test compartment 1 tests may be applied to systems for the protection of shipboard spaces of equal or less volume than 500 m<sup>3</sup>;
- .2 the extinguishing system configuration and filling rate used for the test compartment 2 tests may be applied to systems for the protection of shipboard spaces of equal or greater volumes than that of test compartment 2; and
- .3 for the protection of shipboard spaces with volumes between test compartments 1 and 2, linear interpolation of the filling rates obtained for test compartments 1 and 2, respectively, should be applied. Despite the above, the filling rate used for the test compartment 2 tests may be applied to systems for the protection of small spaces within protected machinery spaces having volumes less than test compartment 2, such as workshops and similar spaces not containing combustion engines, boilers, purifiers and similar equipment.

7.2 If freshwater is used in the fire tests, any differences in expansion ratios between freshwater and simulated seawater (nominal expansion ratio measured according to standard EN13565-1, annex G, and expansion ratio measured according to "small scale test method") should be reflected in the manufacturer's installation guide. If the foam expansion ratios differ between freshwater and simulated seawater, the nominal application rate used in the fire tests should be adjusted to the level that corresponds to the nominal filling rate based on the lower expansion ratio.

**Example:** The fire tests were performed using freshwater with nominal filling rate of 2 m/min, corresponding to a nominal application rate of 4 l/min/m<sup>2</sup> and nominal expansion ratio with freshwater of 500. Tests according to "small scale test method" and standard EN13565-1, annex G, showed that the lowest expansion ratio is 425 with seawater. The design application rate should in this case be at least:  $4.0 \cdot (500/425) = 4.7$  l/min/m<sup>2</sup>.



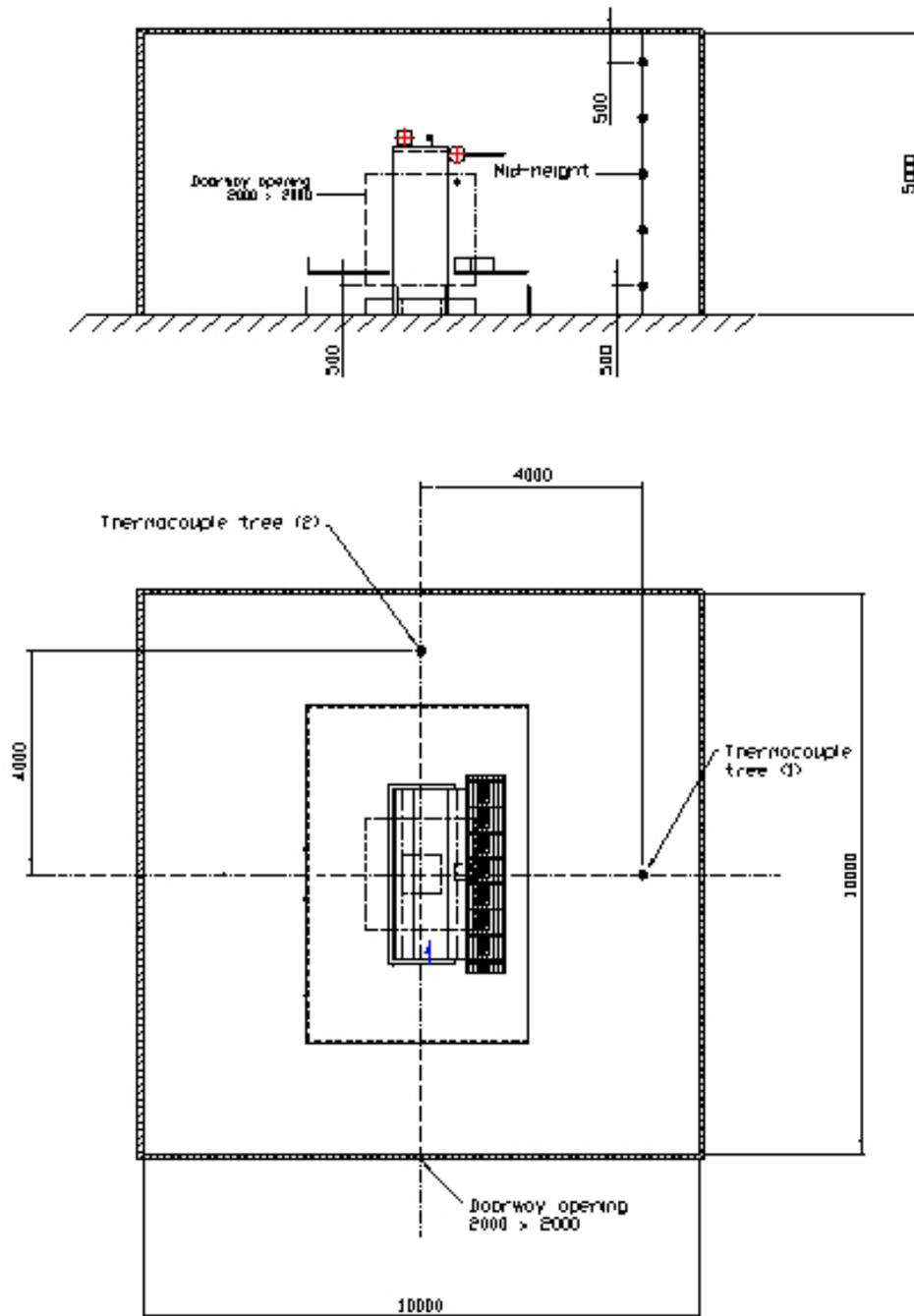


Figure 2

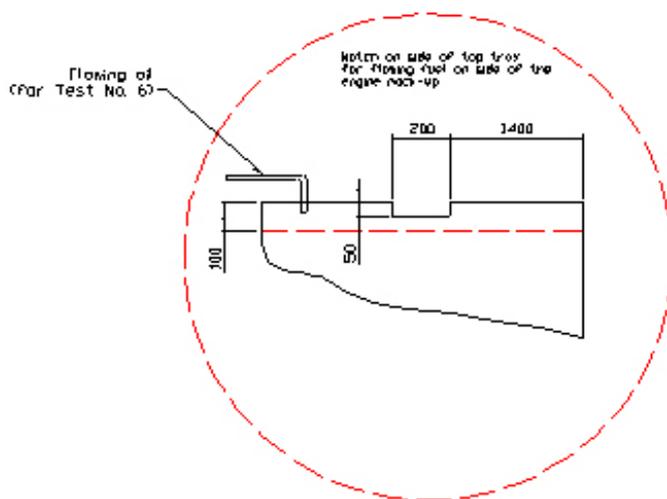
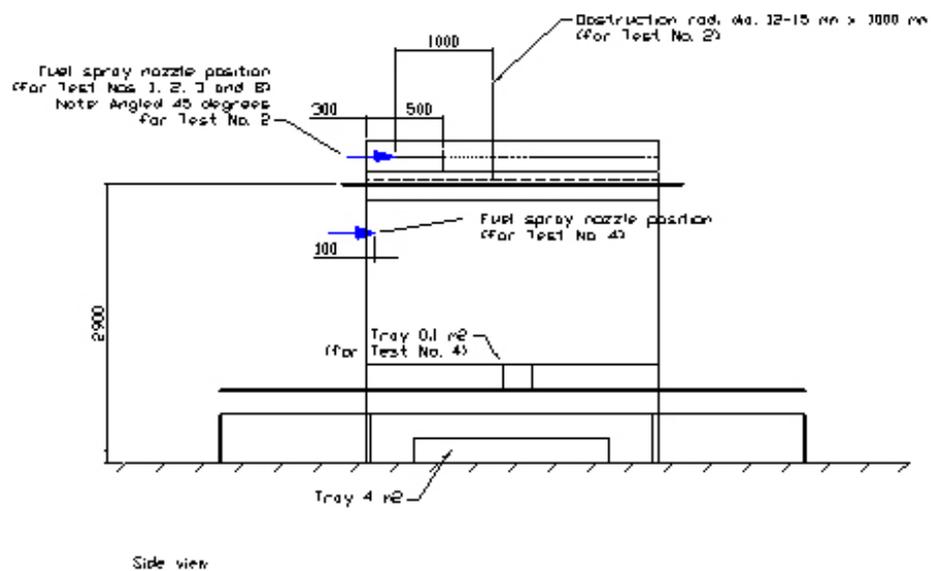


Figure 3

## APPENDIX 2

### COMPONENT MANUFACTURING STANDARDS FOR HIGH-EXPANSION FOAM SYSTEM GENERATORS

1 All foam generator nozzles should be tested in accordance with the following items stipulated in the indicated paragraphs of the Guidelines developed by the Organization<sup>\*</sup>:

- .1 paragraph 3.1 – Dimensions;
- .2 paragraph 3.11.1 – Stress corrosion;
- .3 paragraph 3.11.2 – Sulphur dioxide corrosion: Visual inspection only may be carried out;
- .4 paragraph 3.11.3 – Salt spray corrosion: The test may be carried out at NaCl concentration of 5%. Paragraph 3.14.2 in appendix A to MSC/Circ.1165, as amended by MSC.1/Circ.1269, need not apply;
- .5 paragraph 3.15 – Resistance to heat: Where the components are made of steel, this test need not be applied;
- .6 paragraph 3.17 – Impact test; and
- .7 paragraph 3.22 – Clogging test: where the diameter of the opening of the nozzle exceeds 2.5 mm, this test need not be applied.

