

SUB-COMMITTEE ON CARRIAGE OF  
CARGOES AND CONTAINERS  
3rd session  
Agenda item 15

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**REPORT TO THE MARITIME SAFETY COMMITTEE AND  
THE MARINE ENVIRONMENT PROTECTION COMMITTEE**

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## **1 GENERAL**

### **Introduction**

1.1 The Sub-Committee on Carriage of Cargoes and Containers (CCC) held its third session from 5 to 9 September 2016 under the chairmanship of Mr. H. Xie (China). The Vice-Chair, Mr. P. Van Lancker (Belgium), was also present.

1.2 The session was attended by delegations from Member States and an Associate Member of IMO; and by observers from intergovernmental organizations and non-governmental organizations in consultative status, as listed in document CCC 3/INF.1.

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

1.3 The Secretary-General welcomed participants and delivered the opening address, the full text of which can be downloaded from the IMO website at the following address:  
<http://www.imo.org/en/MediaCentre/SecretaryGeneral/Secretary-GeneralsSpeechesToMeetings/Pages/Default.aspx>

### **Chair's remarks**

1.4 In response, the Chair thanked the Secretary-General for his words of guidance and encouragement and assured him that his advice and requests would be given every consideration in the deliberations of the Sub-Committee.

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

1.5 The Sub-Committee adopted the agenda (CCC 3/1/Rev.1) and agreed to be guided in its work, in general, by the annotations contained in document CCC 3/1/1 (Secretariat) and the working arrangements in document CCC 3/1/2 (Chairman). The agenda, as adopted, together with the list of documents considered under each agenda item, is set out in document CCC 3/INF.27.

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

2.1 The Sub-Committee noted the outcomes of A 29, MEPC 69 and MSC 96 relevant to the work of the Sub-Committee, as reported in document CCC 3/2 (Secretariat), and took them into account in its deliberations when dealing with relevant agenda items.

2.2 With regard to outputs 5.2.3.3 (Amendments to the IMSBC Code and supplements) and 5.2.3.4 (Amendments to the IMDG Code and supplements), the Sub-Committee noted that MSC 96 had agreed that the scope of these outputs was limited to the technical aspects of the cargoes only and that operational and administrative requirements associated with the IMSBC and IMDG Codes were not included within the scope of these outputs. Therefore, should any amendment to the Codes have a possible impact on other parts of the respective Codes, Member States or the Sub-Committees should present a proposal for a new output to the Committee, in accordance with the Committees' Guidelines.

2.3 The Sub-Committee also noted that, with the availability of a new GISIS module on "Development of amendments to the 1974 SOLAS Convention and related mandatory instruments", MSC 96 had instructed its subsidiary bodies and the Secretariat to keep the records updated in GISIS during the preparation of draft amendments to the 1974 SOLAS Convention and related mandatory instruments, in respect of relevant decisions taken at the committee or sub-committee level.

2.4 The Sub-Committee further noted that A 29 had adopted the *Strategic Plan for the Organization (for the six-year period 2016 to 2021)* (resolution A.1097(29)) and the *High-level Action Plan of the Organization and priorities for the 2016-2017 biennium* (resolution A.1098(29)).

### **3 AMENDMENTS TO THE IGF CODE AND DEVELOPMENT OF GUIDELINES FOR LOW-FLASHPOINT FUELS**

#### **GENERAL**

3.1 The Sub-Committee recalled that CCC 2 established a Correspondence Group on Development of Technical Provisions for the Safety of Ships using Low-flashpoint Fuels, with the terms of reference set out in paragraph 3.36 of document CCC 2/15.

#### **REPORT OF THE CORRESPONDENCE GROUP**

3.2 The Sub-Committee had for its consideration document CCC 3/3 (Sweden), providing the report of the correspondence group with regard to the development of draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel and the development of draft requirements for fuel cells for inclusion in the IGF Code.

3.3 In considering the report of the correspondence group, the Sub-Committee noted the following general comments expressed on this matter:

- .1 the correspondence group had made significant progress in its tasks and it could be envisaged that work at this session may be carried out with a view to finalization;
- .2 there is a need for further investigation into the properties and use of fuel cells and methyl/ethyl alcohol fuels before setting safety requirements;
- .3 a careful and conservative approach is required in order to delimit the use of fuel cells and methyl/ethyl alcohol fuel and set appropriate and strict structural and operational safety requirements;
- .4 there is a need to include requirements for fuel cells operating not only with natural gas but also with other fuels, in order for the marine industry to be in a position to take advantage of these rapidly developing technologies; and
- .5 the fundamental principles of operation of fuel cell power systems are common to all fuel cell types and the core components of fuel cell power systems can be generalized. In this regard the delegation of the United Kingdom made a statement, supported by the delegations of Norway and the Marshall Islands, the full text of which is set out in annex 10.

3.4 Taking the above views into account, the Sub-Committee approved the report in general and took action as indicated in paragraphs 3.5 to 3.17.

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## **Draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel**

### ***Terminology in the context of ships using methyl/ethyl alcohol as fuel***

3.5 The Sub-Committee noted the outcome of the correspondence group's discussion regarding the terminology to be used in the context of ships using methyl/ethyl alcohol as fuel, specifically that the term "fuel" should be understood as "methyl/ethyl alcohol". Subsequently, the Sub-Committee agreed to refer the issue of the definition of ethyl and methyl alcohol as fuel to a Working Group on Amendments to the IGF Code and Development of Guidelines for Low-flashpoint Fuels (IGF Code Working Group) for further consideration.

### ***Corrosivity of methyl/ethyl alcohols***

3.6 The Sub-Committee noted the correspondence group's view that further information was needed on the corrosive nature of methyl/ethyl alcohols. In this regard, the Sub-Committee also noted the view that the matters that still need consideration should be dealt with as a high priority item by the IGF Code Working Group with the aim of finalizing the safety provisions for the use of methyl/ethyl alcohol as fuel.

### ***Issues requiring further consideration***

3.7 Following consideration of annex 1 to document CCC 3/3, containing the draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel, the Sub-Committee noted the progress made by the correspondence group and also noted that a significant number of issues remained unresolved and required further consideration. In this regard, the Sub-Committee agreed that the IGF Code Working Group should carefully review the draft technical provisions for the safety of ships using methyl/ethyl alcohol (CCC 3/3, annex 1), and attempt to resolve as many issues as possible or propose possible options on the way forward for items where agreement could not be reached, in order to enable the Sub-Committee to have a well-structured discussion and for interested Member States and international organizations to submit specific proposals at the next session.

### ***The MethaShip project and proposals for specific amendments to the draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel***

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

- .1 CCC 3/INF.23 (Germany), providing information on MethaShip, a three-year German research project aiming to evaluate and support the sustainable development and safety aspects of ships using methyl/ethyl alcohol as fuel by exploring the economic case for the use of methyl alcohol, understanding the fuel infrastructure requirements and developing two ship designs; and
- .2 CCC 3/3/1 (Germany), proposing the following amendments to the draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel, based on findings from the German project MethaShip:
  - .1 usage of the term "secondary barrier" instead of "cofferdam" in provisions that relate to leakage protection (CCC 3/3/1, paragraph 4);

- .2 amendments to paragraph 5.3.2 of the draft technical provisions to allow the omission of a secondary barrier on the tank tops adjacent to machinery spaces containing low fire-risk machinery (such as pumps) (CCC 3/3/1, paragraph 6);
- .3 amendments to paragraph 11.4.4 of the draft technical provisions to align it with paragraph 11.3.3 of the IGF Code so as not to require a cofferdam for tanks adjacent to low fire-risk machinery spaces (CCC 3/3/1, paragraph 9);
- .4 reintroduction of the Emergency Shutdown (ESD) concept and reconsideration of the requirements for emergency shutdown of power generating units and of machinery spaces in chapters 2, 5, 9, 10, 13 and 15 of the draft technical provisions (CCC 3/3/1, paragraph 14);
- .5 addition of definitions for "spaces not normally entered" and "units not normally accessed", and amendments to chapter 5 of the draft technical provisions, with a view to allowing access to tank connection spaces (that are not normally accessed) through manholes rather than airlocks (CCC 3/3/1, paragraphs 17 to 19); and
- .6 deletion of paragraphs 12.5.2.1.4 and 12.5.3.1.1 of the draft technical provisions, which contain requirements for the classification of the hazardous zone for the discharge of tank vents (CCC 3/3/1, paragraph 23).

3.9 Having briefly considered the above two documents, the Sub-Committee agreed to refer them to the IGF Code Working Group for further consideration, having noted the view that the ESD-protected machinery concept was only suitable for fuels lighter than air, such as natural gas, and not methyl/ethyl alcohols, and a concern regarding the proposal to allow the arrangement of fuel pump units directly in the machinery space.

***European Maritime Safety Agency (EMSA) study on the use and bunkering of methyl/ethyl alcohol fuels for passenger and cargo ships***

3.10 The Sub-Committee noted with appreciation the information in document CCC 3/INF.22 regarding a study, commissioned by EMSA, on the use of methyl/ethyl alcohols as fuel in shipping, which offers a technology review, a regulatory gap analysis, a relevant business case and a safety assessment on the use and bunkering of methyl/ethyl alcohol fuel for both passenger and cargo ships. Subsequently, the Sub-Committee agreed to refer the document to the IGF Code Working Group for information purposes.

***Status of the technical provisions for ships using methyl/ethyl alcohol as fuel***

3.11 The Sub-Committee recalled that CCC 2, having noted divergent views on whether the provisions for the use of methyl/ethyl alcohol as fuel should be developed as amendments to the IGF Code or as non-mandatory guidelines, had decided to hold in abeyance any final decisions related to application issues until the safety provisions had been finalized from a technical perspective.

3.12 Notwithstanding the aforementioned decision of CCC 2, the Sub-Committee again considered the issue of the intended status of the technical provisions for the safety of ships using methyl/ethyl alcohol as fuel (i.e. non-mandatory guidelines or mandatory requirements to be incorporated into the IGF Code), with a view to providing a clear indication to the IGF Code Working Group. Following discussion, the Sub-Committee, having again noted divergent views on this matter, agreed to revisit this issue at CCC 4, once the draft safety provisions were closer to finalization from a technical perspective.

#### ***Potential input by other Sub-Committees***

3.13 Having considered the correspondence group's suggestions as to which safety provisions should be forwarded to other sub-committees (CCC 3/3, paragraph 63), the Sub-Committee agreed to instruct the IGF Code Working Group, time permitting, to further consider the correspondence group's suggestions and advise the Sub-Committee in this regard, taking into account the progress made at this session. The Sub-Committee also instructed the IGF Code Working Group to be as specific as possible as to the input sought of other sub-committees.

#### **Requirements for fuel cells**

##### ***Equipment boundaries***

3.14 In considering annex 2 to document CCC 3/3, containing draft amendments to the IGF Code regarding fuel cells, the Sub-Committee noted the draft definitions developed by the correspondence group. In this context, the Sub-Committee, having considered the sample diagram representing a "fuel cell power installation", noted general support for the inclusion of such a diagram in the main body of the draft provisions for fuel cells rather than as an appendix.

##### ***Types of feed fuel***

3.15 With regard to whether or not the draft requirements for fuel cells should address only natural gas as a feed fuel, the Sub-Committee, having noted the various comments made in the correspondence group and having recalled the statement by the United Kingdom and the relevant general comments on the report of the correspondence group (see paragraphs 3.3.2, 3.3.4 and 3.3.5), also noted the following views expressed on this matter:

- .1 the use of low-flashpoint fuels other than natural gas, such as hydrogen, as feed fuel for fuel cells should be carefully considered, including implementing a risk assessment for using such fuels, before introducing them into the IGF Code;
- .2 a number of provisions in the draft amendments to the IGF Code regarding fuel cells developed by the correspondence group require further consideration before discussing different types of feed fuel;
- .3 the focus at this session should be on finalizing the draft amendment to the IGF Code regarding fuel cells using natural gas;
- .4 fuel cells should not only be limited to natural gas; and
- .5 fuel cell requirements should be developed as a separate, general part of the IGF Code rather than being included in part A-1 of the Code, in order to allow the use of different kinds of feed fuels other than natural gas.

3.16 Following discussion and having taken the above views into account, the Sub-Committee agreed that the draft amendments to the IGF Code regarding fuel cells should be developed as a general part to the IGF Code, separate to the natural gas-specific parts. With regard to feed fuels other than natural gas, the Sub-Committee agreed with the understanding that the provisions of the IGF Code for alternative design and arrangements would have to be used with regard to, for example, fuel storage and piping outside the fuel cell power systems, until specific provisions for these aspects are developed for each of the low-flashpoint fuels in question.

3.17 Consequently, having noted the progress made by the correspondence group on the draft requirements for fuel cells, the Sub-Committee decided to instruct the IGF Code Working Group to further develop the draft amendments to the IGF Code regarding fuel cells as a separate, general part using annex 2 to document CCC 3/3 as a basis.

#### **PROPOSED DEFINITION OF BUNKERING STATION, GAS CONTROL SYSTEM AND GAS SAFETY SYSTEM AND PROPOSED AMENDMENTS TO PARAGRAPHS 11.3.6 AND 15.2.6 OF THE IGF CODE**

3.18 The Sub-Committee recalled that the IGF Code Working Group established at CCC 2, owing to time constraints, had been unable to consider document CCC 2/3/3 (China), which proposed amendments to the IGF Code, including definitions for "bunkering station", "gas control system" and "gas safety system"; revised text for paragraph 15.2.6 of the Code on the independence requirements for the gas control system and the gas safety system; and revised text for paragraph 11.3.6 of the Code on fire protection for the LNG bunkering station located on open deck. Consequently, CCC 2 had invited interested Member States and international organizations to submit comments and proposals to CCC 3 on the draft amendments to the IGF Code proposed in the aforementioned document.

3.19 With regard to whether or not document CCC 2/3/3 could be considered, taking into account that it was proposing amendments to the natural gas-specific part of the IGF Code that had recently been adopted, the Sub-Committee recalled that MSC 94 had endorsed the approach that in the second phase of the IGF Code development, the CCC Sub-Committee could consider matters related to natural gas, in addition to low-flashpoint fuels other than natural gas, based on experience gained by the application of the IGF Code (MSC 94/21, paragraph 18.6).

3.20 Having noted that no comments on document CCC 2/3/3 had been submitted, the Sub-Committee decided to instruct the IGF Code Working Group to further consider document CCC 2/3/3 and advise the Sub-Committee on how best to proceed.

#### **RESEARCH PROJECTS RELATING TO LNG AS FUEL**

3.21 The Sub-Committee noted with appreciation the information in the following documents submitted by the Republic of Korea:

- .1 CCC 3/INF.13 on a research project the purpose of which was to identify potential risks of LNG bunkering and to present a statistical method for determining the safe exclusion zone around LNG bunkering stations with the help of a purpose-built computer program;
- .2 CCC 3/INF.14 on the results of an LNG leakage rate analysis, conducted as part of a research project, to be used as a reference for the risk assessment required in the context of paragraph 8.3.1.1 in part A-1 of the IGF Code;



- .3 CCC 3/INF.15 on a research project which was conducted with the aim of investigating the extent of the potential risks of a high pressure LNG fuel gas supply system through a case study; and
- .4 CCC 3/INF.16 on a research project in which a quantitative risk assessment of LNG bunkering port side was completed by means of parametric analysis.

#### **LNG AS FUEL FOR SHIPS TRADING IN SHALLOW WATERS**

3.22 The Sub-Committee noted with appreciation the information on experience gained in using the IGF Code for vessels trading in shallow waters provided by Germany in document CCC 3/INF.24 and agreed to refer the document to the IGF Code Working Group for information purposes.

#### **ESTABLISHMENT OF A WORKING GROUP**

3.23 The Sub-Committee established the Working Group on Amendments to the IGF Code and Development of Guidelines for Low-flashpoint Fuels and instructed it, taking into account comments made and relevant decisions taken in plenary, to:

- .1 finalize the draft amendments to the IGF Code regarding fuel cells, based on annex 2 to document CCC 3/3;
- .2 further develop the draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel, based on annex 1 to document CCC 3/3, taking into account documents CCC 3/3/1, CCC 3/INF.22 and CCC 3/INF.23;
- .3 further consider document CCC 2/3/3 and advise the Sub-Committee on how best to proceed, taking into account document CCC 3/INF.24;
- .4 if time permits, further consider and advise the Sub-Committee with regard to which safety topics and parts of the draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel ought to be forwarded to other sub-committees and, where possible, prepare specific requests as to the input sought of the other sub-committees;
- .5 update the work plan for phase 2 of the development of the IGF Code (CCC 1/WP.3, annex 3), taking into account the progress made at this session; and
- .6 consider whether it is necessary for the correspondence group to be re-established and, if so, prepare terms of reference for consideration by the Sub-Committee.

#### **REPORT OF THE WORKING GROUP**

3.24 Having considered the part of the report of the working group (CCC 3/WP.3) dealing with this item, the Sub-Committee took action as described in paragraphs 3.25 to 3.28 below.

## **Fuel cells**

3.25 The Sub-Committee noted the progress made by the working group with regard to the development of draft amendments to the IGF Code concerning fuel cells, as set out in annex 1 to document CCC 3/WP.3, and endorsed the working group's decision regarding the development of a new draft part E to the IGF Code.

3.26 Having also endorsed the working group's decisions regarding the developed safety provisions of the draft part E that had not been identified as unresolved, the Sub-Committee noted the unresolved issues that had been identified by the working group as needing further consideration (CCC 3/WP.3, paragraphs 4 to 25).

## **Methyl/ethyl alcohol**

3.27 The Sub-Committee noted that, owing to time constraints, the working group had been unable to further develop the draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel or to further consider and advise the Sub-Committee with regard to which safety topics and parts of the draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel ought to be forwarded to other sub-committees.

## **Other proposed amendments to the IGF Code**

3.28 Having noted that, owing to time constraints, the working group had been unable to consider document CCC 2/3/3 (China), the Sub-Committee agreed to postpone consideration of the proposals contained in the aforementioned document until CCC 4.

## **Re-establishment of the correspondence group**

3.29 Having considered the above matters and in order to progress the work intersessionally, the Sub-Committee decided to re-establish the Correspondence Group on Development of Technical Provisions for the Safety of Ships using Low-flashpoint Fuels, under the coordination of Sweden<sup>1</sup>, and instructed it to:

- .1 finalize the draft amendments to the IGF Code regarding fuel cells, based on annex 1 to document CCC 3/WP.3;
- .2 further develop the draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel, based on annex 1 to document CCC 3/3, taking into account documents CCC 3/3/1, CCC 3/INF.22 and CCC 3/INF.23;
- .3 further consider which safety topics and parts of the draft technical provisions for the safety of ships using methyl/ethyl alcohol as fuel should be forwarded to other sub-committees and, where possible, prepare specific requests as to the input sought by the other sub-committees;

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<sup>1</sup>

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- .4 observe and initiate, as and when necessary, the check/monitoring sheet and the record format as contained in annexes 2 and 3 to the *Guidance on drafting of amendments to the 1974 SOLAS convention and related mandatory instruments* (MSC.1/Circ.1500); and
- .5 submit a written report to CCC 4.

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

3.30 Consequently, the Sub-Committee invited the Committee to extend the target completion year for this output to 2017.

### **4 SAFETY REQUIREMENTS FOR CARRIAGE OF LIQUEFIED HYDROGEN IN BULK**

#### **Background**

4.1 The Sub-Committee recalled that MSC 94, having considered document MSC 94/18/3 (Australia and Japan), proposing to develop safety requirements for carriage of liquefied hydrogen in bulk and to amend the IGC Code, agreed to include the new output on "Safety requirements for carriage of liquefied hydrogen in bulk" in the biennial agenda of the Sub-Committee, with a target completion year of 2016.

4.2 The Sub-Committee also recalled that CCC 2, having considered document CCC 2/4 (Australia and Japan), proposing:

- .1 the development of interim recommendations for the carriage of hydrogen in bulk, in order to complete the output by the target completion year; and
- .2 the development of relevant amendments to the IGC Code at a future time, as experience was gathered from shipments of liquefied hydrogen in bulk based on the interim recommendations,

established the Correspondence Group on Development of Safety Requirements for Carriage of Liquefied Hydrogen in Bulk and instructed it to develop draft interim recommendations for carriage of liquefied hydrogen in bulk, taking into account the information contained in the annex to document CCC 2/4, and submit a report to this session.

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

4.3 The Sub-Committee had for its consideration the report of the Correspondence Group on Development of Safety Requirements for Carriage of Liquefied Hydrogen in Bulk (CCC 3/4), providing the draft Interim recommendations for carriage of liquefied hydrogen in bulk (draft Interim recommendations) (CCC 3/4, annex) and information on the relevant discussions.

4.4 In considering the report of the correspondence group, the Sub-Committee noted the following general views:

- .1 more work should be done before finalizing the draft Interim recommendations, in particular, the use of a risk assessment in the approval process ought to be limited, and prescriptive requirements need to be developed to mitigate hazards; and
- .2 practical trials at sea are required to progress the pilot project and, therefore, finalization of the draft Interim recommendation should be considered as a matter of urgency.

4.5 Taking the above views into account, the Sub-Committee agreed that further careful consideration should be undertaken before finalizing the draft Interim recommendations.

4.6 In considering actions requested in paragraph 89 of the correspondence group's report (CCC 3/4), the Sub-Committee approved the report in general and took actions as outlined in paragraphs 4.7 to 4.10 below.

4.7 The Sub-Committee noted the information of the discussion on the aspects related to the risk assessment, special segregation requirements, sloshing, electrical equipment, machinery and equipment to safely handle hydrogen, permeability, tests carried out by the United States on liquefied hydrogen (LH<sub>2</sub>) pool fires, prevention of leakage from pipes, design of cargo containment systems, criteria of oxygen concentration and quenching distance, without taking any specific actions.

4.8 With regard to the issues listed in paragraph 89.3 of document CCC 3/4, the Sub-Committee considered:

- .1 document CCC 3/4/1 (Japan), proposing:
  - .1 that, in addition to helium, a mixture of 5% hydrogen and 95% nitrogen, which is classified as non-flammable in ISO 10156:2010 "Gases and gas mixtures – Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets", should be acceptable for leak testing; and
  - .2 alternative texts for the last paragraph of draft Special Requirement No.24 on piping arrangements, regarding the applicability of the requirement to spaces constituting a part of the cargo containment system; and for paragraph 4.8.3 permitting thermal oxidation of hydrogen boil-off gas.
- .2 document CCC 3/INF.20 (Japan), inviting the Sub-Committee to note the outline of the hazard identification (HAZID) studies at the Front End Engineering Design (FEED) stage of a 2,500 m<sup>3</sup> liquefied hydrogen carrier and the subsequent analysis of the HAZID studies conducted by Japan; and
- .3 document CCC 3/4/2 (Japan), drawing from the analysis of the HAZID studies reported in document CCC 3/INF.20 and proposing an additional special requirement on minimizing bolted flange connections of hydrogen piping, in conjunction with additional text, listing the issues that should be addressed in the risk assessment, to be added at the end of section 4.1 of the draft Interim recommendations.

4.9 The Sub-Committee also noted the following views expressed on these issues:

- .1 statements clearly defining the scope of application of the draft Interim recommendations and clarifying the need for further revisions, if they are to be applied to ships other than a pilot ship, should be included in the introductory notes of the draft Interim recommendations; and
- .2 acceptance of boil-off gas burning should be considered in detail, before taking any final decisions.

4.10 Following the discussion, the Sub-Committee agreed that a working group should be instructed to further review the 13 issues listed in paragraph 89.3 of document CCC 3/4, with a view to finalizing the draft Interim recommendations, based on the annex to this document.

#### **Establishment of a working group**

4.11 The Sub-Committee established the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service and instructed it, taking into account the comments and decisions made in plenary, to finalize the draft Interim recommendations for carriage of liquefied hydrogen in bulk, based on the annex to document CCC 3/4, together with the associated draft MSC resolution, taking into account documents CCC 3/4/1, CCC 3/4/2 and CCC 3/INF.20.

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

4.12 Having considered the part of the report of the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service (CCC 3/WP.4) dealing with this agenda item, the Sub-Committee endorsed the draft Interim recommendations for carriage of liquefied hydrogen in bulk along with the associated draft MSC resolution, as set out in annex 1, and invited MSC 97 to adopt them.

#### **Completion of the work on the output**

4.13 In view of the above, the Sub-Committee invited the Committees to note that the work on this output had been completed.

## **5 AMENDMENTS TO THE IMSBC CODE AND SUPPLEMENTS**

### **GENERAL**

5.1 The Sub-Committee noted that the Editorial and Technical Group (E&T), at its twenty-fifth session prepared the draft amendments (04-17) to the IMSBC Code.

5.2 The Sub-Committee also noted that, after consideration of documents submitted to this session, E&T 26 would be instructed to finalize the draft amendments (04-17) to the IMSBC Code for circulation and its subsequent adoption by MSC 98.

5.3 The Sub-Committee recalled that CCC 2 established a Correspondence Group on Evaluation of Properties of BAUXITE and COAL, with the terms of reference set out in paragraph 5.75 of document CCC 2/15, and instructed the Group to report to this session.

### **REPORT OF E&T 25**

5.4 The Sub-Committee considered the report of E&T 25 (CCC 3/5) together with the related documents submitted to this session and, having approved it in general, took action as indicated in paragraphs 5.5 to 5.35.

### **MHB Specification**

5.5 The Sub-Committee noted the deliberations of the Group regarding those individual schedules in the IMSBC Code that do not specify the basis for MHB classification and invited Member States and international organizations, in particular those that submitted the proposals that resulted in the inclusion of the affected individual schedules in the Code, to submit the

necessary supporting documentation to CCC 3, in order to justify the notational listing assignment.

### **Classification of Alumina Hydrate as MHB**

5.6 The Sub-Committee noted the discussions and deliberations of the Group with regard to the classification of Alumina Hydrate as MHB cargo and that there had been no submissions on this matter at this session.

### **Transportability test of nickel ore from New Caledonia**

5.7 With regard to the Rheolat 2 project to optimize a VTPB (Vibration Table with Penetration Bit) transportability test for New Caledonian nickel ores, the Sub-Committee noted the recommendation of the Group that before the implementation of the Rheolat test, it would be important to take into account remarks from the experts.

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

- .1 CCC 3/5/6 (France), proposing a draft CCC circular on the transportability test of nickel ore from New Caledonia; and
- .2 CCC 3/INF.5 (France), providing the final status of phase 2 of the Rheolat study, in particular, the context and conditions for implementing the transportability test for New Caledonian nickel ores.

5.9 Following discussion, the Sub-Committee noted the following views expressed on this matter:

- .1 the intention is not to amend the IMSBC Code to include the conditions for transport (test method) for New Caledonian nickel ores; and
- .2 a State has the right to endorse and approve its own method under paragraphs 4.1.4 and 8.1 of the IMSBC Code.

5.10 After consideration, the Sub-Committee agreed that, at this stage, the preferred method for disseminating the information regarding the test method to parties interested in the transport of New Caledonian nickel ores was through an IMO circular letter. Subsequently, the Sub-Committee invited the delegation of France to upload the information to the GISIS module on reporting (MSC 94/21, paragraph 15.3).

5.11 The Sub-Committee also agreed to refer documents CCC 3/5/6 and CCC 3/INF.5 to the Working Group on IMSBC Code Matters in order to advise France on possible improvements to the proposed text and technical matters.

### **Bulk cargo shipping name in relation to dangerous goods transported in solid bulk form**

5.12 The Sub-Committee agreed with the decision of the Group to amend the requirements (paragraph 4.1.1 of the Code) regarding the appropriate Bulk Cargo Shipping Name (BCSN) to be used when dangerous goods are transported in solid bulk form and the consequential amendments to the definition of BCSN in the Code.

### **Table for "Characteristics"**

5.13 The Sub-Committee endorsed the Group's recommendation to manage the information related to the table for "Characteristics", in particular, the information to be included when the material may possess chemical hazards when carried in bulk (MHB) in addition to hazards corresponding to materials classified as dangerous goods in the IMDG Code.

5.14 Having considered document CCC 3/5/13 (Canada) proposing to amend the "Characteristics" table of individual schedules of solid bulk cargoes in appendix 1 and the related provisions of the Code, in particular the "Class" box, to adequately reflect the hazards associated with the carriage of bulk cargoes, the Sub-Committee noted the following views expressed on this matter:

- .1 the way to differentiate when there are no IMDG subsidiary risks related to a cargo contained in the IMSBC Code should be clarified;
- .2 descriptive physical properties may not be needed;
- .3 careful consideration should be given before amending the definition for MHB, as it may cause confusion;
- .4 this proposal is related to the technical classification of the cargo and would not result in any administrative burdens to Administrations and, therefore, a new output is not necessary; and
- .5 the proposal should be considered for future work related to amendments to the IMSBC Code.

5.15 After consideration, the Sub-Committee noted that this proposal could be the basis for future work on this matter but, at this stage, its inclusion in amendment 04-17 would not be feasible. In this context, it was agreed to refer document CCC 3/5/13 to E&T 26 for further consideration, with a view to advising the Sub-Committee at its next session.

### **Ammonium Nitrate-based Fertilizer (non-hazardous)**

5.16 The Sub-Committee, having noted the discussions and deliberations of the Group on the proposed amendment to the individual schedule for AMMONIUM NITRATE-BASED FERTILIZER (non-hazardous) and its invitation to interested delegations to submit related documents to CCC 3 with a view to providing further justification and more information, considered the following documents:

- .1 CCC 3/5/9 (Germany), proposing to classify AMMONIUM NITRATE-BASED FERTILIZER (non-hazardous) as an MHB (OH) Group B cargo, based on more detailed data regarding the hazards connected to the loading and storage of bulk material in cargo holds; and
- .2 CCC 3/5/14 (CEFIC), commenting on document CCC 3/5/9, in particular that AMMONIUM NITRATE-BASED FERTILIZERS (non-hazardous) are in themselves non-hazardous products and in the case of the cargo being classified as MHB (OH), the criteria for such classification should be clearly specified.

5.17 In considering the above documents, the Sub-Committee noted the following views expressed on this matter:

- .1 there are currently three individual schedules related to the above cargo in the IMSBC Code and careful consideration should be taken in order to avoid overlap between their current classifications;
- .2 the accident report of the general cargo ship **Purple Beach** has not yet been published;
- .3 the OH classification should be analysed in detail in relation to the cargo and the MHB criteria;
- .4 improving awareness and hazard communication for the ship's crew is necessary, but other means, such as training rather than reclassification of the cargo, could be easier; and
- .5 a comprehensive consideration of all information contained in the existing schedule is necessary in order to determine and update the classification of the cargo, while, in the meantime, the current Group C schedule should not be deleted.

5.18 While the proposal in document CCC 3/5/9 (Germany) was not widely supported, the Sub-Committee recognized that there is a classification issue that needs to be addressed and that more technical information (i.e. cargo specifications, composition) is required for that purpose. Subsequently, the Sub-Committee agreed to refer documents CCC 3/5/9 and CCC 3/5/14 to E&T 26 for further consideration and instructed the Group to advise the Sub-Committee accordingly at its next session.

#### **Glass Cullet**

5.19 The Sub-Committee endorsed the Group's decision to amend the existing individual schedule for "GLASS CULLET" in order to incorporate the proposed individual schedule for flat glass cullet.

#### **Monocalciumphosphate (MCP)**

5.20 The Sub-Committee noted that additional information was needed in order to finalize the section for "Emergency procedures" in the draft individual schedule for MONOCALCIUMPHOSPHATE (MCP).

#### **Seed Cake**

5.21 The Sub-Committee noted the discussions and deliberations of the Group regarding potential amendments to the existing schedules for SEED CAKE and endorsed the Group's recommendations on the need for a road map to define the path that would lead to amending the set of schedules related to seed cakes.

5.22 In this regard, the Sub-Committee had the following documents for its consideration:

- .1 CCC 3/5/11 (Australia, Canada, China, Italy, Spain, the United States and BIMCO), proposing to revise the existing individual schedule for SEED CAKE (non-hazardous) in the IMSBC Code; the introduction of individual schedules for Group B (MHB) and Group C (non-hazardous); and that a new paragraph 9.3.3.3bis and the associated classification diagram be included in section 9.2.3.3 of the IMSBC Code;



- .2 CCC 3/5/18 (Germany), commenting on the document CCC 3/5/11, in particular, providing specific comments on the draft individual schedules as set out in document CCC 3/5/11, in order to address some ambiguities; and
- .3 CCC 3/6/2 (Spain), providing some differences identified between the UN Model Regulations and the IMSBC and IMDG Codes, for UN 1386 SEED CAKE, in particular regarding the contents of oil and moisture, and proposing to achieve a common definition of UN 1386 by amending the IMDG Code, as well as consideration of possible consequential amendments to the individual schedule for SEED CAKE in the IMSBC Code.

5.23 Following discussion, the Sub-Committee noted the following views expressed on this matter:

- .1 the proposal in document CCC 3/5/11 was generally supported based on the view that it provides a good basis in order to make progress on this matter, with the understanding that there is room for improvement with a more uniform approach, such as consideration of the inclusion of grain screening pellets in the new proposed schedule for seed cakes and other residues of processed oily vegetables due to their apparent similar properties, which could be further analysed;
- .2 the proposed flow chart in annex 3 to document CCC 3/5/11 may apply also to grain screening pellets, so the introductory sentence could be revised in order to clarify the range of its application;
- .3 there are apparent differences between the UN Model Regulations and the IMSBC and IMDG Codes for UN 1386 SEED CAKE, as indicated in document CCC 3/6/2. Nevertheless, it is recognized that, when possible, these Codes should be fully harmonized with the UN Model Regulations, but harmonization, in some cases, should not be a priority over safety; and
- .4 action needs to be taken in order to clarify the distinction between types of seed cakes, but updating the existing schedules is a complex matter and will affect the proper shipping name as contained in the UN Orange Book and, therefore, a cautious approach is necessary.

5.24 After consideration, the Sub-Committee decided to refer documents CCC 3/5/11, CCC 3/5/18 and CCC 3/6/2 to the Working Group on IMSBC Code Matters for further consideration.

5.25 Having noted the actions taken by E&T 25 to amend appendix 4 of the IMSBC Code in order to address the inconsistencies between the existing schedules for SEED CAKE and appendix 4, the Sub-Committee decided to instruct E&T 26 to further consider this matter.

### **Fishmeal**

5.26 Having noted that in the draft amendment for the individual schedule for FISHMEAL (FISHCRAP), STABILIZED UN 2216 Anti-Oxidant treated, as set out in annex 1 to document CCC 3/5, the sentence under BCSN is to be deleted, which may create confusion, the Sub-Committee instructed E&T 26 to further consider the proposed amendment.

## Harmonization of the Code

5.27 The Sub-Committee endorsed the actions of the Group regarding the editorial and substantial amendments and harmonization of existing individual schedules.

5.28 Having noted the Group's view on the possible wording harmonization in the Code (e.g. reference to "section" and "paragraph"), the Sub-Committee considered document CCC 3/5/8 (Finland), proposing editorial amendments to the provisions in the IMSBC Code, in order to address the inconsistencies with regard to the usage of the words "section", "subsection" and "paragraph" throughout the Code.

5.29 Following discussion, the Sub-Committee noted the concerns expressed on how the proposed harmonization would be applied to the Code. Some delegations also highlighted that the proposed harmonization could result in a burden for Administrations and, therefore, further consideration is needed.

5.30 After consideration, the Sub-Committee agreed that the above proposal should be considered in future as part of a comprehensive revision of the Code. Notwithstanding, the Sub-Committee agreed to invite E&T 26, if time permits, to consider document CCC 3/5/8 and provide constructive advice to Finland regarding harmonization of the Code in relation to the current structure (i.e. sections, subsections, etc.) for future reference.

## Pig iron by-products

5.31 The Sub-Committee considered document CCC 3/5/12 (IIMA), proposing to extend the scope of application of the draft schedule for BLAST FURNACE IRON BY-PRODUCTS to include by-products from the production of iron via the smelting of ilmenite and titaniferous magnetite, by changing the name to IRON: BY-PRODUCTS FROM SMELTING OF IRON ORE, ILMENITE AND TITANIFEROUS MAGNETITE and amend the "Description" section.

5.32 Having considered the technical information provided, the Sub-Committee agreed that the most appropriate name for this cargo would be "Iron Smelting by-Products" and that the "Description" section could be improved.

5.33 Subsequently, the Sub-Committee agreed, in principle, to the above proposal and decided to refer document CCC 3/5/12 to E&T 26 for further consideration and inclusion, if appropriate, in the draft amendments (04-17) to the Code.

## Draft amendment 04-17

5.34 Having considered the above matters, the Sub-Committee agreed to the draft amendments (04-17) to the IMSBC Code, as set out in annex 1 to document CCC 3/5, and referred them to E&T 26 for finalization.

## Amendments to MSC.1/Circ.1395/Rev.2

5.35 The Sub-Committee agreed to the consequential amendments to the *Lists of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted or for which a fixed gas fire-extinguishing system is ineffective* (MSC.1/Circ.1395/Rev.2), as set out in annex 2 to document CCC 3/5, and referred it to the E&T Group for finalization.

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## REPORT OF THE CORRESPONDENCE GROUP ON EVALUATION OF PROPERTIES OF BAUXITE AND COAL

5.36 The Sub-Committee considered the report of the correspondence group (CCC 3/5/1) together with the related documents submitted to the session and, having approved it in general, took action as indicated in paragraphs 5.37 to 5.56.

### Evaluation of properties of Bauxite

5.37 The Sub-Committee noted the discussion and deliberations of the correspondence group, in particular that a Global Bauxite Working Group (GBWG) has been established, which may be in a position to provide a global industry peer review report to the next session of the Sub-Committee.

5.38 The Sub-Committee considered paragraphs 5 to 10 of document CCC 3/5/21 (Australia), recommending the establishment of a correspondence group by CCC 3 to consider the research work of the GBWG prior to CCC 4, in order to finalize consideration of suitable schedules for bauxite both Group A and Group C. Australia also recommended that, while the work on bauxite continues, CCC.1/Circ.2, containing information on the carriage of bauxite that may liquefy, should remain in effect.

5.39 Following discussion, the Sub-Committee agreed to wait for the results of the GBWG research, which is expected to be provided to CCC 4, and also agreed that CCC.1/Circ.2 should remain in effect while the work on bauxite continued.

5.40 The Sub-Committee, having noted the comments of the correspondence group regarding the marine safety investigation report on the loss of the bulk carrier **Bulk Jupiter**, considered document CCC 3/5/20 (Italy, ICS, INTERCARGO, the International Group of P&I Clubs and BIMCO) commenting on the correspondence group's report and proposing amendments to the IMSBC Code to enhance safety procedures for the ship and crew when carrying Group A cargoes, in particular, that the testing requirement ought to be checked before loading and should be made more prominent by placing it appropriately in any of the parts of section 4, 7 or 8, to highlight the risk of liquefaction. The co-sponsors also invited the Sub-Committee to note that INTERCARGO's Bulk Carrier Casualty Report 2005-2015 (III 3/INF.26) had reported that cargo shift and/or liquefaction is still a serious concern in the safe carriage of solid bulk cargoes and that additional safety improvements are still needed and necessary.

5.41 Following the discussion, the Sub-Committee noted the following views expressed on this matter:

- .1 there is a general concern regarding the continued loss of life at sea in connection with the need for clarity and improvement of relevant provisions to ensure that the moisture content of the cargoes that may liquefy is verified prior to loading, that care should be exercised when shippers declare moisture content below the TML, and emphasize the responsibility of shippers regarding reliable sampling;
- .2 the proposal in document CCC 3/5/20 intends to offer an alternative in order to enhance safety procedures for crews and ships carrying cargoes that may liquefy, but there are ambiguities in the proposed text, for example, the term "significant precipitation" is not well defined and the ambient humidity is not being considered in the proposal, nor is the ship's master considered involved in the moisture testing prior to loading, bearing in mind that the

master cannot be aware of the precipitation if the samples are taken prior to the arrival of the ship;

- .3 explicitly appointing shippers to be responsible for ensuring the moisture content may not solve the problem and it could be contradictory to section 1.4.3 of the Code, which provides the right to each government to assign this responsibility; and
- .4 the proposed amendments concern operational and administrative aspects rather than technical characteristics of the cargo. In particular, the proposed paragraph 3.7.1.1*bis* could be impractical and unrealistic in terms of implementation for all parties involved, considering that all wet cargoes should be tested and certificates are to be recognized by the Administrations.

5.42 In considering the above views, the Sub-Committee decided to refer the matter to the Working Group on IMSBC Code Matters for further consideration, but only for the proposed amendments to provisions 4.5.1 and 4.5.2, as contained in document CCC 3/5/20, and instructed the Group to advise the Sub-Committee on a possible way forward.

5.43 In this connection, the Sub-Committee noted that the correspondence group decided to wait for the results of ongoing research and to suspend the consideration on the adequacy of the current methods for determining the transportable moisture limit for Bauxite and also noted the discussion on the preliminary draft new individual schedule for Bauxite of Group A and the preliminary draft amendment to the individual schedule for Bauxite of Group C.

5.44 Consequently, the Sub-Committee agreed to instruct the Working Group on IMSBC Code Matters to further consider the issue of evaluation of the properties of Bauxite, with a view to developing draft terms of reference for a correspondence group.

#### **Modified Proctor/Fagerberg method for Coal**

5.45 The Sub-Committee noted the discussion of the correspondence group on the examination of test data provided by coal producers to validate the application of the modified Proctor/Fagerberg method for Coal to international coals.

5.46 The Sub-Committee also noted document CCC 3/INF.7 (Australia), providing five reports describing the findings of further testing carried out by the Australian Coal Industry's Research Program (ACARP).

5.47 The Sub-Committee further noted document CCC 3/INF.9 (Canada), providing the results of a research programme to evaluate the applicability of the modified Proctor/Fagerberg method for coal to typical Canadian coals, in particular, the result confirming that the modified Proctor/Fagerberg method for Coal is applicable to Canadian coals based on the testing of the samples provided.

5.48 In this context, the Sub-Committee agreed to incorporate the modified Proctor/Fagerberg test procedure for Coal in appendix 2 to the IMSBC Code.

5.49 The Sub-Committee considered paragraphs 3 and 4 of document CCC 3/5/21, providing more information on the modified Proctor/Fagerberg test for Coal, in particular, that it has been in use for all coal shipped from Australian ports since 1 January 2015 and that it has also been applied to blends of different coals during the same period. The Sub-Committee noted that Australia was of the opinion that experience remains a major factor in a shipper being able to identify the likelihood of formation of a wet base in coal cargoes, in the same way as it is for virtually all solid bulk cargoes.

5.50 After consideration, the Sub-Committee agreed to incorporate the procedure for determining the TML of blends of two or more coals and the draft new paragraph 1.5 of appendix 2 to the IMSBC Code.

5.51 Subsequently, the Sub-Committee agreed to the draft modified Proctor/Fagerberg test procedure for Coal, as contained in annex 2 to document CCC 3/5/1, for inclusion in the draft amendments (04-17) to the Code.

#### **Individual schedule for Coal**

5.52 The Sub-Committee noted the correspondence group's discussion regarding the inclusion of a generic precaution on moisture migration of blended coals, e.g. "due consideration shall be given to moisture migration and formation of dangerous wet base when blended coals are loaded" in the individual schedule for Coal. In this context, the Sub-Committee instructed the Working Group on IMSBC Code Matters to further consider this issue.

5.53 The Sub-Committee agreed to delete the sentence "can liquefy if predominantly fine 75% less than 5 mm coal" in the "Hazard" section of the existing individual schedule for Coal.

5.54 The Sub-Committee also agreed with the criterion based on particle size distribution for Group B only and to incorporate the mandatory application provision on the criteria for Group B only.

5.55 The Sub-Committee further agreed to incorporate the sentence "See sections 7 and 8 of this Code" in the "Hazard" section, and to the inclusion of the sentence "This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML)".

5.56 Subsequently, the Sub-Committee agreed to instruct the Working Group on IMSBC Code Matters, based on annex 3 to document CCC 3/5/1, to finalize the amendment to the individual schedule for Coal, in particular, to clarify the cargo group for coal, for inclusion in amendment 04-17 of the IMSBC Code.

#### **PROPOSALS FOR AMENDMENT 04-17 OF THE IMSBC CODE**

##### **Amendments to existing individual schedules and provisions in the IMSBC Code**

###### ***Corrections to amendment 03-15***

5.57 The Sub-Committee considered document CCC 3/5/2 (France) proposing corrections to amendment 03-15 as set out in resolution MSC.393(95), for both the English and French versions.

5.58 The Sub-Committee agreed to refer the above document to E&T 26 for further consideration, with a view to it providing corrections to the publication and include any editorial corrections in draft amendment 04-17, as appropriate.

###### ***Salt***

5.59 The Sub-Committee considered document CCC 3/5/7 (Finland), proposing to amend the individual schedule for SALT in appendix 1 of the IMSBC Code, in order to refer to the formation of a liquid base instead of a wet base. The Sub-Committee decided to refer the document to E&T 26 for further consideration.

### **Corrosivity test protocols for solid bulk cargoes**

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

- .1 CCC 3/5/17 (Australia), advising on concerns related to the efficacy of the tests used to assess solid bulk materials as corrosive solids in section 9.2.3.7.3 of the IMSBC Code and informing that Australian industry will be working with international partners on this issue with the intention of developing a solution in cooperation with their respective competent authorities;
- .2 CCC 3/5/19 (IIMA), providing comments on document CCC 3/5/17, and in particular, welcoming the pragmatic approach by application of an existing test for corrosivity in soils (DIN 50929-3) to assess localized corrosion in IRON ORE and IRON ORE FINES and expressing concerns over the C.1 test being mandated for other complex bulk mineral cargoes;
- .3 CCC 3/INF.17 (Australia), providing a literary review of the C.1 test prescribed in section 9.2.3.7.3 of the IMSBC Code to classify corrosive solids;
- .4 CCC 3/INF.18 (Australia), providing a literature review of alternate tests to the C.1 test prescribed in section 9.2.3.7.3 of the IMSBC Code to determine solid bulk cargoes corrosion to metals; and
- .5 CCC 3/INF.19 (Australia), providing information on an alternative test method for the classification of corrosive solids under section 9.2.3.7.3 of the IMSBC Code.

5.61 The Sub-Committee noted that there was general agreement and support for an alternative test method for iron ore fines which could also be used for other mineral cargoes, but the present proposal still required further studies, practice and experience before its application through the IMSBC Code. In this regard, the delegation of Chile made a statement, the full text of which is set out in annex 10.

5.62 After discussion, the Sub-Committee expressed its appreciation to Australia for undertaking this project and encouraged Member States and international organizations to actively participate in the work coordinated by Australia.

### **Proposals for new individual schedules**

#### ***Olivine Sand of Group A and Olivine Sand and Olivine Granularly and gravel aggregate products of Group C***

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

- .1 CCC 3/5/3 (Norway), proposing a new individual schedule for Olivine Sand as a Group A cargo in the IMSBC Code;
- .2 CCC 3/5/4 (Norway), proposing a new individual schedule for Olivine Granularly and gravel aggregate products as a Group C cargo in the IMSBC Code; and

- .3 CCC 3/INF.2 (Norway), containing the cargo information to support the proposed new individual schedules for Olivine Sand and Olivine Granularly and gravel aggregate products.

5.64 After consideration, the Sub-Committee agreed, in principle, to the above proposals and decided to refer these documents to E&T 26 for further consideration and inclusion, if appropriate, in the draft amendments (04-17) to the Code.

***Direct Reduced Iron (D) (By-product fines with moisture content typically < 12%)***

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

- .1 CCC 3/5/5 (Belgium and IIMA), proposing new individual schedule for Direct Reduced Iron (D) (By-product fines with moisture content typically < 12%);
- .2 CCC 3/INF.3 (IIMA), providing background information on the provenance, manufacture, composition and properties of DRI (D), in order to support the proposed new individual schedule for Direct Reduced Iron (D), as set out in document CCC 3/5/5; and
- .3 CCC 3/INF.4 (IIMA), providing supporting information for the proposal of a revised schedule for Direct Reduced Iron (D) (By-product fines with moisture content typically < 12%), in particular, the information related to inadequacies identified by E&T 21 and the reasons for the existing schedule for DIRECT REDUCED IRON (C).

5.66 Following the discussion, the Sub-Committee noted the views expressed regarding the urgent need for the shipping industry to have an individual schedule for DRI (D) within the IMSBC Code. The Sub-Committee also noted the need for further clarification and additional information on ventilation and height of ventilators, MHB hazards, self-heating and oxygen depletion. In this regard, the delegation of Trinidad and Tobago made a statement, which is set out in annex 10.