2 Foam generators should also be tested in accordance with the following items stipulated in standard EN 13565-1; where applicable, a representative sample of components from the generator may be used:

- .1 clause 4: general construction requirements (4.1 (connections), 4.5 (corrosion resistance of metal parts) and 4.8 (heat and fire resistance));
- .2 clause 5: discharge coefficients;
- .3 clause 6: quality of foam (6.2 (high-expansion components)); and
- .4 clause 9: components for medium and high-expansion foam systems.

Foam generators should also be able to withstand the effects of vibration without deterioration of their performance characteristics when tested in accordance with paragraph 4.15 of appendix A of MSC/Circ.1165, as amended by MSC.1/Circ.1269, except that three foam generators should be subjected to the vibration test and the test duration should be 2 h. The mounting arrangement and orientation of the foam generators should be in accordance with the manufacturers' instruction. After the vibration test, the generators should show no visible deterioration. The generator should be connected to a suitable water supply and operated at the maximum

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\*

Refer to appendix A to the Revised Guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms (MSC/Circ.1165, as amended by MSC.1/Circ.1269).

operating pressure for 15 min to demonstrate that the generator did not suffer damages. Equivalent alternative testing standards may be used as determined by the Administration. The mounting arrangement and orientation of the foam generators should be in accordance with the manufacturers' instruction.

## APPENDIX 3

### FOAM GENERATOR CAPACITY TESTS

- 1 Representative foam generators should be tested to demonstrate their nominal foam production rate over the manufacturer's specified range of inlet pressures. The results of the testing should be reflected in the manufacturer's design and installation manual.
- 2 The generator should be connected to a suitable water and foam concentrate supply through a pressure regulating device. The generator should then be operated throughout a pressure range of 50% to 150% of the nominal operating pressure in 1 bar increments.
- 3 The generator should be used to fill a fixed volume container at each tested pressure. The time to fill the container should be recorded and used to calculate the generator output in m<sup>3</sup>/min.
- 4 The nominal foam production rate of the generator should be recorded at all test pressures.
- 5 The nominal foam production rate of the generator should be greater than or equal to the manufacturer's specified rating.

## APPENDIX 4

### OPTIONAL SMALL SCALE TEST METHOD FOR HIGH-EXPANSION FOAM CONCENTRATES TO BE USED WITH INSIDE AIR

#### 1 SCOPE

1.1 This fire test method is intended for evaluating and documenting high-expansion foam properties under elevated temperatures. The data could be used for quality control of foam concentrates, as the results from the tests can be compared to results from earlier tests. Therefore, the test method can also be used during the development of new foam concentrates. The test method can also be used for evaluating the influence of using seawater compared to freshwater.

1.2 The test method is NOT intended to serve as a system verification test. Such tests need to be conducted in large scale, using realistic fire conditions and actual foam generators, as the content of the combustion gases also might influence foam production.

**Note 1:** A high-expansion foam system for inside air consists of both the foam generators and the foam concentrate. When measuring the foam expansion ratio of the system, the actual foam generators should be used. As the actual foam generators in practice are much larger, with higher flow rates, than the foam generator used in this small-scale test method, the method is not intended for determination of the foam expansion of the system. For determination of nominal foam expansion ratio of the system the foam concentrate, using actual foam generator, should be tested according to standard EN13565-1, annex G (or equivalent).

**Note 2:** Presently, there are no requirements related to the results given in the test method. However, such criteria could be established in order to test if the foam concentrate has acceptable resistance to heat. The minimum criteria should specify that the foam expansion ratio should be above a certain limit under some specific test conditions in relation to "cold" foam expansion. In that case the test method could be a part of an approval. However, in order to choose sufficient requirements, additional pre-normative tests need to be undertaken.

#### 2 DEFINITIONS

2.1 *Drainage time* is the time taken for the original premix to drain out of the generated foam.

2.2 *Expansion ratio* is the ratio of the volume of foam to the volume of the premix from which it was made.

2.3 *Foam concentrate* is the liquid which, when mixed with water in the appropriate concentration, gives a premix.

2.4 *Premix* is the solution of foam concentrate and water.

#### 3 SAMPLING

The foam concentrate for the tests should be supplied by the manufacturer along with documentation that includes the brand name of the product, manufacturer, the manufacturing site, date of manufacture and batch number.

## 4 METHOD OF TEST

### 4.1 Principle

4.1.1 The foam properties of the foam concentrate should be determined using the following two evaluation parameters:

- .1 the expansion ratio as a function of gas temperature; and
- .2 the drainage time measured at ambient temperature.

**Note:** Pre-normative testing has verified that drainage time is usually very difficult to record at elevated temperatures.

4.1.2 Normally the foam properties should be measured both with fresh and with simulated seawater specified in standards ISO 7203-2, annex F, and EN 1568-2, annex G.

### 4.2 Test equipment

The following test equipment is necessary for the tests:

- .1 fire test compartment, as described within this document;
- .2 propane gas burner, as described in standard ISO 9705;
- .3 high-expansion foam generator, as described within this document;
- .4 foam collector vessel for expansion and drainage measurements, as described in standards ISO 7203-2, annex F, and EN 1568-2, annex G;
- .5 premix pressure vessel;
- .6 air compressor;
- .7 load cell; and
- .8 stopwatch.

### 4.3 Tolerances

Unless otherwise stated, the following tolerances should apply:

- .1 length:  $\pm 2\%$  of value;
- .2 volume:  $\pm 5\%$  of value;
- .3 time:  $\pm 5$  s; and
- .4 temperature:  $\pm 2\%$  of value.

The tolerances are not applicable to the evaluation parameters.

## **5 THE FIRE TEST COMPARTMENT**

### **5.1 General**

5.1.1 The fire test compartment should be constructed using 45 mm by 90 mm wood studs (or equivalent) and non-combustible wall boards, having a nominal thickness of between 10 and 15 mm. The walls and the ceiling should not be insulated.

5.1.2 The compartment should be fitted with a doorway opening, to allow easy access. This doorway should be sealed closed during the tests.

5.1.3 The compartment should be reasonably airtight and, if considered necessary, all gaps between parts of the compartment should be sealed using high-temperature resistant sealant.

### **5.2 Dimensions**

5.2.1 The inner dimensions of the compartment should be:

- .1 length: 2,400 mm;
- .2 width: 1,200 mm; and
- .3 height: 2,400 mm.

5.2.2 The bottom of the walls should be positioned 150 mm above floor level, in order to provide a gap around the bottom perimeter of the compartment, to allow the inflow of fresh air.

### **5.3 Flame screen**

5.3.1 The top part of the test compartment should be fitted with a flame screen, in order to prevent flames and hot combustion gases from flowing directly in to the high-expansion foam generator.

5.3.2 The screen should be made from a perforated (approximately 50% free area) steel sheet. It should cover the width of the test compartment and should extend 600 mm down from the ceiling.

### **5.4 Position of the high-expansion foam generator**

The high-expansion foam generator should be positioned centrally through one of the short sides of the fire test compartment, with its centreline 200 mm below the ceiling. The cone end of the generator should be located 360 mm outside the short side of the fire test compartment.

### **5.5 Position of the propane gas burner**

5.5.1 The propane gas burner should be positioned at the opposite part of the test compartment, relative to the position of the high-expansion foam generator.

5.5.2 The horizontal distance measured from the back and long side walls, should be 600 mm. The propane gas burner should be elevated, such that its top is 500 mm above floor level.

## **6 PREMIX PRESSURE VESSEL AND PIPING**

6.1 A pressure vessel should be used for propelling the premix. The pressure vessel should be connected to an air compressor, via a pressure regulation valve. The outlet should be connected to the high-expansion foam generator, via a shut-off valve.

6.2 The piping to the generator should be connected to a valve arrangement making it possible to switch from water to premix.

## **7 THE HIGH-EXPANSION FOAM GENERATOR**

High-expansion foam generator should have a flow rate of approximately 3 l/min at a pressure of 6 bar.

## **8 INSTRUMENTATION, MEASUREMENTS AND MEASUREMENT EQUIPMENT**

### **8.1 Gas temperature measurements**

The gas temperature inside the test compartment should be continuously measured and recorded during the tests. The individual thermocouples should be positioned as follows:

- .1 one thermocouple 150 mm behind the foam generator; and
- .2 five thermocouples, respectively, at vertical distances of 100 mm, 200 mm, 300 mm, 600 mm and 1,200 mm from the ceiling. The thermocouple tree should be positioned 500 mm from the front side wall (for informative reasons only).

All thermocouples should be of type K (chromel-alumel) and made from 0.5 mm wire welded together.

### **8.2 Foam system and water pressure**

8.2.1 The system pressure at the inlet to the fire test compartment should be monitored using a pressure gauge.

8.2.2 The pressure gauge should have an accuracy of  $\pm 0.05$  bar.

## **9 FIRE TEST PROCEDURES**

### **9.1 Test conditions**

The following test conditions should apply:

- .1 the ambient temperature, measured inside the fire test compartment, prior to the start of a test should be  $20 \pm 5^\circ\text{C}$ ;
- .2 the water temperature, measured prior to the test, should be  $15 \pm 5^\circ\text{C}$ ; and
- .3 the premix temperature, measured prior to the test, should be  $17.5 \pm 2.5^\circ\text{C}$ .