5.67 After consideration, the Sub-Committee agreed to refer this matter to E&T 26 and instructed the Group to further consider the draft individual schedule for Direct Reduced Iron (D) (By-product fines with moisture content typically < 12%), using the annex to document CCC 3/5/5 as a basis, taking into account documents CCC 3/INF.3 and CCC 3/INF.4, and advise CCC 4 accordingly.

***Foam glass gravel***

5.68 The Sub-Committee considered documents CCC 3/5/10 and CCC 3/INF.6 (Germany), proposing a new individual schedule for Foam glass gravel and providing supporting documentation for the new individual schedule for Foam glass gravel, the IMO Solid Bulk Cargo Information Reporting Questionnaire, the Material Safety Data Sheet and images of Foam glass gravel.

5.69 In this regard, the delegation of Germany advised that an updated Material Safety Data Sheet (MSDS) would be provided to E&T 26 for its consideration.

5.70 After consideration, the Sub-Committee agreed in principle to the above proposal and decided to refer it to E&T 26 for further consideration and inclusion, if appropriate, in the draft amendments (04-17) to the Code.

***Sugarcane Biomass Pellets***

5.71 The Sub-Committee considered documents CCC 3/5/15 and CCC 3/INF.11 (Brazil), proposing a new individual schedule for Sugarcane Biomass Pellets in the IMSBC Code as a Group B cargo and providing supporting documentation for the new individual schedule for Sugarcane Biomass Pellets, such as the IMO Solid Bulk Cargo Information Reporting Questionnaire, Material Safety Data Sheet, ESG Analysis Reports and Ignition, Burning Rate and Explosivity Testing of Sugar Cane Dust.

5.72 After consideration, the Sub-Committee agreed, in principle, to the above proposal and decided to refer it to E&T 26 for further consideration and inclusion, if appropriate, in the draft amendments (04-17) to the Code.

***Palm kernel shells***

5.73 The Sub-Committee considered documents CCC 3/5/16 and CCC 3/INF.21 (Liberia, the Marshall Islands, Poland and the International Group of P&I Clubs), proposing a new individual schedule for Palm kernel shells and providing additional technical information, in particular, information based on supplementary investigation research undertaken after two recent incidents involving the production of significant quantities of methane gas.

5.74 The Sub-Committee welcomed the proposal, in general, and noted that various physical properties, such as particle size, moisture content and fibre and oil content as well as other technical matters such as MHB hazards and ventilation, needed further analysis.

5.75 Having agreed, in principle, to the proposal, the Sub-Committee decided to refer it to E&T 26 for further consideration and inclusion, if appropriate, in the draft amendments (04-17) to the Code.

**ESTABLISHMENT OF THE WORKING GROUP**

5.76 Having considered the above matters, the Sub-Committee established the Working Group on IMSBC Code Matters and instructed it, taking into account the comments and decisions made in plenary and documents CCC 3/5/1, CCC 3/5/11, CCC 3/5/18, CCC 3/5/20 and CCC 3/6/2, to:

- .1 finalize the draft amendments to the individual schedule for COAL based on annex 4 to document CCC 3/5/1;
- .2 prepare draft terms of reference for the Correspondence Group on the Evaluation of properties of BAUXITE and revision of individual schedules for SEED CAKE, taking into account documents CCC 3/5/1, CCC 3/5/11, CCC 3/5/18, CCC 3/5/20 and CCC 3/6/2;
- .3 further consider the draft amendments to paragraphs 4.5.1 and 4.5.2 of the IMSBC Code, based on document CCC 3/5/20; and
- .4 if time permits, consider the transportability test of nickel ore from New Caledonia as set out in the annex to document CCC 3/5/6, taking into account document CCC 3/INF.5, with a view to providing comments, as appropriate.



## REPORT OF THE WORKING GROUP

5.77 Having considered the part of the report of the Working Group on IMSBC Code Matters (CCC 3/WP.5) dealing with this agenda item, the Sub-Committee took action as outlined in paragraphs 5.78 to 5.81 below.

### Individual schedule for COAL

5.78 The Sub-Committee endorsed the draft amendments to the individual schedule for COAL, as set out in annex 1 to document CCC 3/WP.5, with a view to inclusion in the draft amendments (04-17) to the IMSBC Code.

### Responsibility for ensuring that a test to determine the TML of a solid bulk cargo is conducted

5.79 The Sub-Committee also endorsed the draft amendments to paragraphs 4.5.1 and 4.5.2 of the IMSBC Code, highlighting the responsibility of the shipper for ensuring that a test to determine the TML of a solid bulk cargo is conducted, as set out in annex 2, and invited MSC 97 to approve them as an urgent matter (CCC 2/15, paragraph 12.8.4), with a view to adoption by MSC 98.

### Establishment of a correspondence group

5.80 With regard to the evaluation of properties of BAUXITE and revision of individual schedules for SEED CAKE, and having taken into account the recommendation of the working group, the Sub-Committee established a Correspondence Group on Evaluation of Properties of BAUXITE and revision of individual schedules for SEED CAKE, under the coordination of Japan,<sup>2</sup> and instructed it, taking into account the comments and decisions made at CCC 3 and comments related to the revision of individual schedules for SEED CAKE made at E&T 26, if any, to:

- .1 consider the draft report of the research conducted by the Global Bauxite Working Group (GBWG), to be submitted by end of March 2017, and consider the final report, which is to be submitted to the correspondence group by end of April 2017;
- .2 consider the adequacy of the current methods for determining the transportable moisture limit (TML) for BAUXITE and develop, as necessary, new and/or amended existing methods to be included in appendix 2 of the IMSBC Code;
- .3 prepare a draft individual schedule for BAUXITE as Group A cargo and review the existing BAUXITE schedule, taking into account annexes 1 and 2 to document CCC 3/5/1;

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<sup>2</sup>

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- .4 prepare individual MHB and non-hazardous schedules for SEED CAKE AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES and SEED CAKE AND OTHER RESIDUES OF PROCESSED OILY VEGETABLES (non-hazardous), based on annexes 1 and 2 to document CCC 3/5/11, taking into account document CCC 3/5/18;
- .5 prepare the draft amendments to the IMSBC Code for the classification of SEED CAKE cargoes, based on annex 3 to document CCC 3/5/11;
- .6 consider the possible amendments to individual schedules for SEED CAKE UN 1386(a), SEED CAKE UN 1386(b) and SEED CAKE UN 2217, and the consequential amendments to the IMDG and IMSBC Codes, taking into account documents CCC 3/5/11 and CCC 3/5/18;
- .7 consider the possible harmonization within the IMDG and IMSBC Codes and UN Model Regulations with regard to SEED CAKE UN 1386 and SEED CAKE UN 2217, taking into account document CCC 3/6/2; and
- .8 submit a report to CCC 4.

### **Transportability test of nickel ore from New Caledonia**

5.81 The Sub-Committee encouraged interested Member States and international organizations to provide comments (if any) directly to the delegation of France, with regard to the transportability test of nickel ore from New Caledonia, set out in documents CCC 3/5/6 and CCC 3/INF.5.

### **DRAFT AMENDMENTS (04-17) TO THE IMSBC CODE AND INSTRUCTIONS TO THE E&T GROUP**

5.82 Having considered all of the matters under this agenda item, the Sub-Committee agreed to the draft amendments (04-17) to the IMSBC Code and authorized E&T 26 to finalize them, based on the documents submitted to CCC 3 and taking into account comments made and decisions taken by the Sub-Committee, excluding matters related to HME substances and paragraphs 4.5.1 and 4.5.2 of the Code, with a view to submitting the draft amendments to MSC 98 for consideration and adoption (see also paragraphs 5.2 and 5.79), and to submit a written report to CCC 4. In this regard, the Sub-Committee also instructed E&T 26 to prepare related recommendations and circulars for submission to MSC 98 for approval, together with the adoption of amendments to the IMSBC Code.

5.83 Subsequently, the Sub-Committee requested the Secretary-General to circulate, in accordance with SOLAS article VIII, the draft amendments to the IMSBC Code as prepared by E&T 26, for consideration and subsequent adoption by MSC 98.

5.84 The Sub-Committee also instructed E&T 26 to identify and correct any editorial mistakes in previous amendments of the Code and take action as appropriate.

## **6 AMENDMENTS TO THE IMDG CODE AND SUPPLEMENTS**

### **GENERAL**

6.1 The Sub-Committee recalled that the amendments (37-14) to the IMDG Code, adopted by resolution MSC.372(93), entered into force on 1 January 2016.

6.2 The Sub-Committee also recalled that MSC 96 adopted the amendments (38-16) to the IMDG Code by resolution MSC.406(96), which is envisaged to enter into force on 1 January 2018 and on a voluntary basis from 1 January 2017.

6.3 The Sub-Committee further recalled the related decisions of MSC 96 and MEPC 69 on this output, in particular that MSC 96 approved MSC.1/Circ.1522 on *Amendments to the Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS Guide)*. In this regard, the Committee, having taken into account the number of times that MSC/Circ.1025 had been amended, instructed the CCC Sub-Committee to consider, at the next revision of the EmS Guide, preparing a new draft revised MSC circular containing a consolidated version of the Guide for ease of reference, rather than continue issuing MSC circulars every two years containing only amendments. The Sub-Committee was invited to take into account that a new consolidated MSC circular with a new number may result in consequential changes to references contained in the IMDG Code.

#### **REPORT OF E&T 24**

6.4 The Sub-Committee considered the report of E&T 24 (CCC 3/6) together with the related documents submitted to the session and, having approved it in general, took action as indicated in paragraphs 6.5 to 6.20.

#### **Editorial corrections to amendment 37-14 of the Code**

6.5 The Sub-Committee noted that the Group finalized editorial corrections to amendment 37-14 of the Code (resolution MSC.372(93)) and that the Secretariat prepared and issued the corrigendum, as set out in document MSC 93/22/Add.2/Corr.1.

6.6 The Sub-Committee also noted that the Group agreed to the editorial corrections applicable to the French and Spanish text of amendment 37-14 to the IMDG Code (resolution MSC.372(93)) and that the Secretariat prepared and issued the corrigendum, as set out in document MSC 93/22/Add.2/Rev.1/Corr.2 for the French version and MSC 93/22/Add.2/Corr.1 for the Spanish version.

#### **Amendment 38-16 of the IMDG Code**

#### ***Issues to be considered by the UN TDG Sub-Committee***

6.7 The Sub-Committee noted that, as requested by E&T 24, the Secretariat had informed the forty-eighth session of the UN TDG Sub-Committee that, as a consequence of the deletion of the text in the columns for test pressure and filling ratio in P 200, table 2, for UN 1058, the Group had agreed to insert letter "z" in the column for special provisions. In this regard, the Sub-Committee also noted that a consequential correction had been introduced in the UN Model Regulations.

6.8 The Sub-Committee further noted that, as requested by E&T 24, the Secretariat had informed the forty-eighth session of the UN TDG Sub-Committee that the requirements for lithium batteries contained in SPs 240, 312, 363 and 385, as contained in the nineteenth revised edition of the UN Model Regulations, were not incorporated into amendment 38-16.

#### ***Harmonization of the segregation table***

6.9 The Sub-Committee agreed to request E&T 26 to harmonize the segregation table contained in section 9 (9.3.3.2) of the IMSBC Code with the amended segregation table (7.6.3.5.2). Furthermore, the Sub-Committee noted the difference of dates of entry into force of the amendments to both Codes, i.e. 1 January 2018 for amendment 38-16 of the IMDG Code and 1 January 2019 for amendment 04-17 of the IMSBC Code.

**Stowage of goods of class 1**

6.10 Regarding the stowage of goods of class 1, the Sub-Committee noted the discussions of the Group with regard to stowage of goods of class 1 and the consequential amendment of the wording of note 2 in provision 7.21.2 of draft amendment 38-16.

**Reference to GESAMP Hazard Profiles in the IMDG Code**

6.11 The Sub-Committee, having noted the views of the Group on the reference to GESAMP Hazard Profiles in the IMDG Code, considered document CCC 3/6/9 (Republic of Korea), proposing to insert an informative and recommendatory reference note in the IMDG Code, in order to indicate those substances that meet "environmentally hazardous substances" criteria according to the latest GESAMP Hazard Profiles.

6.12 In the ensuing discussion, the Sub-Committee noted divergent views with regard to:

- .1 the value of including the GESAMP Hazard Profiles within the IMDG Code;
- .2 the potential to create confusion if the inclusion of the GESAMP Hazard Profiles in the IMDG Code is misinterpreted as implying that the GESAMP data is the preferred source; and
- .3 the potential impact on the principle of shipper self-classification.

6.13 Following consideration, the Sub-Committee noted that the intention of the proposal in document CCC 3/6/9 was to provide recommendatory information to facilitate the classification of cargo. However, the Sub-Committee could not reach an agreement as to whether or not the information proposed in document CCC 3/6/9 should be included in the IMDG Code or in what form.

6.14 In light of the lack of consensus, the Sub-Committee agreed that interested Member States and international organizations could submit proposals to future sessions of the Sub-Committee with a view to facilitating discussions and resolving any of the concerns expressed at CCC 2, E&T 25 and CCC 3.

**Training provisions**

6.15 The Sub-Committee noted that the Group had been unable to reach a general consensus regarding measures to improve the training provisions in chapter 1.3 of the IMDG Code.

**Finalization of amendment 38-16 to the IMDG Code**

6.16 The Sub-Committee noted that the Group had finalized draft amendment 38-16 to the IMDG Code and that the Secretariat had circulated the final draft amendment 38-16 of the IMDG Code, as set out in Circular Letter No.3598.

**Circulars related to the IMDG Code**

6.17 The Sub-Committee noted that the Group had finalized the draft amendments to the EmS Guide and the Secretariat had circulated MSC.1/Circ.1522 as approved by MSC 96.

6.18 The Sub-Committee also noted the opinion of the Group with regard to altering the title of MSC.1/Circ.1442 on *Inspection programmes for cargo transport units carrying dangerous goods* and that the Secretariat had circulated the MSC.1/Circ.1521 as approved by MSC 96, containing the amendments to MSC.1/Circ.1442, as finalized by the Group.

6.19 The Sub-Committee further noted that the Group had finalized the draft MSC circular on *Guidelines on consolidated IMO provisions for the safe carriage of dangerous goods in packaged form by sea* and that the Secretariat had circulated MSC.1/Circ.1520 as approved by MSC 96.

### **FAL Form 7**

6.20 The Sub-Committee noted that the fortieth session of Facilitation Committee had considered the additional information related to FAL Form 7, as prepared by E&T 24, and had decided that the most appropriate place to include the information was in the Explanatory Manual to the FAL Convention. The Sub-Committee also noted the amendments to the Annex to the FAL Convention, which are expected to enter into force on 1 January 2018.

## **PROPOSALS RELATING TO DRAFT AMENDMENT 39-18 OF THE IMDG CODE**

### **Segregation of organic peroxides, class 5.2**

6.21 The Sub-Committee had for its consideration document CCC 3/6/1 (CEFIC), proposing amendments to the segregation requirements of organic peroxides, UN 3101 to UN 3120, exempting organic peroxides and, in this regard, also proposing the inclusion of a new table in paragraph 7.2.6.3 of the IMDG Code.

6.22 In the ensuing discussion, the Sub-Committee noted the following comments on this matter:

- .1 the generic nature of the organic peroxides in the Dangerous Goods List entries makes it difficult to confirm that none of the possible formulations would react and create a dangerous atmosphere;
- .2 the existing paragraph 7.2.6.1 in the IMDG Code already allows for substances of the same class to be stowed together provided they do not react dangerously with each other;
- .3 further clarifications with regard to the ability of shippers to use existing criteria and exceptions in paragraph 7.2.6.1 in the IMDG Code would be useful;
- .4 no test data have been presented to show that the stowage of mixed peroxides is safe;
- .5 similar tables exist already in the IMDG Code for other groups of substances and inclusion of a table for organic peroxides would reduce the administrative burden on competent authorities;
- .6 the table in the annex of document CCC 3/6/1 is accurate and useful but could be made more user friendly; and
- .7 the cargoes listed in the proposed table are inherently compatible.

6.23 Having taken the above comments into account, the Sub-Committee instructed E&T 27 to further consider the proposal in document CCC 3/6/1 and report to CCC 4. The Sub-Committee also urged interested Member States and international organizations, in the time leading up to E&T 27, to work with each other, with a view to clarifying the type of test data needed and to narrow down the list of chemicals so that E&T 27 can be in a better position to have all the information and data available to better consider this issue and report to the next session of the Sub-Committee.

#### **Documentation for excepted packages of class 7 in chapters 5.1 and 5.4**

6.24 The Sub-Committee considered document CCC 3/6/3 (Germany), proposing to align the related provisions in the IMDG Code with the requirements of IAEA Safety Standards Series No.SSR-6, by requiring the information specified in the introductory sentence and subparagraphs (a) and (k) of section 546 of SSR-6 to be provided in a special dangerous goods transport document, and requiring this information to be available on board the ship.

6.25 After consideration, the Sub-Committee agreed, in principle, to the above proposal and decided to refer document CCC 3/6/3 to E&T 27 for further consideration and inclusion of the proposals, if appropriate, in the draft amendments (39-18) to the Code.

#### **Stowage away from sources of ignition**

6.26 The Sub-Committee considered document CCC 3/6/4 (Germany), proposing to amend the wording of 7.4.2.3.2 of the IMDG Code, in order to clarify the requirement to stow a container with flammable liquids (flashpoint below 23°C) and flammable gases 2.4 m away from sources of ignition, and agreed to refer the above document to E&T 27 for further consideration.

#### **Stowage of jet perforating guns**

6.27 The Sub-Committee had for its consideration document CCC 3/6/5 (United States), proposing to amend the existing stowage requirements for jet perforating guns, by amending the stowage of goods of class 1 requirements found in 7.1.4.4 and the addition of a new stowage code.

6.28 In the ensuing discussion, the Sub-Committee did not note any objections to the proposal but agreed that further consideration at E&T 27 was required to address issues such as the possible hazards arising in icy conditions, the ship type, segregation from initiation devices and the total explosive content of 91 kg. Subsequently, the Sub-Committee agreed to refer document CCC 3/6/5 to E&T 27 for further consideration.

#### **Stowage of goods of class 1**

6.29 The Sub-Committee considered document CCC 3/6/6 (United States), proposing to amend the Dangerous Goods List with regard to the existing stowage categories for articles of individual UN numbers, in order to balance regulation and the flow of commerce, and, having agreed in principle to the proposal, decided to refer the above document to E&T 27 for further consideration and inclusion of the proposals in the draft amendments (39-18) to the Code.

#### **Segregation codes in the Dangerous Goods List**

6.30 The Sub-Committee considered document CCC 3/6/7 (Germany), proposing to amend the assignment of segregation codes in the Dangerous Goods List, i.e. assign "SG35" in the Dangerous Goods List to all entries for amines and the other identified entries.

Furthermore, it proposed to discuss the amendments to the Dangerous Goods List with the entries for acids and fluorides where the SG36 and SG49 should be assigned.

6.31 After consideration, the Sub-Committee agreed, in principle, to this proposal and decided to refer document CCC 3/6/7 to E&T 27 for further consideration and inclusion of the proposals, if appropriate, in the draft amendments (39-18) to the Code.

#### **Segregation provisions for ammonium bromate**

6.32 The Sub-Committee considered document CCC 3/6/8 (Germany), proposing to clarify that ammonium bromate is prohibited for transport and therefore no segregation provision applies and to clarify the application of SP 352 and SP 900 to UN 1908 and UN 1791.

6.33 In the ensuing discussion, the Sub-Committee noted the view that the proposal relating to UN 1908 should be eventually submitted to UN TDC as it would affect other transport modes.

6.34 Following consideration, the Sub-Committee agreed to refer document CCC 3/6/8 to E&T 27 for further consideration.

#### **Harmonization of the packaging limits for viscous flammable liquids**

6.35 The Sub-Committee considered document CCC 3/6/10 (IPPIC), proposing to harmonize the package size limits which can cause certain viscous flammable liquids to be removed from Packing Group III, by amending the provision 2.3.2.5 of the IMDG Code, and having agreed, in principle, to the proposal, decided to refer the above document to E&T 27 for further consideration and inclusion of the proposal, if appropriate, in the draft amendments (39-18) to the Code.

#### **Battery-vehicles**

6.36 The Sub-Committee noted document CCC 3/INF.25 (CEFIC), providing a plan to develop draft amendments for chapter 6 of the IMDG Code related to the sea transport of battery-vehicles for compressed gases, and agreed to refer the document to E&T 27 with the aim of exchanging views and sharing information on this matter, if time permits.

### **DRAFT AMENDMENTS (39-18) TO THE IMDG CODE AND INSTRUCTIONS TO THE E&T GROUP**

#### **Instructions to the E&T Group**

6.37 The Sub-Committee authorized E&T 27, which is tentatively scheduled to be held in the spring of 2017, to prepare the draft amendments (39-18) to the IMDG Code, based on documents submitted to CCC 3 and taking into account comments made and decisions taken in plenary. E&T 27 was also instructed to take into consideration the outcome of the UN TDG Sub-Committee with regard to the corrections to the nineteenth revised edition of the UN Recommendations on the Transport of Dangerous Goods, Model Regulations. Furthermore, the Group should, at the next revision of the EmS Guide (if any), prepare a new draft revised MSC circular containing a consolidated version of the Guide for ease of reference, taking into account that a new consolidated MSC circular with a new number may result in consequential changes to references contained in the IMDG Code. The Group should also identify and correct any editorial mistakes of amendment 38-16 of the IMDG Code and submit a written report to CCC 4. The Maritime Safety Committee was invited to endorse this decision.

## **7 AMENDMENTS TO SOLAS REGULATIONS II-2/20.2 AND II-2/20-1 TO CLARIFY THE FIRE SAFETY REQUIREMENTS FOR CARGO SPACES CONTAINING VEHICLES WITH FUEL IN THEIR TANKS FOR THEIR OWN PROPULSION**

### **General**

7.1 The Sub-Committee recalled that MSC 96, following consideration of document MSC 96/23/9 (Antigua and Barbuda, France and IACS), proposing the development of amendments to SOLAS regulations II-2/20.2 and II-2/20-1 in order to address confusion regarding the provisions of SOLAS chapter II-2 relating to spaces carrying vehicles with fuel in their tanks and Special Provisions 961 and 962 in the IMDG Code, agreed to include in the 2016-2017 biennial agenda of the CCC Sub-Committee and the provisional agenda for CCC 3 a new output on "Amendments to SOLAS regulations II-2/20.2 and II-2/20-1 to clarify the fire safety requirements for cargo spaces containing vehicles with fuel in their tanks for their own propulsion", with a target completion year of 2017, in association with the SSE Sub-Committee as and when requested by the CCC Sub-Committee.

7.2 The Sub-Committee also recalled that MSC 96 agreed, in accordance with MSC.1/Circ.1481 and MSC.1/Circ.1500, that:

- .1 the amendments to be developed should apply to new and existing ships to which SOLAS regulations II-2/20 and II-2/20-1 apply;
- .2 the instrument to be amended is the 1974 SOLAS Convention, as amended (i.e. SOLAS II-2/20.2 and II-2/20-1); and
- .3 the amendments to be developed should enter into force on 1 January 2020, provided that they are adopted before 1 July 2018.

### **Amendments to SOLAS regulations II-2/20.2 and II-2/20-1**

7.3 The Sub-Committee considered the draft amendment to SOLAS regulations II-2/20.2 and II-2/20-1, as set out in annex 2 to document MSC 96/23/9, and noted that there was general support for the draft amendments based on the understanding that:

- .1 they did not affect the fire safety requirements of ro-ro spaces; and
- .2 they provided clarity with regard to the relationship between SOLAS regulations II-2/20.2 and II-2/20-1 and the IMDG Code.

7.4 Subsequently, having confirmed that no changes to the draft amendments to SOLAS regulations II-2/20.2 and II-2/20-1 contained in annex 2 to document MSC 96/23/2 were needed, the Sub-Committee endorsed the draft amendments to SOLAS regulations II-2/20.2 and II-2/20-1, as set out in annex 3.

7.5 Taking into account the need to provide clarity with regard to the relationship between SOLAS regulations II-2/20.2 and II-2/20-1 and the IMDG Code as soon as possible, the Sub-Committee agreed to forward the draft amendments to SOLAS regulations II-2/20.2 and II-2/20-1, as set out in annex 3, to MSC 97 for approval, with a view to subsequent adoption.

7.6 In this context, the Sub-Committee noted that SSE 3 had requested MSC 97 to consider the decision made by SSE 3 that only "pure car and truck carriers" need to comply with SOLAS regulation II-2/20-1 and that the definition provided in SOLAS regulation II-2/3.56



should be amended accordingly (SSE 3/16, paragraph 16.2.6). Consequently, the Sub-Committee confirmed that if the aforementioned decision by SSE 3 were to be endorsed by MSC 97, then the draft amendments to SOLAS regulation II-2/20-1 endorsed at this session would be unnecessary.

7.7 Consequently, the Sub-Committee also invited MSC 97 to consider the necessity for the draft amendments to SOLAS regulation II-2/20-1, as set out in annex 3, in conjunction with the aforementioned request by SSE 3.

### **Completion of the work on the output**

7.8 In view of the above, the Sub-Committee invited the Committees to note that the work on this output had been completed.

## **8 SUITABILITY OF HIGH MANGANESE AUSTENITIC STEEL FOR CRYOGENIC SERVICE AND DEVELOPMENT OF ANY NECESSARY AMENDMENTS TO THE IGC CODE AND IGF CODE**

### **Background**

8.1 The Sub-Committee recalled that MSC 96, having considered document MSC 96/23/5 (Republic of Korea), which proposed to amend the IGC and IGF Codes to include high manganese austenitic steel for cryogenic service, agreed to include in the 2016-2017 biennial agenda of the CCC Sub-Committee and the provisional agenda for CCC 3, a new output on "Suitability of high manganese austenitic steel for cryogenic service and development of any necessary amendments to the IGC Code and IGF Code", with a target completion year of 2017.

8.2 The Sub-Committee also recalled that MSC 96 had further agreed, in accordance with MSC.1/Circ.1481 and MSC.1/Circ.1500, that:

- .1 the amendments to be developed should not modify the scope of application of the IGC and IGF Codes, adopted respectively by resolutions MSC.370(93) and MSC.391(95);
- .2 the instruments to be amended are the IGC and IGF Codes; and
- .3 the amendments to be developed should enter into force on 1 January 2020, provided that they are adopted before 1 July 2018.

### **Information on the properties of high manganese austenitic steel and proposed amendments to the IGC and IGF Codes**

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

- .1 CCC 3/8 (Republic of Korea), providing technical information regarding high manganese austenitic steel and welding consumables (CCC 3/8, annex 1) and proposing the establishment of a working group to consider the suitability of high manganese austenitic steel for cryogenic service, together with the proposed draft amendments to the IGC and IGF Codes (CCC 3/8, annex 2); and

- .2 CCC 3/8/1 (Japan), proposing that, prior to discussing the amendments to the IGC and IGF Codes, the following issues should be considered by the Sub-Committee:
- .1 the ductile fracture properties at portions such as the heat affected zone and the centreline of the weld metal, at which carbides precipitate most heavily, should be evaluated and reported;
  - .2 both the required absorbed energy and the allowable stress design factor should be determined based on the evaluated ductile fracture properties, in order to ensure toughness in the case where carbides precipitate most heavily; and
  - .3 the chemical composition and the manufacturing process conditions used to prevent precipitation of grain boundary carbides in the base metal should be specified.

8.4 In considering the above documents, the Sub-Committee noted general support for the continued evaluation of the suitability of high manganese austenitic steel for cryogenic service and also noted the following views expressed on this matter:

- .1 the stress corrosion cracking (SCC) resistance of high manganese austenitic steel is compared to that of 304 stainless steel in document CCC 3/8. However, in considering the suitability of high manganese austenitic steel for cargo piping, its SCC resistance should be compared to 304L or 316L stainless steel, which are normally used for weather-exposed piping due to their superior (SCC) resistance;
- .2 further information and discussions are required with regard to the properties of high manganese austenitic steel (e.g. its chemical composition);
- .3 the issues raised in document CCC 3/8/1 are equally applicable to materials whose use is already permitted for cryogenic service;
- .4 high manganese austenitic steel offers economic benefits compared to nickel steels;
- .5 amendments to the IGC and IGF Codes should only be considered once a complete and thorough examination of the properties of high manganese austenitic steel has been carried out to the satisfaction of the Sub-Committee and the suitability of high manganese austenitic steel for cryogenic service has been agreed; and
- .6 while it is premature, at this stage, to develop draft amendments to the IGC and IGF Codes, high manganese austenitic steel can still be used in liquefied gas carriers and LNG-fuelled ships if the provisions for equivalents and alternative design and arrangements are followed.

8.5 Having considered the documents and comments above, the Sub-Committee agreed that, at this stage, further work and information is required before arriving at a firm conclusion with regard to the suitability of high manganese austenitic steel for cryogenic service and that such work should be completed before draft amendments to the IGC and IGF Codes could be developed.

8.6 Consequently, the Sub-Committee agreed to refer this matter to the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service, established under agenda item 4 (Safety requirements for carriage of liquefied hydrogen in bulk) (see paragraph 4.11), for further consideration. In this regard, the Sub-Committee noted that the Republic of Korea would present additional information addressing the issues raised in document CCC 3/8/1 to the working group.

### **Instructions to the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service**

8.7 The Sub-Committee instructed the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service, established under agenda item 4 (Safety requirements for carriage of liquefied hydrogen in bulk), taking into account the comments and decisions made in plenary, to:

- .1 further consider the suitability of high manganese austenitic steel for cryogenic service, taking into account the information in annex 1 to document CCC 3/8 and document CCC 3/8/1;
- .2 develop draft amendments to the IGC and IGF Codes to include high manganese austenitic steel for cryogenic service, if appropriate, based on annex 2 to document CCC 3/8; and
- .3 consider whether it is necessary for a correspondence group to be established and, if so, prepare terms of reference for consideration by the Sub-Committee.

### **Report of the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service**

8.8 The Sub-Committee considered the part of the report of the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service (CCC 3/WP.4) dealing with this agenda item and, having noted the outcome of the working group's discussion on the suitability of high manganese austenitic steel for cryogenic service, endorsed the working group's decision not to proceed with development of any amendments to the IGC or IGF Codes at this stage.

#### ***Establishment of a correspondence group***

8.9 In order to progress the work on this matter intersessionally, the Sub-Committee, having taken into account the recommendation of the working group, established a Correspondence Group on Suitability of High Manganese Austenitic Steel for Cryogenic Service, under the coordination of the Republic of Korea,<sup>3</sup> and instructed it to:

- .1 develop test acceptance criteria for high manganese austenitic steel for cryogenic service, including the items in table 1 of annex 3 to document CCC 3/WP.4;

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<sup>3</sup>

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- .2 further consider the suitability of high manganese austenitic steel for cryogenic service, taking into account the information in annex 1 to document CCC 3/8 and documents CCC 3/8/1 and CCC 3/J/7;
- .3 develop draft amendments to the IGC and IGF Codes to include high manganese austenitic steel for cryogenic service, if appropriate, based on annex 2 to document CCC 3/8; and
- .4 submit a report to CCC 4.

## **9 MANDATORY REQUIREMENTS FOR CLASSIFICATION AND DECLARATION OF SOLID BULK CARGOES AS HARMFUL TO THE MARINE ENVIRONMENT**

### **General**

9.1 The Sub-Committee noted the outcomes of MEPC 69 and MSC 96 related to this agenda item, as reported by the Secretariat in document CCC 3/9, in particular that MEPC 69 approved the draft amendments to MARPOL Annex V related to substances that are harmful to the marine environment (HME), as set out in annex 8 to document MEPC 69/21.

9.2 In addition, the Sub-Committee recalled that MEPC 69 had noted the draft amendments to the IMSBC Code related to HME substances prepared by CCC 2 (CCC 2/15, annex 8) and had instructed CCC 3 to finalize them, taking into account the approved draft amendments to MARPOL Annex V. MEPC 69 had also instructed CCC 3 to review the draft amendments to the *2012 Guidelines for the implementation of MARPOL Annex V* (resolution MEPC.269(63)), with a view to ensuring that they were brought in line with the amendments to MARPOL Annex V.

9.3 The Sub-Committee also recalled that MSC 96 had noted the progress made by CCC 2 on this output and the related decisions of MEPC 69.

### **Amendments to the IMSBC Code related to HME substances**

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

- .1 CCC 3/9/1 (Finland), providing additional amendments to the IMSBC Code and related instruments, in order to further facilitate the long-term implementation of MARPOL Annex V. The proposals included, in particular, the addition of a new section on "Harmfulness to the marine environment" into each individual schedule in appendix 1 of the IMSBC Code and consequential amendments to the IMSBC Code, e.g. section 14 and paragraphs 1.2.2 and 1.3.3 of the IMSBC Code and MSC.1/Circ.1453/Rev.1; and
- .2 CCC 3/INF.8 (Finland), providing a list of the individual schedules that could be affected by adding a new section on "Harmfulness to the marine environment".

9.5 In considering documents CCC 3/9/1 and CCC 3/INF.8, the Sub-Committee noted the following:

- .1 the responsibility of a shipper to declare HME properties of a solid bulk cargo is regulated by MARPOL Annex V and that the IMSBC Code is not a mandatory instrument under the MARPOL Convention;

- .2 there is no added value in stating in each individual schedule that the shipper has to declare a cargo in accordance with MARPOL Annex V since this requirement is already clearly stated in MARPOL Annex V and is referenced in section 4.2 of the IMSBC Code;
- .3 some cargoes with the same shipping name may be classified differently in terms of their impact on the marine environment, depending on their composition;
- .4 CCC 1 had agreed not to proceed with any indicative lists of HME substances, given the difficulty in developing such lists and concerns raised regarding their practical value. The same arguments would also apply to the proposals in document CCC 3/9/1;
- .5 implementation of the proposals in document CCC 3/9/1 would cause an undue administrative burden and may complicate rather than facilitate the implementation of MARPOL Annex V;
- .6 the approach proposed in document CCC 3/9/1 would have financial implications for the Member States and the Organization and raised questions as to the liability of the Organization and the potential body that would take on the task of indicating cargoes as HME or non-HME;
- .7 it is essential that the shipper provides all necessary information to the master regarding the safe transport of a cargo and the correct handling and disposal of wash-water. The additional information in the IMSBC Code on the environmental properties of cargoes proposed in document CCC 3/9/1 would be useful for all stakeholders and would further emphasize that it is the shipper's responsibility to declare whether a cargo is HME or not; and
- .8 information on the treatment of HME cargoes is very important to the shipping industry, as there is a lack of available reception facilities and cargo hold wash-water is currently being discharged at a high financial cost.

9.6 Having taken the above comments into account, the Sub-Committee noted that the majority of delegations that spoke did not support the proposals in document CCC 3/9/1.

9.7 The Sub-Committee, however, agreed that a strong implementation regime of the HME requirements by Member States was essential for alleviating the problems faced by industry and that issues related to the implementation of MARPOL Annex V should be brought to the attention of the Marine Environment Protection Committee.

9.8 Consequently, the Sub-Committee agreed to instruct the Working Group on IMSBC Code Matters, established under agenda item 5 (Amendments to the IMSBC Code and supplements) (see paragraph 5.76), to finalize the draft amendments to the IMSBC Code related to HME substances, based on annex 8 to document CCC 2/15, taking into account the approved draft amendments to MARPOL Annex V concerning HME substances (see paragraph 9.1).

#### **Amendments to the 2012 Guidelines for the implementation of MARPOL Annex V**

9.9 The Sub-Committee noted that the draft amendments to the *2012 Guidelines for the implementation of MARPOL Annex V* were set out in annex 9 to document CCC 2/15 and that no documents had been submitted on this matter.

## **Instructions to the Working Group on IMSBC Code Matters**

9.10 The Sub-Committee instructed the Working Group on IMSBC Code Matters, taking into account the comments and decisions made in plenary, to:

- .1 finalize the draft amendments to the IMSBC Code related to HME substances, based on annex 8 to document CCC 2/15, taking into account the approved draft amendments to MARPOL Annex V, with a view to inclusion in draft amendment 04-17; and
- .2 finalize the draft amendments to the *2012 Guidelines for the implementation of MARPOL Annex V*, with a view to ensuring that they are brought in line with the amendments to MARPOL Annex V, based on annex 9 to document CCC 2/15 and taking into account the approved draft amendments to MARPOL Annex V.

## **Report of the Working Group on IMSBC Code Matters**

9.11 Having considered the part of the report of the Working Group on IMSBC Code Matters (CCC 3/WP.5) dealing with this agenda item, the Sub-Committee took action as outlined in paragraphs 9.12 to 9.15 below.

### **Draft amendments to the IMSBC Code related to HME substances**

9.12 The Sub-Committee endorsed the draft amendments to the IMSBC Code related to HME substances, as set out in annex 4, and invited MSC 97 to approve them as an urgent matter (CCC 2/15, paragraph 12.8.3) with a view to adoption by MSC 98.

9.13 In this regard, the Sub-Committee invited MEPC 71, taking into account the relevant outcome of MSC 97, to endorse the draft amendments to the IMSBC Code related to HME substances and forward any comments to MSC 98.

### ***Draft amendments to the 2012 Guidelines for the implementation of MARPOL Annex V***

9.14 The Sub-Committee endorsed the draft amendments to the *2012 Guidelines for the implementation of MARPOL Annex V* (resolution MEPC.219(63)), as set out in annex 5, for submission to MEPC 71 for consideration, with a view to adoption.

### **Completion of the work on the output**

9.15 In view of the above, the Sub-Committee invited the Committees to note that the work on this output had been completed.

## **10 UNIFIED INTERPRETATION OF PROVISIONS OF IMO SAFETY, SECURITY, AND ENVIRONMENT-RELATED CONVENTIONS**

### **General**

10.1 The Sub-Committee recalled that this was a continuous item on the biennial agenda and that the Assembly, at its twenty-eighth session, had expanded the output to include all proposed unified interpretations to provisions of IMO safety, security and environment-related conventions, so that any newly developed or updated draft unified interpretation could be submitted for the consideration of the Sub-Committee, with a view to developing an appropriate IMO interpretation.

10.2 The Sub-Committee agreed to consider the documents submitted under this agenda item in the following order:

- .1 firstly, document CCC 3/10/1, with a view to finalizing the terms of reference for the Working Group on Amendments to the IGF Code and Development of Guidelines for Low-flashpoint Fuels (IGF Code Working Group), established under agenda item 3 (Amendments to the IGF Code and development of guidelines for low-flashpoint fuels);
- .2 secondly, documents CCC 3/10, CCC 3/10/2, CCC 3/10/3 and CCC 3/10/5 to CCC 3/10/9, in numerical order, with a view to finalizing the terms of reference for the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service, established under agenda item 4 (Safety requirements for carriage of liquefied hydrogen in bulk); and
- .3 lastly, documents CCC 3/10/4, CCC 3/10/10, CCC 3/10/11 and CCC 3/10/11/Corr.1.

### **Clarification of IGF Code requirements**

10.3 The Sub-Committee had for its consideration document CCC 3/10/1 (IACS), containing 14 draft IACS Unified Interpretations (IACS UIs) regarding requirements of the IGF Code that, in the view of IACS, required clarification in order to facilitate consistent and global implementation of the IGF Code. The Sub-Committee noted that IACS was seeking the Sub-Committee's views on the draft IACS UIs prior to IACS proceeding with their finalization and IACS Members subsequently applying them when verifying the implementation of the IGF Code on behalf of Administrations on whose behalf they are authorized to act as recognized organizations.

#### ***Tank connection space applied to fuel tanks on open deck***

10.4 In considering annex 1 to document CCC 3/10/1, providing a draft IACS UI on paragraph 2.2.15.3 of the IGF Code, the Sub-Committee noted that the draft IACS UI was developed based on the IACS view that a tank connection space should not be excluded from being applied to tanks on open deck, where considered appropriate, since a tank connection space will restrict hazardous zones on an open deck of ships that are not tankers and will also give environmental protection for essential safety equipment.

10.5 In this regard, the Sub-Committee agreed to the draft unified interpretation of paragraph 2.2.15.3 of the IGF Code, for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGF Code that were agreed at this session (see paragraph 10.59 and annex 6).

#### ***Passive equipment in tank connection spaces***

10.6 In considering annex 2 to document CCC 3/10/1, providing a draft IACS UI on paragraph 2.2.15.3 of the IGF Code, the Sub-Committee noted that the draft IACS UI was developed based on the IACS view that, since a tank connection space is considered only to contain potential sources of release but not sources of ignition, a tank connection space may contain passive equipment such as vapourizers or heat exchanges in addition to tank connections and tank valves.

10.7 In the ensuing discussion, a proposal was made to delete the word "passive" from the proposed interpretation. Subsequently, the Sub-Committee agreed to the draft unified interpretation of paragraph 2.2.15.3 of the IGF Code, with the aforementioned modification, for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGF Code that were agreed at this session (see paragraph 10.59 and annex 6).

10.8 Having considered annex 3 to document CCC 3/10/1, providing a draft IACS UI on paragraph 2.2.17 of the IGF Code, which had been developed based on the IACS view that a tank connection space, even with passive equipment such as vapourizers or heat exchangers installed inside, is not regarded as a fuel preparation room, the Sub-Committee agreed to the draft unified interpretation of paragraph 2.2.17 of the IGF Code, for inclusion in the consolidated draft MSC circulars containing the unified interpretations related to the IGF Code that were agreed at this session (see paragraph 10.59 and annex 6), subject to the words "even with passive" being replaced with the words "which has".

### ***Location of premixed engines***

10.9 Having considered annex 4 to document CCC 3/10/1, providing a draft IACS UI on paragraph 5.4.1 of the IGF Code, which had been developed based on the IACS view that, for premixed engines (i.e. gas or dual fuel engines where the gas is introduced before the turbocharger rather than directly into the cylinder or cylinder head port), a single failure may result in release of gas into the machinery space and consequently, such engines must be located in an emergency shutdown (ESD) protected machinery space, the Sub-Committee agreed to the draft unified interpretation of paragraph 5.4.1 of the IGF Code, for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGF Code that were agreed at this session (see paragraph 10.59).

### ***Fuel preparation rooms located on open deck***

10.10 In considering annex 5 to document CCC 3/10/1, providing a draft IACS UI on paragraphs 6.2.1.1 and 5.8 of the IGF Code, the Sub-Committee noted that the draft IACS UI was developed based on the IACS view that, despite the existence of prescriptive requirements only for fuel preparation rooms located below deck with regard to protection against cryogenic leakages and control of hazardous zones, fuel preparation rooms on open decks should be arranged in the same way as a fuel preparation room below deck.

10.11 Subsequently, the Sub-Committee agreed to the draft unified interpretation of paragraphs 5.8 and 6.2.1.1 of the IGF Code, for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGF Code that were agreed at this session (see paragraph 10.59 and annex 6).

### ***Leakage detection for drip trays***

10.12 In considering annex 6 to document CCC 3/10/1, providing a draft IACS UI on paragraph 6.3.10 of the IGF Code, the Sub-Committee noted that the draft IACS UI was developed based on the IACS view that, leakage detection, as required by paragraph 15.3.2 of the IGF Code for tank connection spaces, is also relevant for drip trays used to protect the ship's steel from potential leakages from tank connections and other sources of leakage from liquefied gas fuel storage tanks located on open deck.

10.13 In this regard, having confirmed that the proposed unified interpretation went beyond the requirement of the IGF Code, the Sub-Committee agreed to instruct the IGC Code Working Group to further consider annex 6 to document CCC 3/10/1 and advise the Sub-Committee on how best to proceed (see paragraph 10.32).



### ***Temperature and pressure of liquefied gas fuel tanks***

10.14 In considering annex 7 to document CCC 3/10/1, providing a draft IACS UI on paragraphs 6.9.1.1 and 6.9.1.2 of the IGF Code, the Sub-Committee noted that the draft IACS UI was developed based on the IACS view that the requirement for the pressure and temperature of liquefied gas fuel tanks to be controlled and maintained within the design range at all times, includes those instances when the safety system is activated as a result of a fault condition, which are not necessarily regarded as an emergency situation.

10.15 Following discussion, the Sub-Committee agreed to instruct the IGF Code Working Group to further consider annex 7 to document CCC 3/10/1 and advise the Sub-Committee on how best to proceed (see paragraph 10.31).

### ***Risk assessment of closed or semi-enclosed bunkering stations***

10.16 In considering annex 8 to document CCC 3/10/1, providing a draft IACS UI on paragraph 8.3.1.1 of the IGF Code listing design features, such as segregation, hazardous area, ventilation, leakage detection and related safety actions, access and monitoring that should, according to IACS, be subject to special consideration within the risk assessment of closed or semi-enclosed bunkering stations, the Sub-Committee agreed to the draft unified interpretation of paragraph 8.3.1.1 of the IGF Code, for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGF Code that were agreed at this session (see paragraph 10.59 and annex 6), subject to the two last bullet points being replaced with the following:

"access to bunkering station from non-hazardous areas through airlocks; and  
monitoring of bunkering station by direct line of sight or by CCTV."

### ***Design features for cryogenic pipe protection***

10.17 In considering annex 9 to document CCC 3/10/1, providing a draft IACS UI on paragraph 9.2.3 of the IGF Code, the Sub-Committee noted that the draft IACS UI was developed with a view to clarifying the design features for cryogenic pipe protection and is based on the understanding that paragraph 9.2.3 implies that a secondary enclosure is required for LNG piping in general.

10.18 Following discussion, the Sub-Committee agreed to instruct the IGF Code Working Group to further consider annex 9 to document CCC 3/10/1 and advise the Sub-Committee on how best to proceed (see paragraph 10.32).

### ***Requirement for a cofferdam***

10.19 In considering annex 10 to document CCC 3/10/1, providing a draft IACS UI on paragraph 11.3.3 of the IGF Code, the Sub-Committee noted that the draft IACS UI was developed based on the following IACS views:

- .1 the requirements of paragraph 11.3.3 are also applicable to fuel preparation rooms; and
- .2 although the fuel storage hold for type C tanks may be considered as a cofferdam, as per paragraph 11.3.3 of the IGF Code, a cofferdam should be required for a type C tank located directly above machinery spaces of

category A or other rooms with high fire risk, since the fuel storage hold space cannot act as a cofferdam in such an arrangement given that the tank support will be welded to the deck.

10.20 Following discussion, the Sub-Committee agreed to instruct the IGF Code Working Group to further consider annex 10 to document CCC 3/10/1 and advise the Sub-Committee on how best to proceed (see paragraph 10.32).

#### ***Fire detection and alarm system in the ventilation trunk***

10.21 In considering annex 11 to document CCC 3/10/1, providing a draft IACS UI on paragraph 11.7.1 of the IGF Code, the Sub-Committee noted that the draft IACS UI was developed based on the IACS view that the phrase "the ventilation trunk for fuel containment system below deck" in paragraph 11.7.1 is incorrect terminology which evolved in the transition from resolution MSC.285(86) to the IGF Code, specifically the transition of the "tank room" terminology used in resolution MSC.285(86) to the equivalent "tank connection space" terminology used in the IGF Code. According to the draft IACS UI, the reference to "the ventilation trunk for fuel containment system below deck" should be understood as meaning that fire detection and alarm system should be provided in the ventilation trunk to the tank connection space and in the tank connection space.

10.22 Following discussion, the Sub-Committee agreed with the understanding that in paragraph 11.7.1 of the IGF Code, the "fuel containment system below deck" ought to be "tank connection space" and decided that it would be more appropriate to deal with this error through the issuance of a corrigendum rather than an IMO unified interpretation.

10.23 Consequently, the Sub-Committee requested the Secretariat to prepare a corrigendum to annex 1 to the report of MSC 95 (MSC 95/22/Add.1), containing resolution MSC.391(95) on *Adoption of the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels (IGF Code)*, replacing the words "for fuel containment system below deck" in paragraph 11.7.1 of the annex to the resolution with the words "to the tank connection space and in the tank connection space". MSC 97 was invited to endorse this decision and that the aforementioned modification should be incorporated into the authentic text of resolution MSC.391(95), once the corrigendum had been issued.