## 9.2 Verification of the temperature in the test compartment

9.2.1 Prior to any testing, the propane gas burner should be adjusted to provide the following gas temperatures, respectively, measured using the thermocouple 150 mm behind the foam generator. The approximate Heat Release Rate (HRR) used in pre-normative testing is given as a guide (see note below).

Ambient conditions (propane gas burner not in use)	Approximate Heat Release Rate (HRR)
+ 100°C	18 kW
+ 150°C	28 kW
+ 200°C	42 kW
+ 300°C	90 kW

9.2.2 The temperature should be reached within 3 min to 6 min and the temperature increase should be less than 5% per min after the desired temperature is reached. It might be necessary to adjust the HRR slightly during the temperature rise.

9.2.3 During the verification of the temperature, the generator should be connected to the water source. The flowing water pressure should be  $6 \pm 0.1$  bar. The flowing water will cool down the pipes, connectors and the generator during the temperature rise and provides airflow through the generator and the test compartment.

**Note:** During pre-normative testing it has been concluded that the above temperatures at given HRR are reached within 3 min to 6 min.

## 9.3 Fire test procedures

9.3.1 The fire test procedure should be applied as follows:

- .1 the ambient temperature, the water temperature and the premix temperature should be measured and recorded;
- .2 start the water flow through the generator. The flowing water pressure should be within 10% of the nominal/design water pressure;
- .3 the temperature measurements should be started;
- .4 the propane gas burner should be lit by means of a torch or a match;
- .5 when the desired gas temperature is reached, the valve for the water delivery should be shut and the valve for the premix should be opened;
- .6 adjust the foam system pressure to within 10% of the nominal/design pressure;
- .7 the determination of the foam properties should be undertaken (see section 10); and
- .8 the test is terminated.

9.3.2 The procedure is repeated at each temperature level, as described in subsection 9.2.

## 10 DETERMINATION OF FOAM PROPERTIES

### 10.1 Principle

For the determination of the foam properties, it is essential that all foam and any possible unexpanded premix is collected.

### 10.2 Foam expansion ratio and drainage time at ambient conditions

10.2.1 The expansion ratio and drainage time should be measured in accordance with standards ISO 7203-2, annex F, or EN 1568-2, annex G, with the deviation that the foam generator is replaced by the foam generator as described within this document.

10.2.2 The expansion ratio and drainage time should be measured both with fresh and with simulated seawater specified in standards ISO 7203-2, annex F, and EN 1568-2, annex G.

### 10.3 Foam expansion as a function of temperature

10.3.1 The foam expansion should be measured by collecting the foam in the foam collector vessel during 20 s, or until it is full. Record the volume of the collected foam, or the filling time. Calculate the foam expansion ratio:

$$E = \frac{V}{Qt}$$

where:

V is the volume of the collected foam;  
Q is the premix flow rate from the foam generator; and  
t is the time for collecting the foam.

**Note:** If the foam expansion is high (> 508) the vessel will be full before the 20 s has elapsed. In these cases, the time should be recorded when the vessel is full.

10.3.2 The expansion ratio at each temperature should be measured with both freshwater and simulated seawater specified in standards ISO 7203-2, annex F, and EN 1568-2, annex G.

10.3.3 The results should be presented in diagrams with expansion ratio as a function of temperature.

## 11 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;
- .9 date of supply of the product;
- .10 date of test;
- .11 test method;
- .12 identification of the test equipment and used instruments;
- .13 conclusions;
- .14 deviations from the test method, if any;
- .15 test results including observations during and after the test; and
- .16 date and signature.

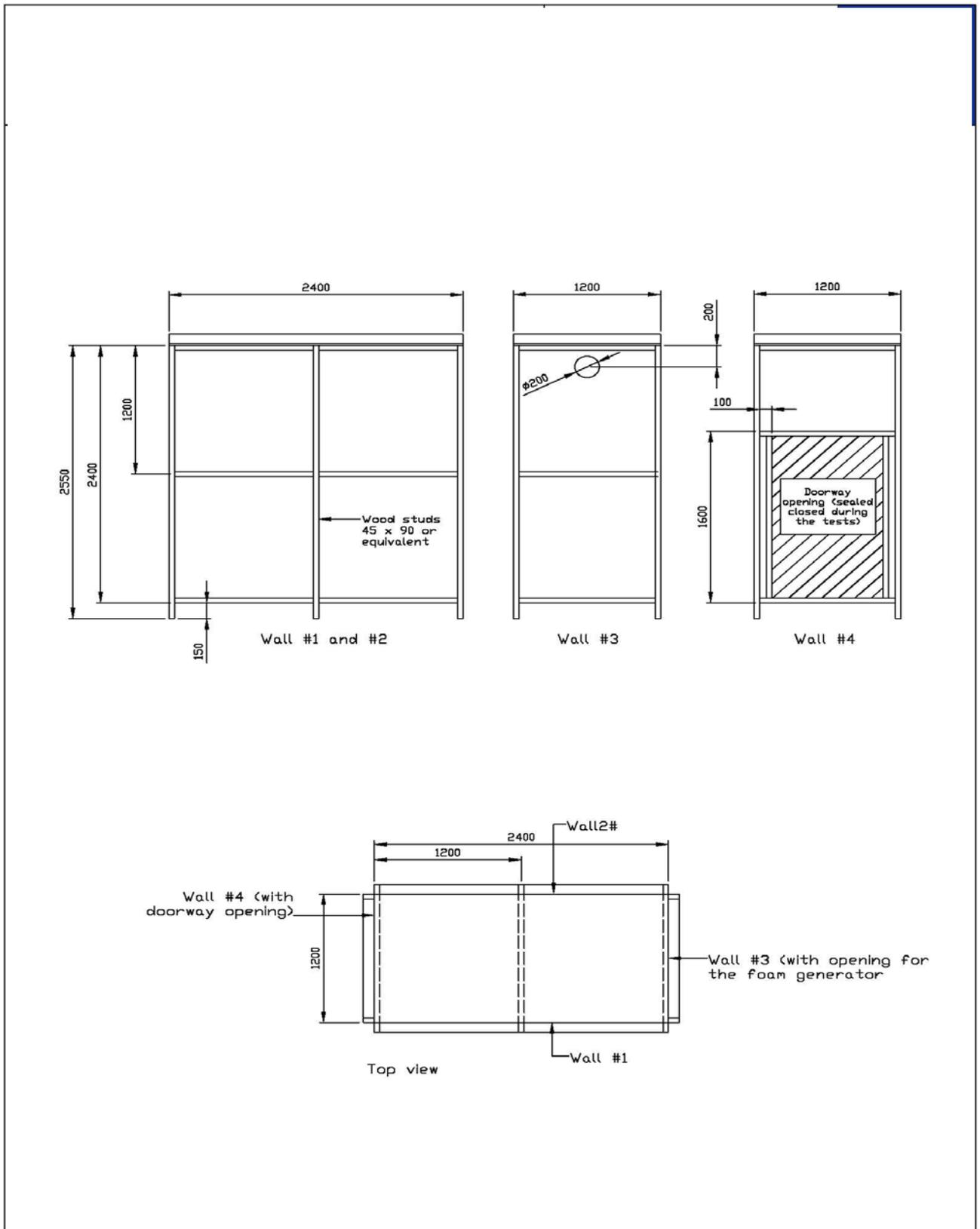
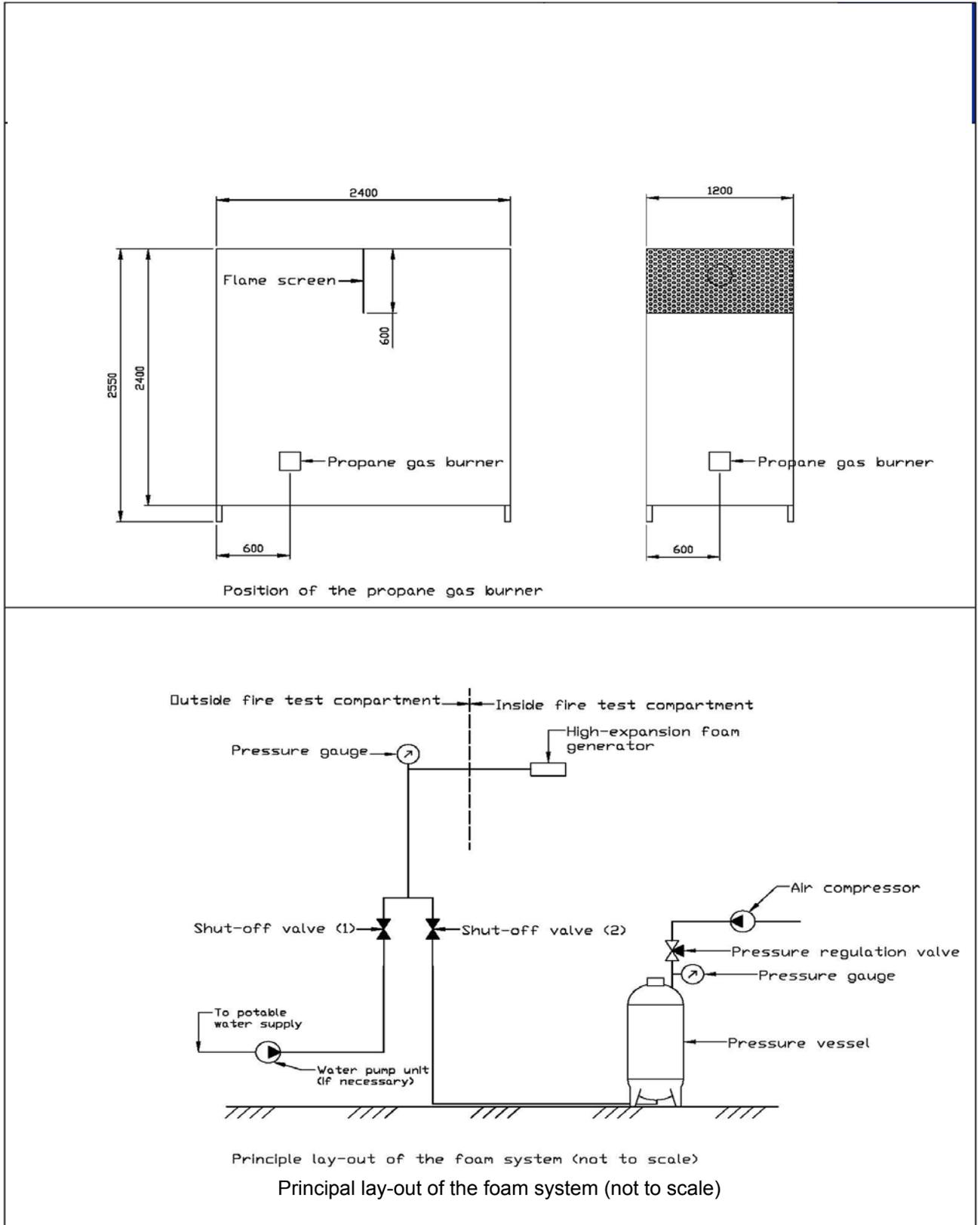