#### ***Ventilation system of machinery spaces***

10.24 Having considered annex 12 to document CCC 3/10/1, providing a draft IACS UI on paragraph 13.5.1 of the IGF Code, that had been developed by IACS based on the view that the intention of the requirements in paragraph 13.5.1 is to segregate the ventilation system for machinery spaces containing gas-fuelled consumers from the ventilation system for other spaces in the ship such as the accommodation, not other spaces in the machinery space area such as purifier rooms or workshops, the Sub-Committee agreed to the draft unified interpretation to paragraph 13.5.1 of the IGF Code, for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGF Code that were agreed at this session (see paragraph 10.59 and annex 6).

#### ***Ventilation system for double piping and for gas valve unit spaces in gas safe engine rooms***

10.25 In considering annex 13 to document CCC 3/10/1, providing a draft IACS UI on paragraph 13.8.2 of the IGF Code, the Sub-Committee noted that the draft IACS UI was developed based on the IACS view that the segregation between the ventilation system for double piping inside and outside the machinery space is not necessarily safety critical, contrary to the segregation between the part of the system where there is potential for LNG leakages and the part of the system where there is no potential for LNG leakages, which is safety critical.

10.26 In this regard, the Sub-Committee agreed to the draft unified interpretation to paragraph 13.8.2 of the IGF Code, for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGF Code that were agreed at this session (see paragraph 10.59 and annex 6).

***Location of the ventilation inlet for the double wall piping or duct***

10.27 In considering annex 14 to document CCC 3/10/1, providing a draft IACS UI on paragraph 13.8.3 of the IGF Code, the Sub-Committee noted differing views as to whether the ventilation inlet for the double wall piping or duct should be located in the open air in addition to the requirement for it to be located in a non-hazardous area away from ignition sources, or whether ventilation inlet for double wall piping can be routed to the engine-room in cases where the pipe pressure is less than 10 bar.

10.28 Subsequently, the Sub-Committee agreed to instruct the IGF Code Working Group to further consider annex 14 to document CCC 3/10/1 and advise the Sub-Committee on how best to proceed (see paragraph 10.31).

***Instructions to the Working Group on Amendments to the IGF Code and Development of Guidelines for Low-flashpoint Fuels***

10.29 The Sub-Committee instructed the Working Group on Amendments to the IGF Code and Development of Guidelines for Low-flashpoint Fuels, established under agenda item 3 (Amendments to the IGF Code and development of guidelines for low-flashpoint fuels) (see paragraph 3.23), taking into account comments and decisions made in plenary, to further consider the draft IACS Unified Interpretations set out in annexes 6, 7, 9, 10 and 14 to document CCC 3/10/1 and advise the Sub-Committee on how best to proceed.

***Report of the Working Group on Amendments to the IGF Code and Development of Guidelines for Low-flashpoint Fuels***

10.30 Having considered the part of the report of the Working Group on Amendments to the IGF Code and Development of Guidelines for Low-flashpoint Fuels (CCC 3/WP.3) dealing with the agenda item the Sub-Committee took action as outlined in paragraphs 10.31 to 10.33 below.

10.31 The Sub-Committee agreed to draft unified interpretations to the following paragraphs of the IGF Code, as prepared by the working group (CCC 3/WP.3, annex 2):

- .1 paragraphs 6.9.1.1 and 6.9.1.2 of the IGF Code, regarding control and maintenance of pressure and temperature of liquefied gas fuel tanks after the activation of the safety system; and
- .2 paragraph 13.8.3, regarding the ventilation inlet for double wall piping or duct,

for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGF Code that were agreed at this session (see paragraph 10.59 and annex 6).

10.32 Having noted the working group's discussions on the technical issues concerning paragraphs 6.3.10, 9.2.3 and 11.3.3 of the IGF Code, the Sub-Committee endorsed the working group's view that technical issues raised with regard to the provisions in aforementioned paragraphs of the IGF Code could only be addressed by means of amendments to the Code.

10.33 In this context, the Sub-Committee noted the statement by IACS set out in annex 4 to document CCC 3/WP.3. Following discussion, the Sub-Committee confirmed that interested Member States and international organizations could propose amendments relevant to the provisions in paragraphs 6.3.10, 9.2.3 and 11.3.3 of the IGF Code, for consideration of the Sub-Committee at its next session, taking into account that MSC 94 had endorsed the approach that in the second phase of the IGF Code development, the CCC Sub-Committee could consider matters related to natural gas, in addition to low-flashpoint fuels other than natural gas, based on experience gained by the application of the Code (see also paragraph 3.19).

## **Clarification of IGC Code requirements**

### ***Requirements for pump vents in machinery spaces***

10.34 The Sub-Committee had for its consideration document CCC 3/10 (IACS), providing an update with regard to IACS UI GC14 on the requirements for pump vents in machinery spaces in paragraph 3.7.5 of the IGC Code, following the comments and feedback provided at CCC 2. The Sub-Committee was informed by IACS that IACS UI GC14 (CCC 2/9/1, annex), clarifying that the requirement for pump vents not to be open to machinery spaces, applies only to pumps in the machinery spaces serving dry duct keels through which ballast piping passes, was technically robust.

10.35 The Sub-Committee noted that IACS UI GC14 had been applied by IACS Members since 1 July 2016, unless they had been provided with written instruction to apply a different interpretation by the Administration on whose behalf they were authorized to act as a recognized organization.

10.36 Having considered document CCC 3/10, the Sub-Committee agreed to the draft unified interpretation of paragraph 3.7.5 of the IGC Code, based on the annex to document CCC 2/9/1, for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGC Code that were agreed at this session (see paragraph 10.59 and annex 7).

### ***Closing devices for air intakes***

10.37 Having considered document CCC 3/10/2 (IACS), providing a copy of IACS UI GC15 regarding the requirements for closing devices in air intakes in paragraph 3.2.6 of the IGC Code, the Sub-Committee noted that UI GC15 had been applied by IACS Members since 1 July 2016, unless they had been provided with written instruction to apply a different interpretation by the Administration on whose behalf they were authorized to act as a recognized organization.

10.38 Following discussion, the Sub-Committee agreed to the draft unified interpretation of paragraph 3.2.6 of the IGC Code for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGC Code that were agreed at this session (see paragraph 10.59 and annex 7), subject to the following modifications:

- .1 the text of the first paragraph being replaced with the following: "The closing devices that need not be operable from within the single spaces may be located in centralized positions."; and
- .2 a new paragraph being added after the third paragraph as follows: "Regardless of this interpretation, the closing devices shall be operable from outside of the space (SOLAS regulation II-2/5.2.1.1).".

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**Cargo tank clearances**

10.39 Having considered document CCC 3/10/3 (IACS), providing a copy of IACS UI GC16 regarding minimum clear opening requirements for access to compartments through openings, hatches or manholes (paragraphs 3.5.3.1.2 and 3.5.3.1.3 of the IGC Code) and providing clarification as to the required geometry and size of the openings based on IACS UI SC191, MSC.1/Circ.1464/Rev.1 (and Corr.1) and MSC.1/Circ.1545, the Sub-Committee noted that UI GC16 had been applied by IACS Members since 1 July 2016, unless they had been provided with written instruction to apply a different interpretation by the Administration on whose behalf they were authorized to act as a recognized organization.

10.40 Subsequently, the Sub-Committee agreed to the draft unified interpretation of paragraphs 3.5.3.1.2 and 3.5.3.1.3 of the IGC Code, for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGC Code that were agreed at this session (see paragraph 10.59 and annex 7).

**External surface area of prismatic tanks for determining the sizing of the pressure relief valve**

10.41 The Sub-Committee had for its consideration document CCC 3/10/5 (IACS), providing clarification with respect to the implementation of requirements for the determination of the appropriate size of pressure relief valves in paragraph 8.4.1.2 and figure 8.1 of the IGC Code. The Sub-Committee noted that the same requirements are specified in paragraph 6.7.3.1.1.2 and figure 6.7.1 of the IGF Code and the same clarification applied.

10.42 Following discussion, the Sub-Committee noted general support for the proposal in document CCC 3/10/5 and agreed to instruct the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service (Hydrogen Working Group) to prepare a draft unified interpretation based on document CCC 3/10/5 (see paragraphs 10.53 and 10.54).

**ESD valve type**

10.43 The Sub-Committee had for its consideration document CCC 3/10/6 (INTERTANKO), proposing that the term "fire closed type", which appears in paragraph 5.11.6.3 of the IGC Code, should be understood to mean "fail-closed type" (i.e. closed on loss of actuating power).

10.44 Following discussion, the Sub-Committee agreed with the aforementioned understanding and decided that it would be more appropriate to deal with this matter through the issuance of a corrigendum rather than an IMO unified interpretation.

10.45 Consequently, the Sub-Committee requested the Secretariat to prepare a corrigendum to annex 6 to the report of MSC 93 (MSC 93/22/Add.1), containing resolution MSC.370(93) on *Amendments to the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code)*, replacing the words "fire closed" in paragraph 5.11.6.3 of the annex to the resolution with the words "fail-closed". MSC 97 was invited to endorse this decision and that the aforementioned modification should be incorporated into the authentic text of resolution MSC.370(93), once the corrigendum had been issued.

**Safe means of emergency isolation in the event of a failure of a cargo tank-installed PRV**

10.46 In considering document CCC 3/10/7 (INTERTANKO), proposing a clarification of paragraph 8.2.9 of the IGC Code with regard to the provision of a safe means of emergency isolation for a cargo tank Pressure Relief Valve (PRV), the Sub-Committee agreed to the following draft unified interpretation of paragraph 8.2.9 of the IGC Code:

"The 'safe means of emergency isolation', as required by paragraph 8.2.9, should be provided so that a PRV can be isolated on a temporary basis to reseal or repair the valve before putting the PRV back into service. Such means of emergency isolation should be installed in a manner that does not allow their inadvertent operation. Permanent arrangements such as valves placed in the vent lines to the PRV are not considered as a means of emergency isolation and should not be permitted."

for inclusion in the consolidated draft MSC circulars containing the unified interpretations related to the IGC Code that were agreed at this session (see paragraph 10.59 and annex 7).

**Arrangement for the water-spray system**

10.47 In considering document CCC 3/10/8 (INTERTANKO), proposing a clarification of paragraph 11.3.6 of the IGC Code with regard to the provision of a means to back-flush the water-spray system with fresh water, the Sub-Committee noted general support for the proposal.

10.48 Consequently, the Sub-Committee agreed to instruct the Hydrogen Working Group to prepare a draft unified interpretation based on document CCC 3/10/8 (see paragraph 10.53).

**Requirements for fire safety and oxygen deficiency monitoring equipment**

10.49 The Sub-Committee had for its consideration document CCC 3/10/9 (Japan), discussing the following two issues:

- .1 whether SOLAS regulation II-2/4.5.10 is to be applied to liquefied gas carriers (see IGC Code paragraphs 3.3.1 and 11.1.1); and
- .2 the necessity of an oxygen monitoring system for type C tanks (see IGC Code paragraph 13.6.4),

and providing two draft unified interpretations (CCC 3/10/9, annex, paragraphs 5 and 13), with a view to clarifying the relevant requirements of the IGC Code.

10.50 Following discussion, the Sub-Committee agreed to instruct the Hydrogen Working Group to further consider document CCC 3/10/9 and advise the Sub-Committee on how best to proceed (see paragraphs 10.53 and 10.55 to 10.57).

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***Instructions to the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service***

10.51 The Sub-Committee instructed the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service, established under agenda item 4 (Safety requirements for carriage of liquefied hydrogen in bulk), taking into account comments and decisions made in plenary, to:

- .1 prepare draft unified interpretations, based on documents CCC 3/10/5 and CCC 3/10/8; and
- .2 further consider document CCC 3/10/9 and advise the Sub-Committee on how best to proceed.

***Report of the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service***

10.52 Having considered the part of the report of the Working Group on Carriage of Hydrogen in Bulk and Suitability of Materials for Cryogenic Service (CCC 3/WP.4) dealing with the agenda item, the Sub-Committee took action as outlined in paragraphs 10.53 to 10.58 below.

*External surface area of the tank for determining sizing of pressure relief valve and application of fire safety requirements in SOLAS chapter II-2 to cargo machinery spaces and turret compartments*

10.53 The Sub-Committee agreed to draft unified interpretations to the following paragraphs of the IGC Code, as prepared by the working group (CCC 3/WP.4, annex 4):

- .1 paragraph 8.4.1.2 and figure 8.1, regarding the external surface area of the tank for determining sizing of pressure relief valve;
- .2 paragraphs 3.3.1 and 11.1.1.1, regarding the application of fire safety requirements in SOLAS chapter II-2 to cargo machinery spaces and turret compartments; and
- .3 paragraph 11.3.6, regarding back-flushing of the water-spray system,

for inclusion in the consolidated draft MSC circular containing the unified interpretations related to the IGC Code that were agreed at this session (see paragraph 10.59 and annex 7).

10.54 The Sub-Committee agreed with the working group's view that the draft unified interpretation of paragraph 8.4.1.2 and figure 8.1 of the IGC Code also applied to paragraph 6.7.3.1.1.2 and figure 6.7.1 of the IGF Code. Consequently, the Sub-Committee agreed to also include the draft unified interpretation regarding the external surface area of the tank for determining sizing of pressure relief valve in the consolidated draft MSC circular containing the unified interpretations related to the IGF Code that were agreed at this session (see paragraph 10.59 and annex 6).

*Oxygen deficiency monitoring*

10.55 With regard to the oxygen deficiency monitoring requirement in paragraph 13.6.4 of the IGC Code, the Sub-Committee noted the working group's conclusion that there was no reason to apply the requirement to hold spaces for type C cargo tanks and that the words "cargo tank hold spaces" in paragraph 13.6.4 of the Code should be corrected by being replaced with the words "hold spaces for independent tanks other than type C tanks".

10.56 The Sub-Committee also noted that the working group, having further examined whether the text "where indicated in column "f" in the table of chapter 19" in paragraph 13.6.4 of the IGC Code was a typographical error or not, had agreed that the correct text should be "where indicated by an "A" in column "f" in the table of chapter 19".

10.57 Subsequently, the Sub-Committee requested the Secretariat to prepare a corrigendum to annex 6 of the report of MSC 93 (MSC 93/22/Add.1), which contains resolution MSC.370(93) on *Amendments to the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code)*, with the following corrections to paragraph 13.6.4 of the annex to resolution MSC.370(93):

- .1 the words "cargo tank hold spaces" are replaced with the words "hold spaces for independent tanks other than type C tanks"; and
- .2 the words "where indicated in column "f" in the table of chapter 19" are replaced with the words "where indicated by an "A" in column "f" in the table of chapter 19".

10.58 MSC 97 was invited to endorse this decision and that the aforementioned modification should be incorporated into the authentic text of resolution MSC.370(93), once the corrigendum had been issued.

#### **Draft MSC circulars on unified interpretations of the IGF and IGC Codes**

10.59 Having considered the above documents and the draft unified interpretations agreed in plenary during this session (CCC 3/WP.6), the Sub-Committee endorsed the consolidated draft MSC circulars on unified interpretations of the IGF Code, as set out in annex 6, and on unified interpretations of the IGC Code, as set out in annex 7, and invited MSC 97 to approve them.

#### **Cargo securing based on environmental conditions – CSS Code, annex 13**

10.60 The Sub-Committee had for its consideration document CCC 3/10/4 (IACS), proposing a draft IACS UI on paragraph 7.1 of annex 13 to the CSS Code containing a linearly reducing acceleration factor starting at a minimum allowable reduction of 0.3 at 0 m significant wave height and increasing linearly until reaching 1 at 7 m significant wave height, to be applied when carrying out reduction of the acceleration values set out in table 2 of paragraph 7.1 of annex 13 to the CSS Code, for operation in a restricted area.

10.61 The Sub-Committee noted that there are no formal requirements and procedures given in the CSS Code on how the reduction of the acceleration figures, as mentioned in paragraph 7.1 of annex 13 to the CSS Code, should be carried out when taking into account the season of the year and the duration of the voyage when operating in a restricted area.

10.62 In this regard, the Sub-Committee also noted that IACS, in order to develop the linear acceleration reduction factor that was included in the draft IACS UI, had completed a review of the text in annex 13 to the CSS Code and the acceleration reduction method given in section 6.2 of the Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 2011 (2011 TDC Code) (resolution A.1048(27)) and had undertaken a validation exercise by comparing full-scale measurements from the [Lashing@Sea](#) project and seakeeping computations, which lead IACS to conclude that requirements for cargo securing based on environmental conditions should be specified by a method that is slightly different from the method in the 2011 TDC Code.



10.63 In considering the above document, the Sub-Committee noted divergent views as to whether it was appropriate to address this matter through a unified interpretation. The Sub-Committee also noted that there was no unanimous support for the method contained in the draft unified interpretation.

10.64 Subsequently, the Sub-Committee did not agree to the draft unified interpretation proposed in document CCC 3/10/4 and urged interested Member States and international organizations to work with IACS with a view to submitting a proposal for a new output, in accordance with the Committees' Guidelines, to amend the CSS Code if they deemed it necessary.

#### **Aperture deformation in corner fittings as provided for in CSC 1972 and CSC.1/Circ.138/Rev.1**

10.65 Having considered document CCC 3/10/10 (China), proposing that the aperture width (66 mm) and the aperture length (127 mm) of corner fittings, for which full engagement of securing or lifting fittings is precluded, should apply only to the top aperture of corner fittings rather than to the top and the side as currently indicated in note 3 of the table under paragraph 4.1 of annex III to CSC 1972 and under paragraph 10.4.2 of the *Revised recommendations on harmonized interpretation and implementation of the International Convention for Safe Containers, 1972, as amended* (CSC.1/Circ.138/Rev.1), the Sub-Committee decided that there was no need to amend CSC 1972 and CSC.1/Circ.138/Rev.1, as the common understanding was that note 3 applies to the top aperture of corner fittings only.

10.66 With regard to the proposal to undertake research on the possible development of "serious deficiency" values for side apertures, the Sub-Committee noted that the row for "Corner and intermediate fittings" in the aforementioned tables deals with both top and side apertures and column (ii) defines side aperture cracks as a serious deficiency.

#### **Test load for stacking test of tank containers**

10.67 The Sub-Committee had for its consideration documents CCC 3/10/11 and CCC 3/10/11/Corr.1 (China), proposing draft text to be included in the *Revised recommendations on harmonized interpretation and implementation of the International Convention for Safe Containers, 1972, as amended* (CSC.1/Circ.138/Rev.1), to reflect the understanding that a tank container that undergoes a stacking test in the tare condition should still reach an equivalent load of 1.8 times its maximum operating gross mass.

10.68 In considering documents CCC 3/10/11 and Corr.1, the Sub-Committee noted the following comments:

- .1 ISO 1496-3, which is being revised, sets out a single stacking test procedure (i.e. the tank container filled completely with water).
- .2 according to CSC 1972, a tank container can be tested in the tare condition but there is no need to test tank containers in the fully loaded condition since the corner fittings fitted on tank containers are the same as the corner fittings on box containers.

10.69 Having taken the above comments into account, the Sub-Committee could not agree on the way forward proposed in document CCC 3/10/11 and Corr.1 and invited interested Member States and international organizations to submit proposals for a new output on this matter, in accordance with the Committee's Guidelines, if they deemed it necessary.

## 11 CONSIDERATION OF REPORTS OF INCIDENTS INVOLVING DANGEROUS GOODS OR MARINE POLLUTANTS IN PACKAGED FORM ON BOARD SHIPS OR IN PORT AREAS

### General

11.1 The Sub-Committee recalled that CCC 2 had expressed its appreciation to Member States for submitting the results of container inspection programmes and had requested them to continue to submit such reports in accordance with MSC.1/Circ.1442 (as amended by MSC.1/Circ.1521).

### Inspection programmes for cargo transport units carrying dangerous goods

11.2 The Sub-Committee noted documents CCC 3/11 (Canada), CCC 3/11/1 (Sweden), CCC 3/11/2 (United States) and CCC 3/11/3 (Republic of Korea), reporting the results of container inspection programmes; and document CCC 3/INF.26 (Secretariat), containing the consolidated results. The Sub-Committee was informed that, among the 55,561 CTUs inspected, 5,232 were found with deficiencies, which means 9.5% of the CTUs inspected had deficiencies. As to the type of deficiencies, placarding and marking accounted for 67.5%, followed by securing/stowage inside the unit (21.9%) and documentation (6.1%).

11.3 The Sub-Committee expressed its appreciation to those States that submitted results of container inspection programmes and its concern about the high rate of deficiencies and the lack of adherence to the provisions of the IMDG Code.

11.4 In this context, the Sub-Committee noted the following points put forward by ICHCA:

- .1 if the percentage of "securing/stowage inside the unit" deficiencies were extrapolated to the world fleet of containers (approximately 37 million in circulation), of which approximately 10% carry dangerous goods, then 85,000 of all containers would be projected to have a deficiency related to provisions of the IMO/ILO/UNECE CTU Code;
- .2 assuming that each container is handled four times a year, 340,000 instances of deficiencies in securing/stowage inside the unit could be expected;
- .3 the figures above are based on an extrapolation of the data from inspections of containers containing dangerous goods, where it is anticipated that packers take more care, so for containers packed with non-dangerous goods the proportion of deficiencies in securing/stowage inside the unit could be even higher; and
- .4 consequently, it would be appreciated if more IMO Member States would submit such reports as this is an area of great concern to the industry and the empirical evidence provided through the reports is important in raising awareness with regard to the deficiencies, which in turn may encourage the take up of the IMO/ILO/UNECE CTU Code.

11.5 Subsequently, the Sub-Committee invited Member States to continue submitting such reports and urged Member States which had not yet carried out container inspection programmes to do so and to submit the relevant information to the Organization in accordance with MSC.1/Circ.1442 (as amended by MSC.1/Circ.1521).

## Reporting results via GISIS

11.6 In order to facilitate the submission of reports in the future, the Sub-Committee requested the Secretariat to investigate the feasibility of developing GISIS functionality that will allow Member States to fill out an electronic version of the form for reporting the results of inspection programmes (MSC.1/Circ.1442, annex 2) and automatically generate current and historical consolidated reports on the results of container inspection programmes. In this regard, the Secretariat was requested to update CCC 4 under the current agenda item. In the meantime, Member States were invited to continue the existing practice and submit the results of the inspection programmes for 2016 as CCC 4 documents.

## 12 BIENNIAL STATUS REPORT AND PROVISIONAL AGENDA FOR CCC 4

### Outcome of A 29, MSC 96 and C 116

12.1 The Sub-Committee noted that the Assembly, at its twenty-ninth session, had adopted the *Strategic Plan for the Organization (for the six-year period 2016 to 2021)* (resolution A.1097(29)) and the *High-level Action Plan of the Organization and priorities for the 2016-2017 biennium* (resolution A.1098(29)).

12.2 The Sub-Committee also noted that C 116 had endorsed the new outputs agreed at MSC 96 for inclusion in the *High-level Action Plan of the Organization and priorities for the 2016-2017 biennium* (see C 116/D, paragraph 7.4(i); and MSC 96/25, paragraph 23.35 and annex 27).

### Biennial status report and proposed provisional agenda for CCC 4

12.3 Taking into account the progress made at the session, the Sub-Committee prepared the revised biennial status report for the 2016-2017 biennium (CCC 3/WP.2, annex 1) and the proposed provisional agenda for CCC 4 (CCC 3/WP.2, annex 2), as set out in annexes 8 and 9, respectively, for consideration by MEPC 70 and MSC 97.

### Correspondence groups established at the session

12.4 The Sub-Committee established correspondence groups on the following subjects, due to report to CCC 4:

- .1 development of technical provisions for the safety of ships using low-flashpoint fuels (agenda item 3);
- .2 evaluation of properties of Bauxite and revision of individual schedules for SEED CAKE (agenda item 5); and
- .3 suitability of high manganese austenitic steel for cryogenic service (agenda item 8).

### Arrangements for the next session

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

- .1 amendments to the IGF Code and development of guidelines for low-flashpoint fuels (agenda item 3);<sup>4</sup>

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<sup>4</sup> Refer to annex 9.

- .2 suitability of high manganese austenitic steel for cryogenic service (agenda item 4); and
- .3 IMSBC Code matters (agenda item 5),

whereby the Chair, taking into account the submissions received on the respective subjects, would advise the Sub-Committee before CCC 4 on the final selection of such groups.

### **Intersessional meetings**

12.6 Having noted that MSC 96 had approved, and C 116 had endorsed, the twenty-sixth meeting of the E&T Group for the IMSBC Code, to be held from 12 to 16 September 2016, directly after CCC 3, the Sub-Committee invited MSC 97 to approve the holding of two intersessional meetings of the E&T Group in 2017 to prepare the next set of amendments to the IMDG Code, one in the first half of 2017 and another directly after CCC 4.

12.7 In the context of amendment 05-19 to the IMSBC Code, the Sub-Committee invited MSC 98 to approve the twenty-ninth meeting of the E&T Group for the IMSBC Code, to take place in the first half of 2018.

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

12.8 The Sub-Committee noted that the fourth session of the Sub-Committee had been tentatively scheduled to take place from 11 to 15 September 2017.

## **13 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2017**

13.1 In accordance with the Rules of Procedure of the Maritime Safety Committee, the Sub-Committee unanimously re-elected Mr. H. Xie (China) as Chair and Mr. P. Van Lancker (Belgium) as Vice-Chair, both for 2017.

## **14 ANY OTHER BUSINESS**

### **Implementation of SOLAS chapter VI requirements for the verification of the gross mass of packed containers**

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

- .1 CCC 3/14 (BIC), containing information regarding the recently launched BIC Technical Characteristics Database, the purpose of which is to allow container owners and operators to upload container fleet technical characteristics, including container tare mass, maximum gross mass, maximum stack weight, etc. to a central database in order to make those technical characteristics (or a subset of those characteristics) available to any party in the transport chain. The database will be operated by BIC as an entirely stand-alone, not-for-profit, non-commercial service;
- .2 CCC 3/14/2 (ICHCA and WSC), providing information regarding the supplementary joint industry frequently asked questions and answers (FAQ) that were developed in response to questions regarding the proper implementation of the SOLAS requirements for the verification of the gross mass (VGM) of packed containers; and

- .3 CCC 3/INF.10 (ICHCA and WSC), providing, in its annex, a copy of the supplementary industry FAQs on the implementation of the SOLAS requirements for verification of the gross mass of packed containers, as developed by WSC and ICHA, in collaboration with the Global Shippers Forum (GSF) and the TT Club.

14.2 Having noted the above documents, the Sub-Committee expressed its appreciation to BIC, ICHCA and WSC for their efforts in support of the implementation of the SOLAS VGM requirements.

14.3 In this context, the Sub-Committee noted an update by WSC regarding the experience of WSC member companies in the period between 1 July 2016 (entry-into-force date of the amendments to SOLAS regulation VI/2) and CCC 3, in particular that:

- .1 a high number of packed containers – 95% or more – were being accompanied by VGM information prior to initial vessel loading;
- .2 the rate of compliance has steadily increased since 1 July 2016, and it is expected that compliance rates will continue to rise;
- .3 there is a high degree of awareness amongst supply chain parties about the VGM requirements, and carriers are systematically engaging shippers who still are not providing VGM information;
- .4 carriers have identified the UN/EDIFACT BAYPLAN MESSAGE (BAPLIE) version 2.2 as an industry best practice to demonstrate compliance with the requirement to obtain a VGM before loading packed containers aboard ship to port State control authorities;
- .5 WSC member companies are of the view that the maritime industry as a truly global industry will be aided by implementation schemes that remain as close to the IMO guidelines as possible and not impose excessive additional documentation requirements such as the capturing of signatures in paper format; and
- .6 the *Advice to Administrations, port State control authorities, companies, port terminals and masters regarding the SOLAS requirements for verified gross mass of packed containers* (MSC.1/Circ.1548) had proven helpful for the avoidance of major disruptions of international containerized maritime traffic, and the high rate of compliance demonstrates that the SOLAS VGM requirements are practical and attainable even after 1 October 2016 at which point MSC.1/Circ.1548 will no longer be in effect.

### **ACEP information**

14.4 Having considered document CCC 3/14/1 (BIC), reporting on the activity of the Global ACEP Database since CCC 2, the Sub-Committee expressed its appreciation to BIC for its continued commitment to maintaining and running the Global ACEP Database and urged CSC 1974 Contracting Parties to make their ACEP information publicly available and communicate to the Secretariat the location where the ACEP information has been posted, in order for the List of locations of publicly available ACEP information (CSC.1/Circ.153), which was approved by MSC 96, to be populated and updated.

### **Preventing the use of counterfeit refrigerants**

14.5 The Sub-Committee noted, with appreciation, the information in document CCC 3/INF.12 (IICL), providing an update on the Industry's Informal Correspondence Group for the Development of Best Practices for Preventing the Use of Counterfeit Refrigerants, chaired by IICL.

14.6 In particular, the Sub-Committee noted that:

- .1 the Air Conditioning, Heating, & Refrigeration Institute (AHRI) had completed a review of the ASHRAE Report on R-40, and has published a revised AHRI Standard 700 for refrigerants, in which item 5.11.2.3 now allows up to 300 parts per million concentration (ppm) of R-40;
- .2 the Industry's Informal Correspondence Group will resume its work on the development of best practices for preventing the use of counterfeit refrigerants; and
- .3 the proposed "Possible steps to reduce the risk of R-40 contamination in refrigerated container machinery", as outlined in document DSC 18/5/1 (IICL), remain relevant.

### **Expressions of appreciation**

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

- Mr. Christos Atalianis (Cyprus) (on transfer)
- Mr. Keith Bradley (United Kingdom) (on retirement)
- Mr. Jo Espinoza-Ferrey (IMO) (on retirement)
- Mr. Flavio Mathuiy (Brazil) (on return home)
- Mrs. Olga O'Neil (IMO) (on retirement)
- Mr. James Paw (IMO) (on retirement)
- Mr. Dandu Pughiuc (IMO) (on retirement).

## **15 ACTION REQUESTED OF THE COMMITTEES**

15.1 The Marine Environment Protection Committee, at its seventieth session, is invited to:

- .1 approve the proposed biennial status report of the CCC Sub-Committee for the 2016-2017 biennium, subject to concurrent approval by MSC 97 (paragraph 12.3 and annex 8); and
- .2 approve the proposed provisional agenda for CCC 4, subject to concurrent approval by MSC 97 (paragraph 12.3 and annex 9).

15.2 The Maritime Safety Committee, at its ninety-seventh session, is invited to:

- .1 adopt the draft Interim recommendations for carriage of liquefied hydrogen in bulk and the associated draft MSC resolution (paragraphs 4.12 and annex 1);

- .2 approve the draft amendments to paragraphs 4.5.1 and 4.5.2 of the IMSBC Code, highlighting the responsibility of the shipper for ensuring that a test to determine the transportable moisture limit (TML) of a solid bulk cargo is conducted, with a view to subsequent adoption at MSC 98 in conjunction with the adoption of the draft amendments (04-17) to the IMSBC Code (paragraph 5.79 and annex 2);
- .3 consider the draft amendments to SOLAS regulations II-2/20.2 and II-2/20-1, with a view to approval and subsequent adoption, taking into account the following:
  - .1 the related request by SSE 3 for the Committee to consider the decision made by SSE 3 that only "pure car and truck carriers" need to comply with SOLAS regulation II-2/20-1 and that the definition provided in SOLAS regulation II-2/3.56 should be amended accordingly (SSE 3/16, paragraph 16.2.6); and
  - .2 the view of CCC 3 that the draft amendments to SOLAS regulation II-2/20-1 would be unnecessary if the aforementioned decision by SSE 3 were to be endorsed (paragraphs 7.3 to 7.7 and annex 3).
- .4 approve the draft amendments to the IMSBC Code related to substances that are harmful to the marine environment, with a view to subsequent adoption at MSC 98, taking into consideration any related comments from MEPC 71, in conjunction with the adoption of the draft amendments (04-17) to the IMSBC Code (paragraphs 9.12 and 9.13 and annex 4);
- .5 endorse the Sub-Committee's decision to request the Secretariat to prepare a corrigendum to annex 1 to the report of MSC 95 (MSC 95/22/Add.1), containing resolution MSC.391(95) on *Adoption of the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels (IGF Code)*, with a correction to paragraph 11.7.1 of the IGF Code, with a view to also incorporating the correction in the authentic text of resolution MSC.391(95) once the corrigendum had been issued (paragraph 10.23);
- .6 endorse the Sub-Committee's decision to request the Secretariat to prepare a corrigendum to annex 6 to the report of MSC 93 (MSC 93/22/Add.1), containing resolution MSC.370(93) on *Amendments to the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code)*, with corrections to paragraphs 5.11.6.3 and 13.6.4 of the IGC Code, with a view to also incorporating the corrections in the authentic text of resolution MSC.370(93) once the corrigendum had been issued (paragraphs 10.45, 10.57 and 10.58);
- .7 approve the draft MSC circular on unified interpretations of the IGF Code (paragraph 10.59 and annex 6);
- .8 approve the draft MSC circular on unified interpretations of the IGC Code (paragraph 10.59 and annex 7);
- .9 approve the revised biennial status report of the CCC Sub-Committee for the 2016-2017 biennium, subject to concurrent approval by MEPC 70 (paragraph 12.3 and annex 8);

- .10 approve the proposed provisional agenda for CCC 4, subject to concurrent approval by MEPC 70 (paragraph 12.3 and annex 9); and
  - .11 approve the holding of two intersessional meetings of the E&T Group in 2017 to prepare the next set of amendments to the IMDG Code, one in the first half of 2017 and another directly after CCC 4 (paragraph 12.6).
- 15.3 The Marine Environment Protection Committee, at its seventy-first session, is invited to:
- .1 endorse the draft amendments to the IMSBC Code related to substances that are harmful to the marine environment, taking into account the relevant outcome of MSC 97, and forward any comments to MSC 98 (paragraphs 9.12 and 9.13 and annex 4);
  - .2 consider the draft amendments to the *2012 Guidelines for the implementation of MARPOL Annex V* (resolution MEPC.219(63)), with a view to adoption (paragraph 9.14 and annex 5); and
  - .3 approve the report in general.
- 15.4 The Maritime Safety Committee, at its ninety-eighth session, is invited to:
- .1 endorse the Sub-Committee's decision to authorize E&T 27 to prepare the draft amendments (39-18) to the IMDG Code, for submission to CCC 4 (paragraph 6.37);
  - .2 approve the holding of the twenty-ninth meeting of the E&T Group in the first half of 2018 to prepare draft amendments (05-19) to the IMSBC Code (paragraph 12.7); and
  - .3 approve the report in general.

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**ANNEX 1**

**DRAFT RESOLUTION MSC.[...(97)]  
(adopted on [...])**

**INTERIM RECOMMENDATIONS FOR CARRIAGE OF LIQUEFIED HYDROGEN IN BULK**

THE MARITIME SAFETY COMMITTEE,

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

NOTING that the International Convention for the Safety of Life at Sea ("the Convention"), 1974 and the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk ("the IGC Code") currently do not specifically provide requirements for carriage of liquefied hydrogen in bulk by sea,

NOTING ALSO that paragraph 5 of Preamble of the IGC Code states that requirements for new products and their conditions of carriage will be circulated as recommendations, on an interim basis, prior to the entry into force of the appropriate amendments.

RECOGNIZING a need for the development of the Interim recommendations for carriage of liquefied hydrogen in bulk,

ACKNOWLEDGING that, in the interim, there is an urgent need to provide recommendations to the Administrations on safe carriage of liquefied hydrogen in bulk,

ACKNOWLEDGING FURTHER that the Interim recommendations are intended to facilitate establishment of a tripartite agreement for a pilot ship, which will be developed for the research and demonstration of safe long-distance overseas carriage of liquefied hydrogen in bulk,

HAVING CONSIDERED the Interim recommendations prepared by the Sub-Committee on Carriage of Cargoes and Containers at its third session,

1 ADOPTS the Interim recommendations for carriage of liquefied hydrogen in bulk, the text of which is set out in the annex to the present resolution;

2 INVITES Governments to apply the Interim recommendations to the pilot ship carrying liquefied hydrogen in bulk taking the explanatory notes into consideration;

3 AGREES to acquire information on safe carriage of liquefied hydrogen in bulk prior to amendment to the IGC Code for the inclusion of liquefied hydrogen;

4 AGREES further that these Interim recommendations may need to be reviewed if they are to be applied to ships other than the pilot ship; and

5 URGES Member Governments and the industry to submit information, observations, comments and recommendations based on the practical experience gained through the application of the Interim recommendations and submit relevant safety analysis on ships carrying liquefied hydrogen in bulk.

## ANNEX

### INTERIM RECOMMENDATIONS FOR CARRIAGE OF LIQUEFIED HYDROGEN IN BULK

#### 1 Introduction

1.1 For the carriage of liquefied gases in bulk by ships, the ships should comply with the relevant requirements in the IGC Code, as amended by resolution MSC.370(93) ("the Code"). The scope of the Code provided in paragraph 1.1.1 is:

"The Code applies to ships regardless of their size, including those of less than 500 gross tonnage, engaged in the carriage of liquefied gases having a vapour pressure exceeding 0.28 MPa absolute at a temperature of 37.8°C, and other products, as shown in chapter 19, when carried in bulk".

1.2 A ship carrying liquefied hydrogen in bulk (hereinafter called "liquefied hydrogen carrier") should comply with the Code.

1.3 The Code requires that a gas carrier should comply with the minimum requirements for the cargo listed in chapter 19. However, the requirements for liquefied hydrogen are not specified in the Code.

1.4 This annex provides the interim recommendations, as referred to in paragraph 5 of the preamble of the Code, for the carriage of liquefied hydrogen in bulk, which are intended to provide the basis for the future minimum requirements for the carriage of this cargo.

1.5 These recommendations have been developed under the assumption that a liquefied hydrogen carrier does not carry liquefied gases other than liquefied hydrogen. These recommendations, therefore, are not applicable to liquefied hydrogen carriers carrying gases other than liquefied hydrogen.

1.6 In the Code, reference is made to paragraph 5 of the Preamble; paragraph 1.1.6.1; and Note No.8 on completion of certificate in "model form of international certificate of fitness for the carriage of liquefied gases in bulk" in appendix 2 to the Code.

#### 2 Interim recommendations for carriage of liquefied hydrogen in bulk

2.1 The Interim recommendations for the carriage of liquefied hydrogen in bulk have been developed based on the results of a comparison study of similar cargoes listed in chapter 19 of the Code, e.g. liquefied natural gas.

2.2 In the Code, chapter 19 governs the application of general requirements for respective cargoes. Selections of the general requirements for respective cargoes are expressed in columns 'c' to 'g'. In addition to general requirements, special requirements may apply to specific cargoes depending on the properties/hazards of the cargoes.

2.3 Tables 1 and 2 specify the proposed selection of the general requirements and the special requirements, respectively, for liquefied hydrogen.

**Table 1: Interim recommendations for carriage of liquefied hydrogen in bulk**

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>
<b>Product name</b>		<b>Ship type</b>	<b>Independent tank type C required</b>	<b>Control of vapour space within cargo tanks</b>	<b>Vapour detection</b>	<b>Gauging</b>		<b>Special requirements</b>
Hydrogen		2G	-	-	F	C		See table 2

**Table 2: Special Requirements for carriage of liquefied hydrogen in bulk**

<b>No.</b>	<b>Special Requirement</b>	<b>Related hazard</b>
1	Requirements for materials whose design temperature is lower than -165°C should be agreed with the Administration, paying attention to appropriate standards. Where minimum design temperature is lower than -196°C, property testing for insulation materials should be carried out with the appropriate medium, over a range of temperatures expected in service.	Low temperature (see 4.2.1)
2	Materials of construction and ancillary equipment such as insulation should be resistant to the effects of high oxygen concentrations caused by condensation and enrichment at the low temperatures attained in parts of the cargo system (refer to the requirement for nitrogen).	Low temperature (see 4.2.2)
3	For cargo pipes containing liquid hydrogen and cold hydrogen vapour, measures should be taken to prevent the exposed surfaces from reaching -183°C. For places where preventive measures against low temperature are not sufficiently effective, such as cargo manifolds, other appropriate measures such as ventilation which avoids the formation of highly enriched oxygen and the installation of trays recovering liquid air may be permitted in lieu of the preventive measures. Insulation on liquid hydrogen piping systems exposing to air should be of non-combustible material and should be designed to have a seal in the outer covering to prevent the condensation of air and subsequent oxygen enrichment within the insulation.	Low temperature (see 4.2.2)
4	Appropriate means, e.g. filtering, should be provided in cargo piping systems to remove impure substances condensed at low temperature.	Low temperature (see 4.2.3)
5	Pressure relief systems should be suitably designed and constructed to prevent blockage due to formation of water or ice.	Low temperature (see 4.2.4)
6	At places where contact with hydrogen is anticipated, suitable materials should be used to prevent any deterioration owing to hydrogen embrittlement, as necessary.	Hydrogen embrittlement (see 4.3)
7	All welded joints of the shells of cargo tanks should be of the in-plane butt weld full penetration type. For dome-to-shell connections only, tee welds of the full penetration type may be used depending on the results of the tests carried out at the approval of the welding procedure.	Permeability (see 4.4.1)

No.	Special Requirement	Related hazard
8	Double tube structures ensuring no leakage, or fixed hydrogen detectors being capable of detecting a hydrogen leak, should be provided for places where leakage of hydrogen may occur, such as cargo valves, flanges, and seals.	Permeability (see 4.4.2)
9	Helium or a mixture of 5% hydrogen and 95% nitrogen should be used as the tightness test medium for cargo tank and cargo piping.	Permeability (see 4.4.3)
10	The amount of carbon dioxide carried for a carbon dioxide fire-extinguishing system should be sufficient to provide a quantity of free gas equal to 75% or more of the gross volume of the cargo compressor and pump rooms in all cases.	Fire by Hydrogen (see 4.7.3) Wide range of flammability limits (see 4.10)
11	When deterioration of insulation capability by single damage is possible, appropriate safety measures should be adopted taking into account the deterioration.	High pressure (see 4.8)
12	When vacuum insulation is used for a cargo containment system, the insulation performance should be evaluated to the satisfaction of the Administration based on experiments, as necessary.	General (see 4.1)
13	Appropriate measures should be provided to prevent vents becoming blocked by accumulations of ice formed from moisture in the air.	Low temperature (see 4.2.2)
14	Due consideration should be given to means for handling boil-off gas.	High pressure (see 4.8)
15	Due consideration should be given to static electricity associated with rotating or reciprocating machinery including the installation of conductive machinery belts and precautionary measures incorporated in operating and maintenance procedures. Anti-static clothing and footwear, and a portable hydrogen detector should be provided for each crew member working in the cargo area.	Static electricity (see 4.9.2)
16	An operation manual for a liquefied hydrogen carrier should include limitations of various operations in relation to environmental conditions.	Wide range of flammability limits (see 4.10)
17	<p>An appropriate procedure should be established for warm-up, inert gas purge, gas-free, hydrogen purge and pre-cooling. The procedure should include:</p> <ul style="list-style-type: none"> <li>.1 selection of inert gas in relation to temperature limit;</li> <li>.2 measurement of gas concentration;</li> <li>.3 measurement of temperature;</li> <li>.4 rates of supply of gases;</li> <li>.5 conditions for commencement, suspension, resuming and termination of each operation;</li> <li>.6 treatment of return gases; and</li> <li>.7 discharge of gases.</li> </ul>	Prevention of dangerous purging operation (see 4.11)

No.	Special Requirement	Related hazard
18	Only almost pure para-hydrogen (i.e. more than 95%) should be loaded in order to avoid excessive heating by ortho- to para-hydrogen conversion.	General (see 4.1)
19	Fire detectors for detecting hydrogen fire should be selected after due deliberation, taking into account the features of hydrogen fire, to the satisfaction of the Administration.	Features of hydrogen fire (see 4.7.4)
20	At the design stage, dispersion of hydrogen from vent outlets should be analysed in order to minimize risk of ingress of flammable gas into accommodation spaces, service spaces, machinery spaces and control stations. Extension of hazardous areas should be considered based on the results of the analysis.	Low density and high diffusivity (see 4.5)
21	<p>Due consideration should be given to appropriate safety measures to prevent formation of explosive mixture in the case of a leakage of hydrogen, including:</p> <ul style="list-style-type: none"> <li>.1 installation of hydrogen detectors in order to detect a possible ground-level travel of low temperature hydrogen gas, and at high points in spaces where warm hydrogen gas can be trapped; and</li> <li>.2 application of "best practice" for land-based liquid hydrogen storage taking into account appropriate guidance such as "Cryogenics Safety Manual – Fourth Edition (1998)"<sup>8)</sup>.</li> </ul>	General (see 4.1)
22	In the case that fusible elements are used as a means of fire detection required by paragraph 18.10.3.2 of the Code, flame detectors suitable for hydrogen flames should be provided in addition at the same locations. Appropriate means should be adopted to prevent the activation of ESD system owing to false alarm of flame detectors, e.g. avoiding activation of ESD system by single sensor (voting method).	Fire hazard (see 4.7.4)
23	Consideration should be given to enhance the ventilation capacity of the enclosed spaces subject to liquefied hydrogen leakage, taking into account the latent heat of vapourization, specific heat and the volume of hydrogen gas in relation to temperature and heat capacity of adjacent spaces.	Low density and high diffusivity (see 4.5)

No.	Special Requirement	Related hazard
24	<p>Liquid and gas hydrogen pipes should not pass through enclosed spaces other than those referred to in paragraph 5.2.2.1.2 of the Code, unless:</p> <ul style="list-style-type: none"> <li>.1.1 the spaces are equipped with gas detection systems which activate the alarm at not more than 30% LFL and shut down the isolation valves, as appropriate, at not more than 60% LFL (see sections 16.4.2 and 16.4.8 of the Code); and</li> <li>.1.2 the spaces are adequately ventilated; or</li> <li>.2 the spaces are maintained in an inert condition.</li> </ul> <p>This requirement is not applicable to spaces constituting a part of a cargo containment system using vacuum insulation where the degree of vacuum is monitored.</p>	Permeability (see 4.4)
25	<p>A risk assessment should be conducted to ensure that risks arising from liquefied hydrogen cargo affecting persons on board, the environment, the structural strength or the integrity of the ship are addressed. Consideration should be given to the hazards associated with properties of liquefied hydrogen and hydrogen gas, physical layout, operation and maintenance, following any reasonably foreseeable failure. For the risk assessment, appropriate methods, e.g. HAZID, HAZOP, FMEA/FMECA, what-if analysis, etc., should be adopted taking into account IEC/ISO 31010:2009 "Risk management – Risk assessment techniques"<sup>7)</sup> and SAE ARP 5580-2001 "Recommended failure modes and effects analysis (FMEA) practices for non-automobile applications"<sup>9)</sup>.</p>	General (see 4.1)
26	<p>Relief valve sizing should be undertaken for the most onerous scenario. Whether this scenario is brought into existence due to fire or by loss of vacuum from the overall insulation system should be assessed and the resulting magnitude of the heat flux on the containment system considered in each case.</p>	High pressure hazard (see 4.8)
27	<p>A filling limit exceeding 98% at reference temperature should not be permitted.</p>	High pressure hazard (see 4.8)
28	<p>Bolted flange connections of hydrogen piping should be avoided where welded connections are feasible.</p>	Permeability (see 4.4.2)
29	<p>Due consideration should be given to the invisible nature of hydrogen fire.</p>	Fire hazard (see 4.7.1)

### 3 Explanation on general requirements

#### 3.1 Properties of liquefied hydrogen

The application of general requirements in the Code for liquefied hydrogen has been considered based on a comparison study on the physical properties of liquefied hydrogen and LNG. LNG and liquefied hydrogen are cryogenic liquids, non-toxic, and generate flammable high pressure gas. For reference, table 3 shows the comparison of physical properties of hydrogen and methane, the major component of LNG.