Figure 1 – Fire test compartment



**Figure 2 – Interior of fire test compartment with principal layout of the foam system**

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## ANNEX 4

### DRAFT MSC CIRCULAR

#### SCIENTIFIC METHODS ON SCALING OF TEST VOLUME FOR FIRE TEST ON WATER-MIST FIRE-EXTINGUISHING SYSTEMS

1 With regard to the scientific methods on scaling of test volume for fire test on water-mist fire-extinguishing systems, the Revised Guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms (MSC/Circ.1165), in paragraph 2 of appendix B to the Revised Guidelines, states:

"However, when based on the scientific methods developed by the Organization<sup>\*</sup>, scaling from the maximum tested volume to a larger volume may be permitted. The scaling should not exceed twice the tested volume.

<sup>\*</sup> To be developed by the Organization."

2 The Maritime Safety Committee, at its [eighty-eighth session (24 November to 3 December 2010)], after having considered the proposal by the fifty-fourth session of the Sub-Committee on Fire Protection, approved the scientific methods on scaling of test volume for fire test on water-mist fire-extinguishing systems, related to MSC/Circ.1165, as set out in the annex.

3 Member Governments are invited to apply the annexed scientific methods when approving scaling from the maximum tested volume to a larger volume in conjunction with MSC/Circ.1165 and bring them to the attention of ship designers, shipowners, equipment manufacturers, test laboratories and other parties concerned.

ANNEX

**SCIENTIFIC METHODS ON SCALING OF TEST VOLUME FOR FIRE TEST ON  
WATER-MIST FIRE-EXTINGUISHING SYSTEMS**

1        Scaling from the maximum tested volume to larger volumes may be accepted based on the approval fire test scenarios in appendix B, paragraph 4.3.1, table 1 (MSC/Circ.1165), provided that:

- .1        none of the test fires 1 to 4 has an extinguishment time exceeding 10 min;  
          and
- .2        provisions of the table below are met.

<b>Average time to extinguishment for the three fires with the longest extinguishing times (tests 1 to 8)</b>	<b>Scaling factor</b>
≤ 10 min	2
12.5 min	1.5
15 min	1

2        Linear interpolation may be used for average extinguishing times between the values above. The ceiling height shall not be increased over that tested. All the volumes referred to should be the net volume.

\*\*\*

**ANNEX 5**

**DRAFT MSC CIRCULAR**

**AMENDMENTS TO THE REVISED GUIDELINES FOR THE APPROVAL OF EQUIVALENT  
WATER-BASED FIRE-EXTINGUISHING SYSTEMS FOR MACHINERY SPACES AND  
CARGO PUMP-ROOMS (MSC/CIRC.1165)**

1 The Maritime Safety Committee, at its [eighty-eighth session (24 November to 3 December 2010)], approved amendments to the Revised Guidelines for the approval of equivalent water-based fire-extinguishing systems for machinery spaces and cargo pump-rooms (MSC/Circ.1165), as set out in the annex, concerning redundant means of pumping, and ceiling and bilge nozzles (paragraph 17 of, and paragraph 1.3 of appendix B to, the annex to MSC/Circ.1165), prepared by the Sub-Committee on Fire Protection, at its fifty-fourth session.

2 Member Governments are invited to use the amendments when applying MSC/Circ.1165 and to bring the unified interpretations to the attention of all parties concerned.

ANNEX

**AMENDMENTS TO THE REVISED GUIDELINES FOR THE APPROVAL OF EQUIVALENT  
WATER-BASED FIRE-EXTINGUISHING SYSTEMS FOR MACHINERY SPACES AND  
CARGO PUMP-ROOMS (MSC/CIRC.1165)**

- 1 In paragraph 17 of the annex, the first sentence is replaced by the following:

"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. Failure of any one component in the power and control system should not result in a reduction of required pump capacity. Primary pump starting equipment may be manual or automatic. Switch over to redundant means of pumping may be manual or automatic."

- 2 Paragraph 1.3 of appendix B to the annex is replaced by the following:

"1.3 It was developed for systems using ceiling mounted nozzles or multiple levels of nozzles. Bilge nozzles are required for all spaces with bilges. Ceiling and bilge nozzles may be tested and approved as a system or may be tested and approved separately."

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**ANNEX 6**

**DRAFT MSC CIRCULAR**

**REVISED GUIDELINES FOR THE APPROVAL OF FIXED WATER-BASED LOCAL  
APPLICATION FIRE-FIGHTING SYSTEMS FOR USE IN CATEGORY A  
MACHINERY SPACES (MSC/CIRC.913)**

1 The Maritime Safety Committee, at its seventy-first session (19 to 28 May 1999), approved Guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces (MSC/Circ.913).

2 The Committee, at its [eighty-eighth session (24 November to 3 December 2010)], having considered the proposal of the Sub-Committee on Fire Protection, at its fifty-fourth session, approved the Revised Guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces, set out in the annex.

3 Member Governments are invited to apply the annexed revised Guidelines when approving fixed water-based local application fire-fighting systems for use in category A machinery spaces, and bring them to the attention of ship designers, shipowners, equipment manufacturers, test laboratories and other parties concerned.

4 This circular supersedes MSC/Circ.913, except that fire and component tests previously conducted in accordance with MSC/Circ.913 remain valid for the approval of new systems. Existing fixed water-based local application fire-fighting systems approved and installed based on MSC/Circ.913 should be permitted to remain in service as long as they are serviceable.

## ANNEX

### REVISED GUIDELINES FOR THE APPROVAL OF FIXED WATER-BASED LOCAL APPLICATION FIRE-FIGHTING SYSTEMS FOR USE IN CATEGORY A MACHINERY SPACES

#### 1 General

Fixed water-based local application fire-fighting systems should provide localized fire suppression in areas, as specified in SOLAS regulation II-2/10.5, for category A machinery spaces, without the necessity of engine shut-down, personnel evacuation, shutting down of forced ventilation fans, or sealing of the space.

#### 2 Definitions

2.1 *Fire suppression* is a reduction in heat output from the fire and control of the fire to restrict its spread from its seat and reduce the flame area.

2.2 *Protected space* is a machinery space where a local application fire-fighting system (hereinafter, referred to as "the system") is installed.

2.3 *Protected area* is an area (an installation or part of an installation) within a protected space which is required to be protected by the system\*.

2.4 *Water-based extinguishing medium* is freshwater or seawater with or without additives mixed to enhance fire-extinguishing capability.

#### 3 Principal requirements for the system

##### 3.1 System operation

- .1 The system should be capable of manual release.
- .2 The activation of the system should not require engine shutdown, closing fuel oil tank outlet valves, evacuation of personnel or sealing of the space, which could lead to loss of electrical power or reduction of manoeuvrability. This is not intended to place requirements on the electrical equipment in the protected area when the system is discharging freshwater.

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\* For internal combustion machinery, typical protected areas are hot surfaces such as exhaust pipes without insulation, or with insulation fitted in accordance with SOLAS regulation II-2/4.2.2.6.1 that is likely to be removed frequently for maintenance, and high-pressure fuel oil systems installed near hot surfaces. For typical diesel engines, such areas would include the area on top of the engine, the fuel injection pumps and turbo chargers, unless the fuel injection pumps are installed in a sheltered location beneath the steel platform.