**Table 3: Comparison of physical properties of Hydrogen and Methane**

	Hydrogen	Methane	References
Boiling temperature (K) <sup>*</sup>	20.3	111.6	ISO <sup>1)</sup> , Annex A, Table A.3
Liquid density (kg/m <sup>3</sup> ) <sup>*</sup>	70.8	422.5	ISO <sup>1)</sup> , Annex A, Table A.3
Gas density (kg/m <sup>3</sup> ) <sup>**</sup> (Air: 1.198)	0.084	0.668	NIST RefProp <sup>10)</sup>
Viscosity (g/cm•s x 10 <sup>-6</sup> )			
Gas	8.8	10.91	NIST RefProp <sup>10)</sup>
Liquid	13.49	116.79	NIST RefProp <sup>10)</sup>
Flame temperature in air (°C)	2396	2230	Calculated using Cantera and GRI 3.0 mechanism
Maximum burning velocity (m/s)	3.15	0.385	Calculated using Cantera and GRI 3.0 mechanism
Heat of vapourization (J/g) <sup>*</sup>	448.7	510.4	ISO <sup>1)</sup> , Annex A, Table A.3
Lower flammability limit (% vol. fraction) <sup>***</sup>	4.0	5.3	ISO <sup>1)</sup> , Annex B, Table B.2
Upper flammability limit (% vol. fraction) <sup>***</sup>	75.0	17.0	ISO <sup>1)</sup> , Annex B, Table B.2
Lower detonation limit (% vol. fraction) <sup>***</sup>	18.3	6.3	ISO <sup>1)</sup> , Annex B, Table B.2
Upper detonation limit (% vol. fraction) <sup>***</sup>	59.0	13.5	ISO <sup>1)</sup> , Annex B, Table B.2
Minimum ignition energy (mJ) <sup>***</sup>	0.017	0.274	ISO <sup>1)</sup> , Annex B, Table B.2
Auto-ignition temp. (°C) <sup>***</sup>	585	537	ISO <sup>1)</sup> , Annex B, Table B.2
Toxicity	Non	Non	Orange book <sup>5)</sup>
Temperature at critical point (K)	33.19 <sup>****</sup>	190.55	Hydrogen: ISO <sup>1)</sup> , Annex A, Table A.1 Methane: The Japan Society of Mechanical Engineers, Data Book, Thermophysical Properties of Fluids (1983)
Pressure at critical point (kPaA)	1297 <sup>****</sup>	4595	Hydrogen: ISO <sup>1)</sup> , Annex A, Table A.1 Methane: The Japan Society of Mechanical Engineers, Data Book, Thermophysical Properties of Fluids (1983)

Remarks:

- \* At their normal boiling points for comparison purpose.
- \*\* At normal temperature and pressure.
- \*\*\* Ignition and combustion properties for air mixtures at 25°C and 101.3 kPaA.
- \*\*\*\* Normal Hydrogen.

## **3.2 Explanation on respective requirements**

### **3.2.1 Ship type (column 'c')**

3.2.1.1 As a result of the studies, the following points were noted in relation to ship type allocated in the Code:

- .1 type 1G is allocated only to dangerous goods of class 2.3<sup>1</sup> in the International Maritime Dangerous Goods Code, but not to class 2.2 and class 2.1;
- .2 type 2G and type 2PG are allocated mainly to non-toxic flammable gases of class 2.1; and
- .3 type 3G is allocated only to non-flammable and non-toxic gases of class 2.2.

3.2.1.2 "Type 2PG" is not applicable to liquefied hydrogen for the reason that the design temperature is lower than -55°C. Taking into account that liquefied hydrogen is a class 2.1 dangerous good, it is appropriate to allocate "type 2G" to liquefied hydrogen.

### **3.2.2 Independent tank type C required (column 'd')**

Independent tank type C is allocated only to dangerous goods of class 2.3 whose vapour density is heavier than air. Independent tank type C is considered not to be required for liquefied hydrogen.

### **3.2.3 Control of vapour space within cargo tank (column 'e')**

Special environment controls such as drying and inerting are generally required for liquid chemical products in consideration of the reactivity of cargo vapour and air. As is the case for LNG, it is considered not to be necessary to apply such requirements for liquefied hydrogen.

### **3.2.4 Vapour detection (column 'f')**

Because hydrogen is flammable and non-toxic, it is appropriate to require Flammable (F) as vapour detection for liquefied hydrogen.

### **3.2.5 Gauging (column 'g')**

On the grounds that Closed (C) gauging is required, in principle, for flammable or toxic cargoes, such as methane, it is considered to be appropriate to require Closed (C) gauging for hydrogen, taking into account that hydrogen has high ignitability and a wide flammable range in air and that closed gauging is effective to prevent leakage of gases into air.

## **4 Special requirements against hazards of liquefied hydrogen**

### **4.1 Hazards of liquefied hydrogen to be considered**

4.1.1 The hazards related to liquefied hydrogen are low ignition energy, a wide range of flammability limits, low visibility of flames in case of fire, high flame velocity which may lead to the detonation with shockwave, low temperature and liquefaction/solidification of inert gas and constituents of air which may result in an oxygen-enriched atmosphere, high permeability, low viscosity, and hydrogen embrittlement including weld metals. Where vacuum insulation is adopted, due consideration should be given to the possibility of untimely deterioration of

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<sup>1</sup> Toxic and flammable gases are classified as class 2.3 with subsidiary class 2.1.



insulation properties at the envisaged carriage temperatures of liquid hydrogen. The vacuum insulation evaluation should be specified for the normal range or upper limit of cold vacuum pressure (CVP), and loss of vacuum should be defined with respect to this value. Accordingly, effect of vacuum pressure should be taken into account at the time of design and testing of cargo containment systems and piping. Supporting structure and adjacent hull structure should be designed taking into account the cooling owing to loss of vacuum insulation.

4.1.2 Hydrogen is essentially a mixture of ortho- and para-hydrogen, with an equilibrium concentration of 75% ortho-hydrogen and 25% para-hydrogen at ambient temperature. When liquefied at 20K, there is a slow but continuous transformation of ortho-hydrogen to para-hydrogen. The exothermic conversion of the nuclear spin isomers of hydrogen (ortho- to para-hydrogen) may take place and the effect of the conversion may have an impact on the cooling capacity and relief valve capacity of the vessel's equipment.

4.1.3 For consideration on the special requirements for liquefied hydrogen carriers, bibliographic studies were conducted using the references at the end of this document, in particular, ISO/TR 15916, "High Pressure Gas Safety Act"<sup>(1)</sup> (Japanese law), "Safety standard for hydrogen and hydrogen system" by AIAA<sup>(2)</sup> and NFPA 2 "Hydrogen Technologies Code"<sup>(6)</sup>. The majority of special requirements for liquefied hydrogen carriers are provided based on ISO/TR 15916. This standard refers to liquefied hydrogen tank storage facilities on shore, tank trucks and so on, and includes basic viewpoints when discussing the properties of liquefied hydrogen.

4.1.4 Trace amounts of air will condense or solidify in an environment with liquid hydrogen possibly resulting in an unstable and explosive mixture. Precautions should be taken to assure that the possibility of condensed air is accounted within properly secured hazard areas.

## **4.2 Low temperature hazard**

### **4.2.1 Selection of appropriate material**

4.2.1.1 Tables 6.3 and 6.4 in the Code prescribe material selection for piping or cargo tanks whose design temperature is -165°C or higher. According to Note 2 of table 6.3 and Note 3 of table 6.4 of the Code, the requirements for materials whose design temperatures are lower than -165°C should be specially agreed with the Administration. In this regard, the publication by AIAA<sup>(2)</sup> introduces some appropriate materials corresponding to the design temperature and the Administration should take into account such references for the material selection.

4.2.1.2 Although paragraph 4.19.3 in the Code requires testing of materials used for thermal insulation for various properties adequate for the intended service temperature, the minimum test temperature is -196°C. The requirements in the Code do not refer to the normal boiling point of hydrogen, being -253°C. In case of carriage of liquefied hydrogen, special requirements should be provided to consider the lower design temperature.

### **4.2.2 Measures for condensed air**

4.2.2.1 In the case of nitrogen whose normal boiling point is -196°C, for which air condensation and oxygen enrichment are concerns, the following special requirement has already been included in paragraph 17.17 in the Code:

"Material of construction and ancillary equipment such as insulation shall be resistant to the effect of high oxygen concentrations caused by condensation and enrichment at the low temperatures attained in parts of the cargo system. Due consideration shall be given to ventilation in such areas where condensation might occur to avoid the stratification of oxygen-enriched atmosphere."

A similar special requirement is applicable to hydrogen.

4.2.2.2 A vent may be blocked by accumulation of ice formed from moisture in the air, which may result in excessive pressure leading to rupture of the vent and relevant piping (see paragraph 4.2.4).

#### **4.2.3 Removal of impure substances condensed**

The removal of impure substances, such as those contained in condensate in pipes, should be separately considered. Installation of filters can be an appropriate measure and should be stipulated as a special requirement.

#### **4.2.4 Prevention of blockage due to formation of water or ice**

Pressure relief systems may become blocked due to formation of water or ice, depending on the temperature and humidity of air, resulting from the low temperature of the cargo and its vapour (see paragraph 4.2.2). Appropriate means should be provided to prevent such phenomena.

### **4.3 Hydrogen embrittlement**

4.3.1 Selection of appropriate materials should be required to prevent failures owing to hydrogen embrittlement. The publication by AIAA<sup>2)</sup> introduces some appropriate materials resistant to hydrogen embrittlement, and concludes that aluminium is the material least affected.

4.3.2 International or national standards should be followed for the selection of materials for the design of liquefied and gaseous hydrogen installations in a marine environment.

### **4.4 Permeability**

#### **4.4.1 Prevention of leakage from cargo tanks**

To mitigate leakage of hydrogen, it is deemed appropriate to require "butt weld full penetration" type welds, regardless of tank types, taking into account the high permeability of hydrogen. Furthermore, dome-to-shell connections welds and nozzle welds should be designed with full penetration regardless of tank types, taking into account paragraphs 4.20.1.1 and 4.20.1.2 of the Code.

#### **4.4.2 Prevention of leakage from pipes**

To mitigate undetected accumulation of hydrogen in a confined space, effective measures should be employed to reduce the possibility of leakage of hydrogen, taking its high permeability into account. Effective measures can be double tube structures, or fixed hydrogen leak detectors in areas assessed as being highly hazardous with regard to hydrogen leakage. Hydrogen leakage through welds, joints and seals is an important consideration for the design of hydrogen systems and an important operational issue.

#### **4.4.3 Implementation of effective tightness test**

4.4.3.1 Tightness tests for cargo tanks and cargo pipes/valves are required by paragraphs 4.20.3.2, 5.13.1 and 5.13.2.3 in the Code respectively. Helium or a mixture of 5% hydrogen and 95% nitrogen should be used as the medium for tightness tests, instead of air, because the permeability of hydrogen is high.

4.4.3.2 For a hydrogen installation, the pipework should be pressure-tested at its design pressure. Consideration should be given to using oxygen-free nitrogen with a small molecule tracer gas, such as helium as the test medium and an electronic leak detector for identifying leaks.

#### **4.4.4 Confirmation of appropriate operating procedure**

Instructions/manuals containing the operating procedures for the prevention of leakage during transport, methods for early detection in case of leakage, and appropriate measures after such events, should be provided. For this, paragraph 18.3 of the Code requires that the information shall be on board and available to all concerned, giving the necessary data for the safe carriage of cargo. In detail, the Code requires such information on action to be taken in the event of spills or leak, countermeasures against accidental personal contact, procedures for cargo transfer, and emergency procedures to be on board. With regard to the manuals on procedures for liquefied hydrogen during carriage and transfer operations, the requirements in the Code are applicable and no special requirement is necessary.

#### **4.5 Low density and high diffusivity**

Though low density and high diffusivity of hydrogen may reduce the possibility of formation of a flammable atmosphere in open spaces, adequate ventilation is necessary for enclosed spaces in cargo areas where formation of hydrogen-oxygen/air mixture may occur. Paragraph 12.2 of the Code requires fixed ventilation systems or portable mechanical ventilation for such enclosed spaces. These requirements in the Code are applicable to liquefied hydrogen carriers and no special requirement is necessary in this regard.

#### **4.6 Ignitability**

4.6.1 The Code requires electrical bonds of the piping and the cargo tanks in paragraph 5.7.4, exclusion of all sources of ignition in paragraph 11.1.2, electrical installations to minimize the risk of fire and explosion from flammable products in paragraph 10.2.1 and so on, in order to prevent ignition of flammable cargoes.

4.6.2 The Code requires compliance with the relevant standards issued by the International Electrotechnical Commission (IEC) and the IEC standards specify the details of such safety measures depending on the respective properties of flammable gases including hydrogen. No special requirement is necessary with regard to ignitability of hydrogen<sup>2</sup>.

#### **4.7 Fire hazard**

##### **4.7.1 Safety of personnel in case of fire**

To avoid the effects of flame and UV radiation produced by a hydrogen fire, it is effective to use firefighter's outfits and protective equipment. The Code already requires firefighter's outfits for ships carrying flammable products in paragraph 11.6.1 and safety equipment in paragraph 14.3. This issue should be considered as the matter of cargo information required by paragraph 18.3 of the Code. Due consideration should be given to the invisible nature of hydrogen fire.

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<sup>2</sup> Electrical equipment used in hydrogen/air mixture should be, at least, the type of "II-C" and "T-1" as the group based on the maximum experimental safe gap for flameproof enclosures and the temperature class based on maximum surface temperature, respectively, according to IEC 60079-20-1<sup>4</sup>).

#### **4.7.2 Compatibility of fire-extinguishing systems**

Dry chemical powder fire-extinguishing or carbon dioxide fire-extinguishing systems are considered to be effective in case of hydrogen fire and such fire-extinguishing systems are already required by paragraphs 11.4 and 11.5 of the Code. Special requirements for installation of other types of fire-extinguishing systems are considered unnecessary, except with regard to the increased amount of carbon dioxide required, as mentioned in the next paragraph in this document.

#### **4.7.3 Increase of the amount of gas for carbon dioxide fire-extinguishing systems**

4.7.3.1 Paragraph 11.5.1 of the Code requires as follows:

"Enclosed spaces meeting the criteria of cargo machinery spaces in 1.2.10, and the cargo motor room within the cargo area of any ship, shall be provided with a fixed fire-extinguishing system complying with the provisions of the FSS Code and taking into account the necessary concentrations/application rate required for extinguishing gas fires."

4.7.3.2 Chapter 5 of the FSS Code, i.e. Fixed gas fire-extinguishing systems, requires that the quantity of carbon dioxide for cargo spaces, unless otherwise provided, shall be sufficient to give a minimum volume of free gas equal to 30% of the gross volume of the largest cargo space to be protected in the ship, in paragraph 2.2.1.1.

4.7.3.3 On the other hand, NFPA 12<sup>3)</sup> requires that the design quantity of carbon dioxide for hydrogen fire should be 75% or more of the gross volume of the protected space. The special requirement for an increased amount of carbon dioxide should be provided for carbon dioxide fire-extinguishing systems.

#### **4.7.4 Features of hydrogen fire**

Hydrogen burns at high temperature, but generally gives off less radiant heat than propane or other hydrocarbons (e.g. only about 10% of that radiated by an equal-sized propane flame). Although the heat radiated by a hydrogen flame is also relatively low compared to hydrocarbons, it is important to take into account the differences in heats of combustion, burning rate and flame size. Hydrogen flames are colourless or nearly colourless. Both of these characteristics make it more difficult to detect a hydrogen fire. Even relatively small hydrogen fires are very difficult to extinguish. The only reliable approach to extinguish a fire is to shut off the source of hydrogen supply.

#### **4.8 High pressure hazard**

4.8.1 High pressure is a hazard common to hydrogen and other flammable gases listed in the Code. To prevent overpressure, the Code requires various measures such as pressure control and pressure design. Specifically, paragraph 8.2, in regard to the provision of pressure control of cargo tanks, requires fittings of pressure relief valves to the cargo tanks. Furthermore, paragraph 7.1.1 requires temperature control by the use of mechanical refrigeration and/or design to withstand possible increases of temperature and pressure. In addition, paragraph 15.2 specifies the filling limit of cargo tanks taking into account cargo volume increase by its thermal expansion. These requirements are applicable for hydrogen and no special requirement is considered necessary in this regard.

4.8.2 Vacuum insulation systems are likely to be used for liquefied hydrogen containment systems and the insulation capability of such systems may be adversely affected by damage to the system, depending on the design of the system. If a rapid deterioration of the insulation system took place, rapid increase of temperature in the cargo tank would occur and/or the rate of vapourization of liquefied hydrogen might exceed the capacity of pressure relief valves. To prevent such dangerous deterioration of insulation, appropriate safety measures should be taken.

4.8.3 Boil-off may be a bigger problem for hydrogen than for LNG in particular when insulation properties have deteriorated. Means of handling boil-off gas should be carefully considered taking into account the following issues:

- .1 Re-liquefaction of hydrogen involves very specific and costly equipment. Cargo cooling in order to avoid boil-off shows the same kind of issues; and
- .2 Notwithstanding the provision in paragraph 7.4.1 of the Code, thermal oxidation of hydrogen may be permitted in accordance with paragraph 1.3 of the Code.

4.8.4 The special requirements in these aspects are considered necessary.

## **4.9 Health hazard**

### **4.9.1 Human safety concern under low temperature**

With regard to the influences of cold hydrogen on persons' bodies, suitable protective equipment is effective. In this aspect, paragraph 14.1 of the Code requires suitable protective equipment taking into account the character of the products, therefore, no special requirement is considered necessary.

### **4.9.2 Static electricity**

Hydrogen ignition energy is very low and hydrogen can be easily ignitable by static electricity and due consideration should be given to this issue, in accordance with the requirement in the Code on suitable protective equipment.

### **4.9.3 Oxygen depletion and asphyxiation**

Leakage of hydrogen may cause low level of oxygen and associated asphyxiation.

## **4.10 Wide range of flammable limits**

### **4.10.1 Extinguishing hydrogen fire**

4.10.1.1 As mentioned in paragraph 4.6, for flammable products the Code already requires elimination of sources of ignition, including use of electrical installations of appropriate types in order to minimize the risk of fire and explosion. No special requirement is considered necessary with regard to ignitability of hydrogen.

4.10.1.2 Furthermore, with regard to the wide range of flammable limits of hydrogen, the increased quantities of carbon dioxide as a fire-extinguishing medium should be specified as mentioned in paragraph 4.7. No additional special requirement is considered to be necessary with regard to the wide range of flammable limits of hydrogen.



## References

- 1) ISO/TR 15916, Basic consideration for the safety of hydrogen systems (ISO)
- 2) American Institute of Aeronautics and Astronautics, "Safety Standard for Hydrogen and Hydrogen Systems (Guide to Safety of Hydrogen and Hydrogen Systems)", 2005 (AIAA)
- 3) NFPA 12: Standard on Carbon Dioxide Extinguishing Systems 2005 Edition (NFPA)
- 4) IEC 60079-20-1 Ed. 1.0:2010 (b) Explosive atmospheres – Part 20-1: Material characteristics for gas and vapour classification – Test methods and data
- 5) UN Recommendations on the Transport of Dangerous Goods – Model Regulations, Nineteenth revised edition
- 6) NFPA 2: Hydrogen Technologies Code 2016 Edition (NFPA)
- 7) IEC/ISO 31010:2009 Risk management – Risk assessment techniques
- 8) Cryogenics Safety Manual – Fourth Edition (1998)
- 9) SAE ARP 5580-2001 "Recommended failure modes and effects analysis (FMEA) practices for non-automobile applications"
- 10) National Institute of Standards and Technology (NIST) RefProp database

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## ANNEX 2

### DRAFT AMENDMENTS TO PARAGRAPHS 4.5.1 AND 4.5.2 OF THE INTERNATIONAL MARITIME SOLID BULK CARGOES (IMSBC) CODE

#### Section 4

#### Assessment of acceptability of consignments for safe shipment

#### 4.5 Interval between sampling/testing and loading for TML and moisture content determination

- 1 Replace the existing paragraphs 4.5.1 and 4.5.2 with the following:

"4.5.1 The shipper shall be responsible for ensuring that a test to determine the TML of a solid bulk cargo is conducted within six months to the date of loading the cargo. Notwithstanding this provision, where the composition or characteristics of the cargo are variable for any reason, the shipper shall be responsible for ensuring that a test to determine the TML is conducted again after it is reasonably assumed that such variation has taken place.

4.5.2 The shipper shall be responsible for ensuring that sampling and testing for moisture content is conducted as near as practicable to the date of commencement of loading. The interval between sampling/testing and the date of commencement of loading shall never be more than seven days. If the cargo has been exposed to significant rain or snow between the time of testing and the date of completion of loading, the shipper shall be responsible for ensuring that the moisture content of the cargo is still less than its TML, and evidence of this is provided to the master as soon as practicable."

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### ANNEX 3

#### DRAFT AMENDMENTS TO SOLAS REGULATIONS II-2/20.2 AND II-2/20-1<sup>1</sup>

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

1 The following paragraph 2.1.2 is added after the existing paragraph 2.1.1:

"2.1.2 Notwithstanding the above, cargo spaces on all ships, which contain vehicles with fuel in their tanks for their own propulsion that are loaded/unloaded into spaces which do not meet the requirements of this regulation and which do not use their own propulsion within the cargo space, are not required to comply with this regulation, providing the vehicles are carried in compliance with the appropriate requirements of regulation 19 and the IMDG Code, as defined in regulation VII/1.1."

##### Regulation 20-1 – Requirements for vehicle carriers carrying motor vehicles with compressed hydrogen or natural gas in their tanks for their own propulsion as cargo

2 The existing paragraph 5 is amended as follows:

"5.1 When a vehicle carrier carries as cargo one or more motor vehicles with either compressed hydrogen or compressed natural gas in their tanks for their own propulsion, at least two portable gas detectors shall be provided. Such detectors shall be suitable for the detection of the gas fuel and be of a certified safe type for use in the explosive gas and air mixture.

5.2 Notwithstanding the above, cargo spaces on ships which contain vehicles with compressed hydrogen or compressed natural gas in their tanks for their own propulsion that are not carried in spaces designated as vehicle spaces or ro-ro spaces and which do not use their own propulsion within the cargo space are not required to comply with regulation 20 providing the vehicles are carried in compliance with the appropriate requirements of regulation 19 and the IMDG Code, as defined in regulation VII/1.1."

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<sup>1</sup> Tracked changes are created using "strikeout" for deleted text and "grey shading" to highlight all modifications and new insertions, including deleted text.

## APPENDIX 1<sup>2</sup>

### CHECK/MONITORING SHEET FOR THE PROCESSING OF AMENDMENTS TO THE CONVENTION AND RELATED MANDATORY INSTRUMENTS (PROPOSAL/DEVELOPMENT)

#### Part I – Submitter of proposal (refer to section 3.2.1.1 of MSC.1/Circ.1500)

1	Submitted by (Document Number and submitter) <b>MSC 96/23/9 (Antigua and Barbuda, France and IACS)</b>
2	Meeting session <b>MSC 96</b>
3	Date (date of submission) <b>9 February 2016</b>

#### Part II – Details of proposed amendment(s) or new mandatory instrument (refer to sections 3.2.1.1 and 3.2.1.2 of MSC.1/Circ.1500)

1	High-level action plan <b>2.0.1</b>
2	Planned output <b>Development of amendments to SOLAS regulation II-2/20.2 and II-2/20-1 to clarify the fire safety requirements for cargo spaces containing vehicles with fuel in their tanks for their own propulsion</b>
3	Recommended type of amendments (MSC.1/Circ.1481) (delete as appropriate) <b>Four-year cycle of entry into force</b>
4	Instruments intended for amendment (SOLAS, LSA Code, etc.) or developed (new code, new version of a code, etc.) <b>SOLAS Chapter II-2</b>
5	Intended application (scope, size, type, tonnage/length restriction, service (International/non-international), activity, etc.) <b>Ships to which SOLAS regulations II-2/20 and II-2/20-1 apply</b>
6	Application to new/existing ships <b>New and existing ships</b>
7	Proposed coordinating sub-committee <b>Carriage of Cargoes and Containers</b>
8	Anticipated supporting sub-committees <b>Ship Systems and Equipment (SSE)</b>
9	Time scale for completion <b>2017</b>
10	Expected date(s) for entry into force and implementation/application <b>1 January 2020</b>
11	Any relevant decision taken or instruction given by the Committee <b>The Committee is invited to consider if it would urge early implementation of the amendments at the time of their adoption with a view to providing the earliest possible clarification to industry.</b>

<sup>2</sup> This appendix is available in English only. Parts I and II have been copied from annex 4 to document MSC 96/23/9 and part III was prepared by the Secretariat.