For boiler fronts and oil-fired inert gas generators, typical protected areas are hot surfaces around the burners without insulation, or with insulation fitted in accordance with SOLAS regulation II-2/4.2.2.6.1 that is likely to be removed frequently for maintenance. Boiler fronts should be interpreted as the boiler burner location irrespective of the boiler design.

For incinerators, typical protected areas are hot surfaces around the burners without insulation, or with insulation fitted in accordance with SOLAS regulation II-2/4.2.2.6.1 that is likely to be removed frequently for maintenance.

- .3 The operation controls should be located at easily accessible positions inside and outside the protected space. The controls inside the space should not be liable to be cut off by a fire in the protected areas.
- .4 Pressure source components of the system should be located outside the protected areas.
- .5 Where automatically operated fire-fighting systems are installed:
  - .1 a warning notice should be displayed outside each entry point stating the type of medium used and the possibility of automatic release;
  - .2 the detection system should ensure rapid operation while consideration should also be given to preventing accidental release. The area of coverage of the detection system sections should correspond to the area of coverage of the extinguishing system sections. The following arrangements are acceptable:
    - .1 set-up of two approved flame detectors; or
    - .2 set-up of one approved flame detector and one approved smoke detector.

Other arrangements can be accepted by the Administration. However, use of heat detectors should in general be avoided for these systems;
  - .3 the discharge of water should be controlled by the detection system. The detection system should provide an alarm upon activation of any single detector and discharge if two or more detectors activate. The Administration may accept other arrangements; and
  - .4 visual and audible indication of the activated section should be provided in the engine control room and the navigation bridge or continuously manned central control station. Audible alarms may use a single tone.
- .6 Operating instructions for the system should be displayed at each operating position.
- .7 Appropriate operational measures or interlocks should be provided if the engine-room is fitted with a fixed high-expansion foam or aerosol fire-fighting system, to prevent the local application system from interfering with the effectiveness of these systems.

### **3.2 Arrangement of nozzles and water supply**

- .1 The system should be capable of fire suppression based on testing conducted in accordance with the appendix to these Guidelines. Any installation of nozzles on board should reflect the arrangement successfully tested in accordance with the appendix to these Guidelines. If a specific arrangement of the nozzles is foreseen on board, deviating from the one

tested, it can be accepted provided such arrangement additionally passes fire tests based on the scenarios of these Guidelines.

- .2 The location, type and characteristics of the nozzles should be within the limits tested in accordance with the appendix to these Guidelines. Nozzle positioning should take into account obstructions to the spray of the fire-fighting system. The use of a single row of nozzles or single nozzles may be accepted for installation where this gives adequate protection according to paragraph 3.4.2.4 of the appendix.
- .3 The piping system should be sized in accordance with a hydraulic calculation technique such as the Hazen-Williams hydraulic calculation technique\*\*\* and the Darcy-Weisbach hydraulic calculation technique, to ensure availability of flows and pressures required for correct performance of the system.
- .4 The system may be grouped into separate sections within a protected space. The capacity and design of the system should be based on the section demanding the greatest volume of water. In any case the minimum capacity should be adequate for a single section protecting the largest single engine, diesel generator or piece of machinery. In multi-engine installations, at least two sections should be arranged.
- .5 Nozzles and piping should not prevent access to engine or machinery for routine maintenance. In ships fitted with overhead hoists or other moving equipment, nozzles and piping should not be located to prevent operation of such equipment.

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\*\*\* 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 galvanised mild steel	100
Copper and copper alloys	150
Stainless steel	150

## APPENDIX

### TEST METHOD FOR FIXED WATER-BASED LOCAL APPLICATION FIRE-FIGHTING SYSTEMS

#### 1 SCOPE

This test method is for evaluating the effectiveness of fixed water-based local application fire-fighting systems. The test method verifies the design criteria for vertical and horizontal grids of nozzles. The test method is intended to evaluate maximum nozzle spacing, minimum and maximum distance from the nozzle to the hazard, minimum nozzle flow rate and nozzle angle, if any, in addition to minimum operating pressure.

#### 2 SAMPLING

2.1 The nozzles and other system components should be supplied by the manufacturer with design and installation criteria, operating instructions, drawings, and technical data sufficient for the identification of the components.

2.2 The flow rate for each type and size of nozzle should be determined at the minimum nozzle operating pressure.

#### 3 FIRE TESTS

##### 3.1 Test principles

3.1.1 These tests are intended to evaluate the fire-extinguishing capabilities of individual nozzles and grids of nozzles used as local application fire-fighting systems on light diesel oil fuel spray fires.

3.1.2 The tests also define the following design and installation criteria:

- .1 maximum spacing between nozzles;
- .2 minimum and maximum distance between the nozzles and the protected area;
- .3 the need for nozzles to be positioned outside of the protected area; and
- .4 minimum operating pressure.

##### 3.2 Test description

###### 3.2.1 Test enclosure

3.2.1.1 The test enclosure, if any, should be sufficiently large and provided with adequate natural or forced ventilation during the fire test to ensure that the oxygen concentration throughout the fire test remains above 20% (by volume) for 5 min after ignition at the locations specified in paragraph 4.2.2.

3.2.1.2 The test enclosure, if any, should be at least 100 m<sup>2</sup> in area. The height of the test enclosure should be at least 5 m.

### 3.2.2 Fire scenarios

3.2.2.1 The fire scenarios should consist of nominal 1 and 6 MW spray fires. These fires should be produced using light diesel oil as the fuel as described in table 3.2.2.1 below.

**Table 3.2.2.1 – Spray fire parameters**

<b>Spray nozzle</b>	<b>Wide spray angle (120° to 125°) full cone type</b>	<b>Wide spray angle (80°) full cone type</b>
Nominal oil pressure	8 bar	8.5 bar
Oil flow	0.16 ± 0.01 kg/s	0.03 ± 0.005 kg/s
Oil temperature	20 ± 5°C	20 ± 5°C
Nominal heat release rate	6 MW	1 MW

3.2.2.2 The fuel spray nozzles should be installed horizontally and directed toward the centre of the nozzle grid as shown in figure 3.3.2.

3.2.2.3 The fuel spray nozzle should be located 1 m above the floor and at least 4 m away from the walls of the enclosure, if any.

### 3.2.3 Installation requirements for tests

3.2.3.1 The local application system should consist of uniformly spaced nozzles directed vertically downward or to the side, or installed at an inclined angle, if any, and tested in accordance with paragraphs 3.3 and 3.4.

3.2.3.2 The system should consist of either a 2 x 2 or 3 x 3-nozzle grid in general.

3.2.3.3 The nozzles should be installed at least 1 m below the ceiling of the enclosure.

3.2.3.4 The maximum spacing of the nozzles should be in accordance with the manufacturer's system design and installation manual.

3.2.3.5 Additional nozzles may be installed at the test in accordance with manufacturer's instruction. In this case, details for additional nozzles should be included in the test report and reflected in the individual ship's design.

## 3.3 Test programme

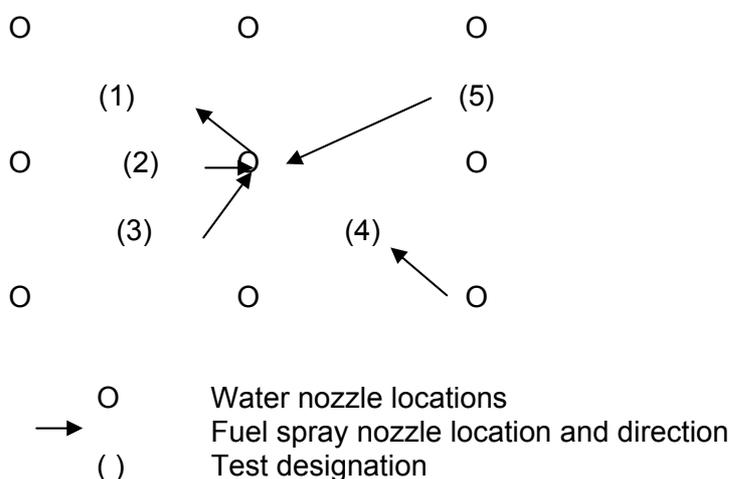
3.3.1 The fire-extinguishing capabilities of the system should be evaluated for the minimum and maximum separation distances (the distance between the nozzle grid and the fuel spray nozzle). These distances should be as defined in the manufacturer's system design and installation manual.

3.3.2 Each separation distance should be evaluated against the two fire scenarios (1 and 6 MW spray fires). Tests should be conducted with the fuel spray nozzles horizontally positioned in the following locations:

- .1 under one nozzle in the centre of the grid;
- .2 between two nozzles in the centre of the grid;
- .3 between four nozzles;

- .4 under one nozzle at the edge of the grid (corner); and
- .5 between two nozzles at the edge of the grid.

These fire locations are shown in figures 3.3.2, and 3.4.2.1 to 3.4.2.3 below.



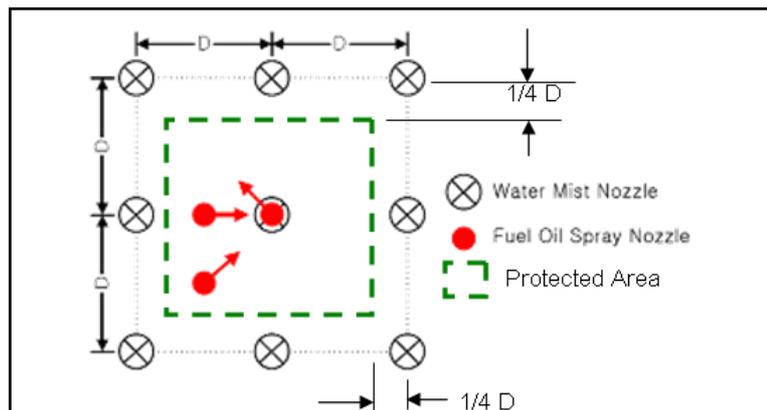
**Figure 3.3.2 – Fuel spray nozzle locations**

### 3.4 Test results and interpretation

3.4.1 The local application fire-fighting system is required to extinguish the test fires within 5 min of the start of water discharge. The fuel oil spray and water spray are required to continue in operation after this, as specified in paragraph 4.3. If the fire re-ignites after this five-minute water discharge period the test is considered to be a failure.

3.4.2 The results of the tests should be interpreted as follows:

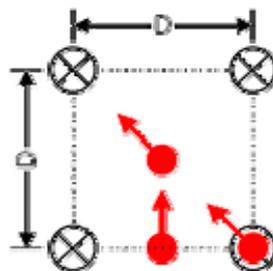
- .1 Systems (utilizing a 3 x 3 nozzle grid) that extinguish fires referred to in paragraphs 3.3.2.1 to 3.3.2.3 are considered to have successfully completed the protocol with the condition that the outer nozzles should be installed outside of the protected area a distance of at least 1/4 of the maximum nozzle spacing as shown in figure 3.4.2.1.



**Figure 3.4.2.1**

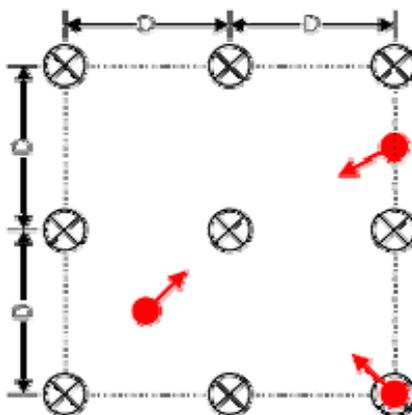
For this system, the outer nozzles should be installed outside of the protected area a distance of at least 1/4 of the maximum nozzle spacing.

- .2 Systems (utilizing either a 2 x 2 or 3 x 3 nozzle grid) that extinguish fires referred to in paragraphs 3.3.2.3 to 3.3.2.5 are considered to have successfully completed the protocol and can be designed with the outer nozzles located at the edge of the protected area as shown in figures 3.4.2.2 and 3.4.2.3. This does not prohibit the location of the nozzles outside of the protected area.



**Figure 3.4.2.2 – 2 x 2 nozzle grid**

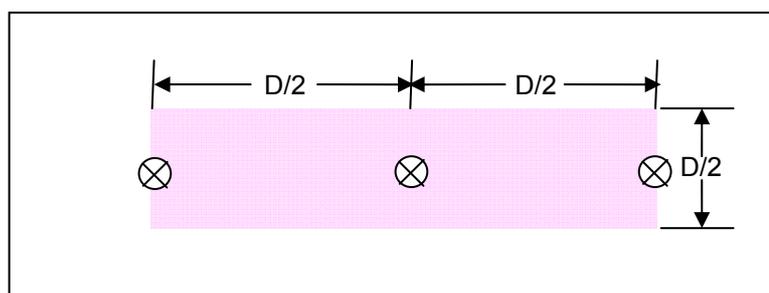
For systems which utilize a 2 x 2 nozzle grid, the outer nozzles can be located either at the edge of the protected area or outside of the protected area.



**Figure 3.4.2.3 – 3 x 3 nozzle grid**

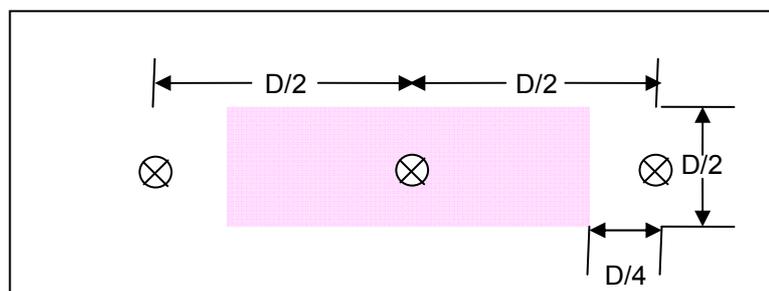
For systems which utilize a 3 x 3 nozzle grid, the outer nozzles can be located either at the edge of the protected area or outside the protected area.

- .3 The requirements stated in either paragraph 3.4.2.1 or 3.4.2.2 should be met for both the minimum and maximum separation distances as well as the minimum operating pressure.
- .4 For installations which may be adequately protected using individual nozzles or a single row of nozzles, the effective nozzle coverage (width and length) is defined as  $1/2$  the maximum nozzle spacing as shown in figures 3.4.2.4 to 3.4.2.6. **Note:** the fuel spray nozzle locations shown in figures 3.4.2.4 to 3.4.2.6 are shown for information only.



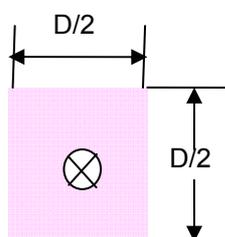
**Figure 3.4.2.4**

For systems with a single row of nozzles that extinguishes fires referred to in paragraphs 3.3.2.3 to 3.3.2.5, the outer nozzles should be placed at least at the edge of the protected area.



**Figure 3.4.2.5**

For systems with a single row of nozzles that extinguishes fires referred to in paragraphs 3.3.2.1 to 3.3.2.3, the outer nozzles should be placed outside the protected area a distance of at least 1/4 of the maximum nozzle spacing.



**Figure 3.4.2.6**

For a single nozzle installation, the spacing should be as shown in figure 3.4.2.6.

- .5 For installations where the protected area is next to a bulkhead or similar vertical obstruction, the first row of nozzles should be located at 1/2 the maximum nozzle spacing away from the bulkhead for either of the conditions described in paragraph 3.4.2.1 or 3.4.2.2.

## **4 TEST PROCEDURE**

### **4.1 Pre-burn time**

Each fuel oil spray should be ignited and allowed to burn from 10 s to 15 s prior to system operation.

### **4.2 Measurements**

#### **4.2.1 Fuel oil spray system**

4.2.1.1 The fuel oil flow rate and pressure in the fuel oil spray system should be verified prior to the test.

4.2.1.2 The fuel oil spray system pressure should be measured during the test.

#### **4.2.2 Oxygen concentration at the fire location**

Oxygen concentration should be measured at 100 mm below and 500 mm behind the fuel oil spray nozzle.

#### **4.2.3 Water spray system pressure and flow rate**

The system water pressure and flow rate should be measured using suitable equipment.

### **4.3 Operation of the fire-fighting system**

4.3.1 The water spray system should be activated within the pre-burn time specified in section 4.1.

4.3.2 The fires should be extinguished within 5 min of water application.

4.3.3 The fuel oil spray should be operated for at least 15 s after fire extinguishment.

4.3.4 The water spray system should be operated for a minimum of 1 min after fire extinguishment.

### **4.4 Observations during the fire test**

During the test, the following observations should be recorded:

- .1 start of the ignition procedure;
- .2 start of the test (ignition);
- .3 time when the extinguishing system is activated;
- .4 time when the extinguishing system is shut off;
- .5 time of re-ignition;
- .6 time when the fuel supply to the nozzle is stopped;
- .7 time when the fire is extinguished; and
- .8 time when the test is terminated.

## **5 TEST REPORT**

The test report should, as a minimum, include the following information:

- .1 name and address of the test laboratory;
- .2 date of issue and identification number of the test report;
- .3 name and address of applicant;
- .4 name and address of manufacturer or supplier of the product;
- .5 test method and purpose;

- .6 product identification;
- .7 description of the tested product:
  - .1 assembly drawings;
  - .2 descriptions;
  - .3 assembly of included materials and components;
  - .4 specification of included materials and components;
  - .5 installation specification; and
  - .6 detailed drawings of the test set-up;
- .8 date of tests;
- .9 drawing of each fire test configuration;
- .10 measured water spray nozzle flow characteristics;
- .11 identification of the test equipment and used instruments;
- .12 test results including observations and measurements made during and after the test:
  - .1 maximum nozzle spacing;
  - .2 minimum and maximum separation distances and angles; and
  - .3 minimum operating pressures;
- .13 deviations from the test method;
- .14 conclusions; and
- .15 date of the report and signature.

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**ANNEX 7**

**DRAFT MSC RESOLUTION**

**ADOPTION OF AMENDMENTS TO THE GUIDELINES FOR THE APPLICATION OF  
PLASTIC PIPES ON SHIPS (RESOLUTION A.753(18))**

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO resolution MSC.61(67), by which it adopted the International Code for Application of Fire Test Procedures (FTP Code) for the testing of new marine materials which are increasingly being introduced into the design and construction of ships and craft engaged in international maritime transport,

RECALLING FURTHER resolution A.753(18), by which the Assembly, at its eighteenth session, adopted Guidelines for the application of plastic pipes on ships to assist maritime Administrations to determine, in a rational and uniform manner, the permitted applications of such materials,

NOTING that part 2 of the FTP Code makes reference to resolution A.753(18) for the testing of materials for smoke and toxic hazards,

RECOGNIZING that the continual development of plastic materials for use on ships and improvement of marine safety standards since the adoption of resolution A.753(18) necessitated the revision of the provisions of the Guidelines for the application of plastic pipes on ships in order to take into account technological developments and maintain the highest practical level of safety,

NOTING FURTHER that the Assembly requested the Committee to keep the Guidelines under review and amend them as necessary,

HAVING CONSIDERED, at its [eighty-eighth] session, amendments to the Guidelines for the application of plastic pipes on ships, proposed by the Sub-Committee on Fire Protection at its fifty-fourth session,

1. ADOPTS amendments to the Guidelines for the application of plastic pipes on ships (resolution A.753(18)), the text of which is set out in the Annex to the present resolution;
2. INVITES Governments to apply the annexed amendments when considering the use of plastic piping on board ships flying the flag of their State.

ANNEX

**AMENDMENTS TO THE GUIDELINES FOR THE APPLICATION  
OF PLASTIC PIPES ON SHIPS (RESOLUTION A.753(18))**

- 1 The existing paragraph 1.2.3 is replaced by the following:  
  
"These Guidelines are applicable to piping systems made predominantly of other material than metal. The use of mechanical and flexible couplings which are accepted for use in metallic piping systems is not addressed."
- 2 In paragraph 1.4.1, the following sentence is added at the end:  
  
"Plastic includes synthetic rubber and materials of similar thermo/mechanical properties."
- 3 In paragraph 2.2.1.2.1, the following text is added at the end:  
  
"Level 1W – Piping systems similar to level 1 systems except these systems do not carry flammable fluid or any gas and a maximum 5% flow loss in the system after exposure is acceptable\*."
- 4 In paragraph 2.2.1.2.2, the following text is added at the end:  
  
"Level 2W – Piping systems similar to level 2 systems except a maximum 5% flow loss in the system after exposure is acceptable\*."
- 5 In paragraph 4.1.1 after the words "pipe dimension" add the words ", length of the piping".
- 6 In appendix 1, note 2 to paragraph 1, the words "as set out in paragraph 3.1.3 of the annex to Assembly resolution A.517(13)" are replaced by the words "as set out in paragraphs 7.1, 7.2 and 7.3 of the annex to Assembly resolution A.754(18)".
- 7 In appendix 1, paragraph 6, the words "without leakage" at the end of the second sentence are deleted and the following new text is inserted after the second sentence:  
  
"Pipes without leakage qualify as level 1 or 2 depending on the test duration. Pipes with negligible leakage, i.e. not exceeding 5% flow loss, qualify as level 1W or level 2W depending on the test duration."
- 8 In appendix 4, in the Fire Endurance Requirements Matrix, "L1" is replaced by "L1W" in rows 14, 15 and 23 and "L2" is replaced by "L2W" in rows 16, 17 and 31.

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\* The flow loss must be taken into account when dimensioning the system.

**ANNEX 8**

**MODIFICATIONS TO THE DRAFT 2010 FTP CODE  
(FP 53/23/ADD.1, ANNEX 14)**

(The text of this annex is reproduced in document FP 54/25/Add.1)

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**ANNEX 9**

**DRAFT MSC CIRCULAR**

**INTERIM CLARIFICATIONS OF SOLAS CHAPTER II-2 REQUIREMENTS REGARDING  
INTERRELATION BETWEEN THE CENTRAL CONTROL STATION,  
NAVIGATION BRIDGE AND SAFETY CENTRE**

(The text of this annex is reproduced in document FP 54/25/Add.1)

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**ANNEX 10**

**DRAFT MSC CIRCULAR**

**INTERIM EXPLANATORY NOTES FOR THE ASSESSMENT OF PASSENGER SHIP  
SYSTEMS' CAPABILITIES AFTER A FIRE OR FLOODING CASUALTY**

(The text of this annex is reproduced in document FP 54/25/Add.1)

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**ANNEX 11**

**DRAFT MSC CIRCULAR**

**UNIFIED INTERPRETATION OF CHAPTER 12 OF THE INTERNATIONAL CODE  
FOR FIRE SAFETY SYSTEMS**

1 The Maritime Safety Committee, at its [eighty-eighth session (24 November to 3 December 2010)], with a view to providing more specific guidance for application of the relevant requirements of the International Code for Fire Safety Systems (FSS Code), approved the unified interpretation of chapter 12 of the FSS Code, as set out in the annex, prepared by the Sub-Committee on Fire Protection at its fifty-fourth session.

2 Member Governments are invited to use the annexed unified interpretation as guidance when applying relevant provisions of chapter 12 of the FSS Code for ships constructed on or after [*date of approval of the circular*] and to bring the unified interpretation to the attention of all parties concerned.

ANNEX

**UNIFIED INTERPRETATION OF CHAPTER 12 OF THE INTERNATIONAL CODE  
FOR FIRE SAFETY SYSTEMS (FSS CODE)**

**Chapter 12, paragraph 2.2.1.3 – Emergency fire pumps in cargo ships**

1 It should be documented that chapter 12, paragraph 2.2.1.3, of the Code is satisfied and the suction inlet is fully submerged under all conditions given in this unified interpretation.

1.1 Operational seagoing condition for which roll, pitch and heave should be taken into account.

The lightest seagoing condition should be considered, which is defined as the ballast condition which gives shallowest draught at the position of the sea chest and emergency fire pump as given in the approved stability booklet (or preliminary stability calculation for new building). The following table should be applied for the calculation of roll, pitch and heave. The heave combined pitch and heave combined roll are taken into account separately.

1.1.1 Heave combined pitch<sup>1</sup> in head sea

L, m	75 and below	100	125	150	175	200	225	250	300	350 and above
$\varphi$ , deg	4.5	4	3.2	2.7	2.3	2.1	1.8	1.7	1.6	1.5
H, m	0.73	0.8	0.87	0.93	0.98	1.03	1.07	1.11	1.19	1.25

**Note:** Values at the intermediate length of ships are to be obtained by linear interpolation.

where:

L: length of the ship, in metres, as defined in the International Convention on Load Lines in force, or length between perpendiculars at the ballast draught, whichever is greater

$\varphi$ : pitch angle<sup>2</sup> as defined in figure 1

H: heave amplitude as defined in figure 1.

1.1.2 Heave combined roll in beam sea

Heave combined roll angle<sup>2</sup> should be taken as:

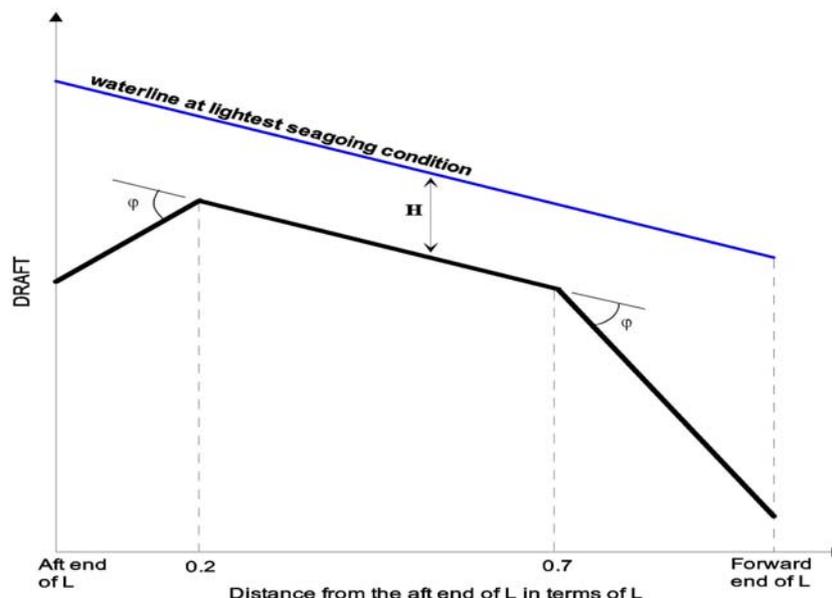
.1 ships with bilge keels: 11°; and

.2 ships without bilge keels: 13°.

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<sup>1</sup> The heave combined pitch is taken into account as in figure 1.

<sup>2</sup> Angle is to be measured from still waterline and downwards.



**Figure 1 – Waterline for which heave combined pitch is taken into account**

1.2 The emergency fire pump suction should be submerged at the waterlines corresponding to the two following conditions:

- .1 a static waterline drawn through the level of 2/3 immersion of the propeller at even keel (for pod or thruster driven ship, special consideration should be given); and
- .2 the ship in the arrival ballast condition, as per the approved trim and stability booklet, without cargo and with 10% stores and fuel remaining.

For either condition, roll, pitch and heave need not be applied.

1.3 A ship operating solely in sheltered water issued with SOLAS Certificates should be subject to compliance with the still water submergence requirements set out in paragraph 1.2.1 above.

2 In all cases the net positive suction head (NPSH) available for the pump should be greater than the NPSH required.

3 Upon completion of the emergency fire pump installation, a performance test confirming the pump's capacity required in the FSS Code, chapter 12, paragraph 2.2.1.1, should be carried out and, if the emergency fire pump is the main supply of water for any fixed fire-extinguishing system provided to protect the space where the main fire pumps are located, the pump should have the capacity for this system. As far as practicable, the test should be carried out at the draught corresponding to the lightest seagoing condition.

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**ANNEX 12**

**DRAFT MSC CIRCULAR**

**GUIDELINES FOR THE DESIGN, CONSTRUCTION AND TESTING OF FIXED  
HYDROCARBON GAS DETECTION SYSTEMS**

(The text of this annex is reproduced in document FP 54/25/Add.1)

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## ANNEX 13

### DRAFT AMENDMENTS TO SOLAS REGULATION II-2/9

#### Regulation 9 – Containment of fire

- 1 In table 9.3, column (11) (Special category and ro-ro spaces), row (2) (Corridors), the symbol "A-15" is replaced by the symbol "A-30".
- 2 In table 9.3, column (11) (Special category and ro-ro spaces), row (4) (Stairways), the symbol "A-15" is replaced by the symbol "A-30".
- 3 In table 9.3, column and row (11) (Special category and ro-ro spaces), the symbol "A-0" is replaced by the symbol "A-30".
- 4 In table 9.4, column (11) (Special category and ro-ro spaces), row (1) (Control stations), the symbol "A-30" is replaced by the symbol "A-60".
- 5 In table 9.4, column (11) (Special category and ro-ro spaces), row (2) (Corridors), the symbol "A-0" is replaced by the symbol "A-30".
- 6 In table 9.4, column (11) (Special category and ro-ro spaces), row (4) (Stairways), the symbol "A-0" is replaced by the symbol "A-30".
- 7 In table 9.4, column and row (11) (Special category and ro-ro spaces), the symbol "A-0" is replaced by the symbol "A-30".
- 8 In table 9.4, column (2) (Corridors), row (11) (Special category and ro-ro spaces), the symbol "A-15" is replaced by the symbol "A-30".
- 9 In table 9.4, column (4) (Stairways), row (11) (Special category and ro-ro spaces), the symbol "A-15" is replaced by the symbol "A-30".
- 10 In table 9.4, column (6) (Machinery spaces of category A), row (11) (Special category and ro-ro spaces), the symbol "A-30" is replaced by the symbol "A-60".
- 11 In table 9.5, column and row (11) (Ro-ro and vehicle spaces), the symbol "\*" is replaced by the symbol "A-30".
- 12 In table 9.6, column (11) (Ro-ro and vehicle spaces), row (10) (Open decks), the symbol "\*" is replaced by the symbol "A-0".
- 13 In table 9.6, column and row (11) (Ro-ro and vehicle spaces), the symbol "\*" is replaced by the symbol "A-30".
- 14 In table 9.6, column (10) (Open decks), row (11) (Ro-ro and vehicle spaces), the symbol "\*" is replaced by the symbol "A-0".
- 15 Paragraphs 6.2 and 6.3 are deleted and the subsequent paragraphs are renumbered accordingly.

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ANNEX 14

BIENNIAL AGENDA OF THE SUB-COMMITTEE AND POST-BIENNIAL AGENDA ITEMS ASSIGNED TO THE FP SUB-COMMITTEE

BIENNIAL AGENDA\*

SUB-COMMITTEE ON FIRE PROTECTION (FP)					
PLANNED OUTPUTS 2010-2011 (resolution A.1012(26))		Parent organ(s)	Coordinating organ(s)	Involved organ(s)	Target completion year
Number	Description				
1.1.2.2	<b>Consideration of IACS unified interpretations</b>	MSC			Continuous
<del>2.0.1.1</del>	<del>Comprehensive review of the Fire Test Procedures Code</del>	MSC	FP		2010
2.0.1.3	<b>Means for recharging air bottles for air breathing apparatuses</b>	MSC	FP		2011
2.0.1.7	<del>Clarification of SOLAS chapter II-2 requirements regarding interrelation between central control station and safety centre</del>	MSC	FP		2010
2.0.1.9	<b>Performance testing and approval standards for fire safety systems</b>	MSC	FP		2011
2.0.1.10	<del>Fixed hydrocarbon gas detection systems on double-hull oil tankers</del>	MSC	FP	BLG	2010
5.1.1.4	<b>Review of fire protection requirements for on-deck cargo areas</b>	MSC	FP	DSC	2011
5.1.1.6	<del>Explanatory notes for the application of the safe return to port requirements</del>	MSC	FP	DE SLF	2010
5.1.1.7	<b>Safety provisions applicable to tenders operating from passenger ships</b>	MSC	DE	FP, COMSAR, NAV, SLF, STW	3 sessions 2013
5.1.1.10	<b>Guidelines for a visible element to general emergency alarm systems on passenger ships</b>	MSC	DE	FP	2012

\* Items printed in bold have been selected for the provisional agenda for FP 55, shown in annex 15. Struck-out text indicates completed outputs and shaded text indicates proposed additions and/or changes.

SUB-COMMITTEE ON FIRE PROTECTION (FP)					
PLANNED OUTPUTS 2010-2011 (resolution A.1012(26))		Parent organ(s)	Coordinating organ(s)	Involved organ(s)	Target completion year
Number	Description				
5.1.1.11	<b>Recommendation on evacuation analysis for new and existing passenger ships</b>	MSC	FP		2010 2011
5.2.1.2	<b>Fire resistance of ventilation ducts</b>	MSC	FP		2010 2011
5.2.1.6	<b>Means of escape from machinery spaces</b>	MSC	FP		2010 2011
5.2.1.7	<del>Amendments to SOLAS chapter II-2 related to the releasing controls and means of escape for spaces protected by fixed carbon dioxide systems</del>	MSC	FP		2010
5.2.1.9	<b>Harmonization of the requirements for the location of entrances, air inlets and openings in the superstructures of tankers</b>	MSC	FP	BLG	2010 2011
5.2.1.11	<del>Fire integrity of bulkheads and decks of ro-ro spaces on passenger and cargo ships</del>	MSC	FP		2011
5.2.1.12	<b>Requirements for ships carrying hydrogen and compressed natural gas vehicles</b>	MSC	FP		2011
5.2.1.25	<b>Revision of the Recommendations for entering enclosed spaces aboard ships</b>	MSC	DSC	FP	2010 2011
5.2.3.15	<b>Measures to prevent explosions on oil and chemical tankers transporting low-flashpoint cargoes</b>	MSC	FP	BLG DE	2011
12.1.2.2	<b>Analysis of fire casualty records</b>	MSC	FSI		Continuous

POST-BIENNIAL AGENDA

SUB-COMMITTEE ON FIRE PROTECTION (FP)								
ACCEPTED POST-BIENNIAL OUTPUTS				Parent organ(s)	Coordinating organ(s)	Associated organ(s)	Timescale (sessions)	Remarks
Number	Reference to Strategic Directions	Reference to High-level Actions	Description					
FP 1	5.2	5.2.1	Smoke control and ventilation*	MSC	FP		2	FP 39/19, section 9; FP 46/16, section 4

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\* Although these items are contained in the High-level Action Plan and, therefore, should be included in the biennial agenda, the Sub-Committee, taking into account resolution A.1013(26), agreed to move them to the post-biennial agenda, as work on them is not envisaged to commence in this biennium.



## ANNEX 15

### DRAFT PROVISIONAL AGENDA FOR FP 55\*

- Opening of the session
- 1 Adoption of the agenda
- 2 Decisions of other IMO bodies
- 3 Performance testing and approval standards for fire safety systems
- 4 Requirements for ships carrying hydrogen and compressed natural gas vehicles
- 5 Fire resistance of ventilation ducts
- 6 Measures to prevent explosions on oil and chemical tankers transporting low-flash point cargoes
- 7 Recommendation on evacuation analysis for new and existing passenger ships
- 8 Consideration of IACS unified interpretations
- 9 Harmonization of the requirements for the location of entrances, air inlets and openings in the superstructures of tankers
- 10 Means of escape from machinery spaces
- 11 Review of fire protection requirements for on-deck cargo areas
- 12 Analysis of fire casualty records
- 13 Revision of the Recommendations for entering enclosed spaces aboard ships
- 14 Guidelines for a visible element to general emergency alarm systems on passenger ships
- 15 Means for recharging air bottles for air breathing apparatuses
- 16 Safety provisions applicable to tenders operating from passenger ships
- 17 Work programme and agenda for FP 56
- 18 Election of Chairman and Vice-Chairman for 2012
- 19 Any other business
- 20 Report to the Maritime Safety Committee

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\* Agenda item numbers do not indicate priorities.



**ANNEX 16**

**REPORT ON THE STATUS OF PLANNED OUTPUTS FOR THE FP SUB-COMMITTEE**

(The text of this annex is reproduced in document FP 54/25/Add.1)

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