**Part III – Process monitoring to be completed during the work process at the sub-committee and checked as part of the final approval process by the Committee (Refer to section 3.2.1.3 of MSC.1/Circ.1500)**

1	The sub-committee, at an initial engagement, has allocated sufficient time for technical research and discussion before the target completion date, especially on issues needing to be addressed by more than one sub-committee and for which the timing of relevant sub-committees meetings and exchanges of the result of consideration needed to be carefully examined.	yes
2	The scope of application agreed at the proposal stage was not changed without the approval of the Committee.	yes
3	The technical base document/draft amendment addresses the proposal's issue(s) through the suggested instrument(s); where it does not, the sub-committee offers the Committee an alternative method of addressing the problem raised by the proposal.	yes
4	Due attention has been paid to the <i>Interim guidelines for the systematic application of the grandfather clauses</i> (MSC/Circ.765-MEPC/Circ.315).	yes
5	All references have been examined against the text that will be valid if the proposed amendment enters into force.	yes
6	The location of the insertion or modified text is correct for the text that will be valid when the proposed text enters into force on a four-year cycle of entry into force, as other relevant amendments adopted might enter into force on the same date.	yes
7	There are no inconsistencies in respect of scope of application between the technical regulation and the application statement contained in regulation 1 or 2 of the relevant chapter, and application is specifically addressed for existing and/or new ships, as necessary.	yes
8	Where a new term has been introduced into a regulation and a clear definition is necessary, the definition is given in the article of the Convention or at the beginning of the chapter.	yes
9	Where any of the terms "fitted", "provided", "installed" or "installation" are used, consideration has been given to clarifying the intended meaning of the term.	not applicable
10	All necessary related and consequential amendments to other existing instruments, including non-mandatory instruments, in particular to the forms of certificates and records of equipment required in the instrument being amended, have been examined and included as part of the proposed amendment(s).	not applicable
11	The forms of certificates and records of equipment have been harmonized, where appropriate, between the Convention and its Protocols.	not applicable

**Part III – Process monitoring to be completed during the work process at the sub-committee and checked as part of the final approval process by the Committee (Refer to section 3.2.1.3 of MSC.1/Circ.1500)**

12	It is confirmed that the amendment is being made to a currently valid text and that no other bodies are concurrently proposing changes to the same text.	yes <sup>3</sup>
13	All entry-into-force criteria (building contract, keel laying and delivery) have been considered and addressed.	yes
14	Other impacts of the implementation of the proposed/approved amendment have been fully analysed, including consequential amendments to the "application" and "definition" regulations of the chapter.	yes
15	The amendments presented for adoption clearly indicate changes made with respect to the original text, so as to facilitate their consideration.	yes
16	For amendments to mandatory instruments, the relationship between the Convention and the related instrument has been observed and addressed, as appropriate.	not applicable
17	The related record format has been completed or updated, as appropriate.	yes

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<sup>3</sup> SSE 3 has requested MSC 97 to consider the decision made by SSE 3 that only "pure car and truck carriers" need to comply with SOLAS regulation II-2/20-1 and that the definition provided in SOLAS regulation II -/3.56 should be amended accordingly (SSE 3/16, paragraph 16.2.6).

## APPENDIX 2<sup>4</sup>

### RECORDS FOR REGULATORY DEVELOPMENT

The following records should be created and kept updated for each regulatory development.

The records can be completed by providing references to paragraphs of related documents containing the relevant information, proposals, discussions and decisions.

<b>1</b>	<b>Title (number and title of regulation(s))</b>
	SOLAS regulations II-2/20 (Protection of vehicle, special category and ro-ro spaces) and II-2/20-1 (Requirements for vehicle carriers carrying motor vehicles with compressed hydrogen or natural gas in their tanks for their own propulsion as cargo)
<b>2</b>	<b>Origin of the requirement (original proposal document)</b>
	MSC 96/23/9; and MSC 96/25, section 23
<b>3</b>	<b>Main reason for the development (extract from the proposal document)</b>
	MSC 96 considered document MSC 96/23/9 (Antigua and Barbuda, France and IACS), proposing a new output to amend SOLAS regulations II-2/20.2 and II-2/20-1 to address confusion regarding the provisions of SOLAS chapter II-2 relating to spaces carrying vehicles with fuel in their tanks and Special Provisions 961 and 962 in the IMDG Code.
<b>4</b>	<b>Related output</b>
	Amendments to SOLAS regulations II-2/20.2 and II-2/20-1 to clarify the fire safety requirements for cargo spaces containing vehicles with fuel in their tanks for their own propulsion.
<b>5</b>	<b>History of the discussion (approval of work programmes, sessions of sub-committees, including CG/DG/WG arrangements)</b>
	<p><b>MSC 96</b> agreed to include in the 2016-2017 biennial agenda of the CCC Sub-Committee and the provisional agenda for CCC 3, a new output on "Amendments to SOLAS regulations II-2/20.2 and II-2/20-1 to clarify the fire safety requirements for cargo spaces containing vehicles with fuel in their tanks for their own propulsion", with a target completion year of 2017, in association with the SSE Sub-Committee as and when requested by the CCC Sub-Committee.</p> <p><b>CCC 3</b> confirmed that no changes to the draft amendments to SOLAS regulations II-2/20.2 and II-2/20-1 contained in annex 2 to document MSC 96/23/2 were needed, the Sub-Committee endorsed the draft amendments to SOLAS regulations II-2/20.2 and II-2/20-1, as set out in annex 3 to document CCC 3/15.</p> <p>Excerpt from document CCC 3/15:</p> <p>"7.4 Following consideration of annex 2 to document MSC 96/23/9, the Sub-Committee noted general support for the draft amendments to SOLAS regulations II-2/20.2 and II-2/20-1, based on the understanding that:</p> <p style="padding-left: 40px;">.1 they did not affect the fire safety requirements of ro-ro spaces; and</p>

<sup>4</sup> This appendix was prepared by the Secretariat and is available in English only.

	<p>.2 they provided clarity with regard to the relationship between SOLAS regulations II-2/20.2 and II-2/20-1 and the IMDG Code.</p> <p>7.5 Subsequently, having confirmed that no changes to the draft amendments to SOLAS regulations II-2/20.2 and II-2/20-1 contained in annex 2 to document MSC 96/23/2 were needed, the Sub-Committee endorsed the draft amendments to SOLAS regulations II-2/20.2 and II-2/20-1, as set out in annex 3.</p> <p>7.6 Taking into account the need to provide clarity with regard to the relationship between SOLAS regulations II-2/20.2 and II-2/20-1 and the IMDG Code as soon as possible, the Sub-Committee agreed to forward the draft amendments to SOLAS regulations II-2/20.2 and II-2/20-1, as set out in annex 3, to MSC 97 for approval, with a view to subsequent adoption.</p> <p>7.7 In this context, the Sub-Committee noted that SSE 3 had requested MSC 97 to consider the decision made by SSE 3 that only 'pure car and truck carriers' need to comply with SOLAS regulation II-2/20-1 and that the definition provided in SOLAS regulation II-2/3.56 should be amended accordingly (SSE 3/16, paragraph 16.2.6). Consequently, the Sub-Committee confirmed that if the aforementioned decision by SSE 3 were to be endorsed by MSC 97, then the draft amendments to SOLAS regulation II-2/20-1 endorsed at this session would be unnecessary.</p> <p>7.8 Consequently, the Sub-Committee also invited MSC 97 to consider the necessity for the draft amendments to SOLAS regulation II-2/20-1, as set out in annex 3, in conjunction with the aforementioned request by SSE 3."</p>
<b>6</b>	<b>Impact on other instruments (e.g. codes, performance standards, guidance circulars, certificates/records format, etc.)</b>
	N/A
<b>7</b>	<b>Technical background</b>
<b>7.1</b>	<b>Scope and objective (to cross check with items 4 and 5 in part II of the checklist)</b>
	<p>Clarification of the fire safety requirements for cargo spaces containing vehicles with fuel in their tanks for their own propulsion</p> <p>The proposed amendments apply to new and existing ships to which SOLAS regulations II-2/20 and II-2/20-1 apply.</p>
<b>7.2</b>	<b>Technical/operational background and rationale (summary of FSA study, etc., if available or, engineering challenge posed, etc.)</b>
	N/A
<b>7.3</b>	<b>Source/derivation of requirement (non-mandatory instrument, industry standard, national/regional requirement)</b>
	N/A



**7.4 Short summary of requirement (what is the new requirement – in short and lay terms)**

A new paragraph 2.1.2 was added to the application of regulation II-2/20 and a new paragraph 5.2 was added to regulation II-2/20.1.

**7.5 Points of discussions (controversial points and conclusion)**

CCC 3 confirmed that if the decision by SSE 3, that only "pure car and truck carriers" need to comply with SOLAS regulation II-2/20-1 and that the definition provided in SOLAS regulation II-2/3.56 should be amended accordingly, were to be endorsed by MSC 97, then the draft amendments to SOLAS regulation II-2/20-1 endorsed by CCC 3 would be unnecessary.

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## ANNEX 4

### DRAFT AMENDMENTS TO THE INTERNATIONAL MARITIME SOLID BULK CARGOES (IMSBC) CODE RELATED TO HME SUBSTANCES

#### Section 1 General Provisions

##### 1.4 Application and implementation of this Code

1 In paragraph 1.4.2, the words "Paragraph 4.2.2.2;" and "Section 14 Prevention of pollution by cargo residues from ships;" are deleted.

#### Section 4 Assessment of acceptability of consignments for safe shipment

2 The existing paragraph 4.2.2.1 is renumbered as "4.2.2".

3 In the renumbered paragraph 4.2.2, in subparagraph .15, the word "and" is deleted.

4 In the renumbered paragraph 4.2.2, a new subparagraph .16 is inserted as follows:

".16 whether or not the cargo is classified as harmful to the marine environment in accordance with Annex V of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as amended; and"

5 In the renumbered paragraph 4.2.2, the existing subparagraph .16 is renumbered as subparagraph .17.

6 Paragraph 4.2.2.2 "The cargo information should include whether or not the cargo is harmful to the marine environment\*" and the corresponding footnote are deleted.

#### Section 13 References to related information and recommendation

7 In section 13.2.7 "Minimum information/documentation", new rows are added at the end of section as follows:

4.2	MARPOL Annex V, regulation 4.3	<i>Discharge of garbage outside special areas</i>
4.2	MARPOL Annex V, regulation 6.1.2.2	<i>Discharge of garbage within special areas</i>

#### Section 14 Prevention of pollution by cargo residues from ships

8 Section 14 is deleted.

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## ANNEX 5

### DRAFT AMENDMENTS TO THE 2012 GUIDELINES FOR THE IMPLEMENTATION OF MARPOL ANNEX V (RESOLUTION MEPC.219(63))

#### **3 MANAGEMENT OF CARGO RESIDUES OF SOLID BULK CARGOES**

1 Replace paragraph 3.2 with the following:

"3.2 Cargo residues are considered harmful to the marine environment and subject to regulations 4.1.3 and 6.1.2.1 of the revised MARPOL Annex V if they are residues of solid bulk cargoes which are classified according to the criteria set out in appendix I of MARPOL Annex V."

2 Replace paragraph 3.4 with the following:

"3.4 Solid bulk cargoes, as defined in regulation VI/1-1.2 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, other than grain, shall be classified in accordance with appendix I of MARPOL Annex V, and declared by the shipper as to whether or not they are harmful to the marine environment. For ships engaged in international voyages, such a declaration should be included in the information required in section 4.2.3 of the IMSBC Code. For ships not engaged in international voyages, other means of declaration may be used, as determined by the Administration."

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**ANNEX 6**

**DRAFT MSC CIRCULAR**

**UNIFIED INTERPRETATIONS OF THE IGF CODE**

1 The Maritime Safety Committee, at its [ninety-seventh session (21 to 25 November 2016)], with a view to providing more specific guidance for the application of the relevant requirements of the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels (IGF Code), approved unified interpretations of the IGF Code prepared by the Sub-Committee on Carriage of Cargoes and Containers, at its third session, as set out in the annex.

2 Member States are invited to use the annexed unified interpretations as guidance when applying relevant provisions of the IGF Code and to bring them to the attention of all parties concerned.

ANNEX

**UNIFIED INTERPRETATIONS OF THE IGF CODE**

**1 Tank connection space for tanks on open deck and tank connection space equipment (paragraph 2.2.15.3)**

1.1 A tank connection space may be required also for tanks on open deck. This may apply for ships where restriction of hazardous areas is safety critical. A tank connection space may also be necessary in order to provide environmental protection for essential safety equipment related to the gas fuel system like tank valves, safety valves and instrumentation.

1.2 A tank connection space may also contain equipment such as vapourizers or heat exchangers. Such equipment is considered to only contain potential sources of release, but not sources of ignition.

**2 Fuel preparation room (paragraph 2.2.17)**

A tank connection space which has equipment such as vapourizers or heat exchangers installed inside is not regarded as a fuel preparation room. Such equipment is considered to only contain potential sources of release, but not sources of ignition.

**3 Appropriate location of premixed engines using fuel gas mixed with air before the turbocharger (paragraph 5.4.1)**

Premixed engines using fuel gas mixed with air before the turbocharger should be located in ESD-protected machinery spaces.

**4 Protection against cryogenic leakage and control of hazardous zones in fuel preparation rooms on open deck (paragraphs 5.8 and 6.2.1.1)**

4.1 Fuel preparation rooms, regardless of location, should be arranged to safely contain cryogenic leakages.

4.2 The material of the boundaries of the fuel preparation room should have a design temperature corresponding with the lowest temperature it can be subjected to in a probable maximum leakage scenario unless the boundaries of the space, i.e. bulkheads and decks, are provided with suitable thermal protection.

4.3 The fuel preparation room should be arranged to prevent surrounding hull structure from being exposed to unacceptable cooling, in case of leakage of cryogenic liquids.

4.4 The fuel preparation room should be designed to withstand the maximum pressure build up during such a leakage. Alternatively, pressure relief venting to a safe location (mast) can be provided.

**5 External surface area of the tank for determining sizing of pressure relief valve (paragraph 6.7.3.1.1.2 and figure 6.7.1)**

*For prismatic tanks*

5.1  $L_{min}$ , for non-tapered tanks, is the smaller of the horizontal dimensions of the flat bottom of the tank. For tapered tanks, as would be used for the forward tank,  $L_{min}$  is the smaller of the length and the average width.



5.2 For prismatic tanks whose distance between the flat bottom of the tank and bottom of the hold space is equal to or less than  $L_{min}/10$ :

A = external surface area minus flat bottom surface area.

5.3 For prismatic tanks whose distance between the flat bottom of the tank and bottom of the hold space is greater than  $L_{min}/10$ :

A = external surface area.

## **6 Control and maintenance of pressure and temperature of liquefied gas fuel tanks after the activation of the safety system (paragraphs 6.9.1.1 and 6.9.1.2)**

Liquefied gas fuel tanks' pressure and temperature should be controlled and maintained within the design range at all times including after activation of the safety system required in 15.2.2 for a period of minimum 15 days. The activation of the safety system alone is not deemed as an emergency situation.

## **7 Special consideration within the risk assessment of closed or semi-enclosed bunkering stations (paragraph 8.3.1.1)**

The special consideration should as a minimum include, but not be restricted to, the following design features:

- segregation towards other areas on the ship
- hazardous area plans for the ship
- requirements for forced ventilation
- requirements for leakage detection (e.g. gas detection and low temperature detection)
- safety actions related to leakage detection (e.g. gas detection and low temperature detection)
- access to bunkering station from non-hazardous areas through airlocks
- monitoring of bunkering station by direct line of sight or by CCTV.

## **8 Ventilation of machinery spaces (paragraph 13.5.1)**

Spaces enclosed in the boundaries of machinery spaces (such as purifier's room, engine-room workshops and stores) are considered an integral part of machinery spaces containing gas-fuelled consumers and, therefore, their ventilation system does not need to be independent of the one of machinery spaces.

## **9 Ventilation of double piping and gas valve unit spaces in gas safe engine-rooms (paragraph 13.8.2)**

Double piping and gas valve unit spaces in gas safe engine-rooms are considered an integral part of the fuel supply systems and, therefore, their ventilation system does not need to be independent of other fuel supply ventilation systems provided such fuel supply systems contain only gaseous fuel.

## **10 Ventilation inlet for double wall piping or duct (paragraph 13.8.3)**

The ventilation inlet for the double wall piping or duct should always be located in a non-hazardous area in open air away from ignition sources.

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**ANNEX 7**

**DRAFT MSC CIRCULAR**

**UNIFIED INTERPRETATIONS OF THE IGC CODE  
(AS AMENDED BY RESOLUTION MSC.370(93))**

1 The Maritime Safety Committee, at its [ninety-seventh session (21 to 25 November 2016)], with a view to providing more specific guidance for the application of the relevant requirements of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), approved unified interpretations of the IGC Code (as amended by resolution MSC.370(93)) prepared by the Sub-Committee on Carriage of Cargoes and Containers, at its third session, as set out in the annex.

2 Member States are invited to use the annexed unified interpretations as guidance when applying relevant provisions of the IGC Code (as amended by resolution MSC.370(93)) and to bring them to the attention of all parties concerned.

ANNEX

**UNIFIED INTERPRETATIONS OF THE IGC CODE  
(AS AMENDED BY RESOLUTION MSC.370(93))**

**1 Closing devices for air intakes (paragraph 3.2.6)**

1.1 The closing devices that need not be operable from within the single spaces may be located in centralized positions.

1.2 Engine-room casings, cargo machinery spaces, electric motor rooms and steering gear compartments are generally considered as spaces not covered by paragraph 3.2.6 and, therefore, the requirement for closing devices need not be applied to these spaces.

1.3 The closing devices should give a reasonable degree of gas tightness. Ordinary steel fire-flaps without gaskets/seals should not be considered satisfactory.

1.4 Regardless of this interpretation, the closing devices shall be operable from outside of the space (SOLAS regulation II-2/5.2.1.1).

**2 Application of fire safety requirements in SOLAS chapter II-2 to cargo machinery spaces and turret compartments (paragraphs 3.3.1 and 11.1.1.1)**

The sentence "for the purpose of prevention of potential explosion according to SOLAS regulation II-2/4.5.10" in paragraph 3.3.1 does not require application of the aforementioned SOLAS regulation. SOLAS regulation II-2/4.5.10 does not apply in accordance with paragraph 11.1.1.1.

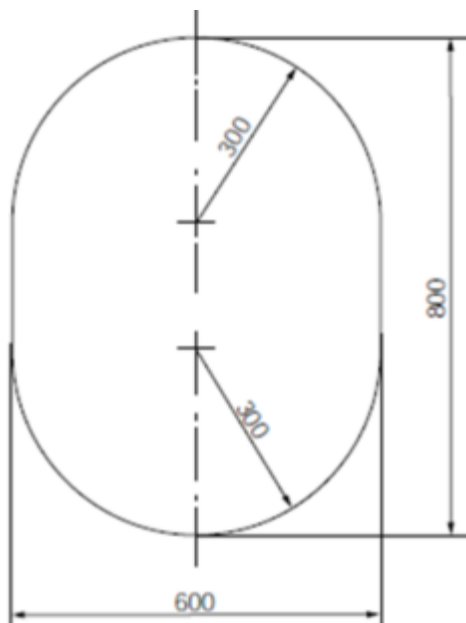
**3 Cargo tank clearances (paragraphs 3.5.3.1.2 and 3.5.3.1.3)**

*Access through horizontal openings, hatches or manholes*

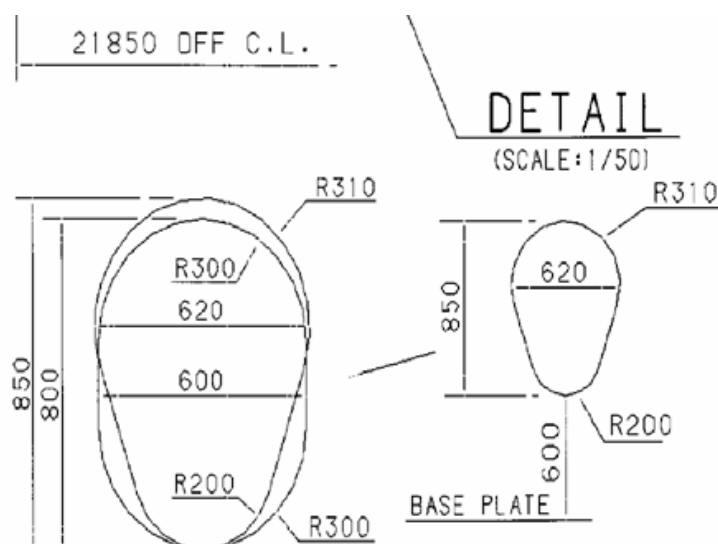
3.1 The minimum clear opening of 600 mm x 600 mm may have corner radii up to 100 mm maximum. In such a case where as a consequence of structural analysis of a given design the stress is to be reduced around the opening, it is considered appropriate to take measures to reduce the stress such as making the opening larger with increased radii, e.g. 600 mm x 800 mm with 300 mm radii, in which a clear opening of 600 mm x 600 mm with corner radii up to 100 mm maximum fits.

*Access through vertical openings or manholes providing passage through the length and breadth of the space*

3.2 The minimum clear opening of not less than 600 mm x 800 mm may also include an opening with corner radii of 300 mm. An opening of 600 mm in height x 800 mm in width may be accepted as access openings in vertical structures where it is not desirable to make large openings in the structural strength aspects, i.e. girders and floors in double bottom tanks.



3.3 Subject to verification of easy evacuation of an injured person on a stretcher the vertical opening 850 mm x 620 mm with upper half wider than 600 mm, while the lower half may be less than 600 mm with the overall height not less than 850 mm is considered an acceptable alternative to the traditional opening of 600 mm x 800 mm with corner radii of 300 mm.



3.4 If a vertical opening is at a height of more than 600 mm steps and handgrips should be provided. In such arrangements it should be demonstrated that an injured person can be easily evacuated.

#### **4 Pump Vents in Machinery Spaces (paragraph 3.7.5)\***

The requirement of "Pump vents shall not be open to machinery spaces" applies only to pumps in the machinery spaces serving dry duct keels through which ballast piping passes.

#### **5 Safe means of emergency isolation of pressure relief valves (paragraph 8.2.9)**

The "safe means of emergency isolation", as required by paragraph 8.2.9, should be provided so that a PRV can be isolated on a temporary basis to reseal or repair the valve before putting the PRV back into service. Such means of emergency isolation should be installed in a manner that does not allow their inadvertent operation. Permanent arrangements such as valves placed in the vent lines to the PRV are not considered as a means of emergency isolation and should not be permitted.

#### **6 External surface area of the tank for determining sizing of pressure relief valve (paragraph 8.4.1.2 and figure 8.1)**

*For prismatic tanks*

6.1  $L_{min}$ , for non-tapered tanks, is the smaller of the horizontal dimensions of the flat bottom of the tank. For tapered tanks, as would be used for the forward tank,  $L_{min}$  is the smaller of the length and the average width.

6.2 For prismatic tanks whose distance between the flat bottom of the tank and bottom of the hold space is equal to or less than  $L_{min}/10$ :

A = external surface area minus flat bottom surface area.

6.3 For prismatic tanks whose distance between the flat bottom of the tank and bottom of the hold space is greater than  $L_{min}/10$ :

A = external surface area.

#### **7 Back-flushing of the water-spray system (paragraph 11.3.6)**

The last sentence of paragraph 11.3.6, i.e. "In addition, means shall be provided to back-flush the system with fresh water", should be understood to mean that arrangements should be provided so that the water-spray system as a whole (i.e. piping, nozzles and in-line filters) can be flushed or back-flushed, as appropriate, with fresh water to prevent the blockage of pipes, nozzles and filters.

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\* The interpretation also applies to the requirement of "Pump vents should not be open to machinery spaces" in paragraph 3.7.4 of the IGC Code, as amended by resolution MSC.103(73).

**ANNEX 8**

**BIENNIAL STATUS REPORT OF THE SUB-COMMITTEE**

<b>SUB-COMMITTEE ON CARRIAGE OF CARGOES AND CONTAINERS (CCC)</b>								
<b>Output number</b>	<b>Description</b>	<b>Target completion year</b>	<b>Parent organ(s)</b>	<b>Associated organ(s)</b>	<b>Coordinating organ(s)</b>	<b>Status of output for Year 1</b>	<b>Status of output for Year 2</b>	<b>References</b>
1.1.2.3	Unified interpretation of provisions of IMO safety, security, and environment-related Conventions	Continuous	MSC/MEPC	III/PPR/CCC/SDC/SSE/NCSR		Ongoing		MSC 78/26, paragraph 22.12; CCC 3/15, section 10
Notes: The Assembly, at its twenty-eighth session, had expanded the output to include all proposed unified interpretations to provisions of IMO safety, security, and environment-related Conventions.								
2.0.1.5	Amendments to SOLAS regulations II-2/20.2 and II-2/20-1 to clarify the fire safety requirements for cargo spaces containing vehicles with fuel in their tanks for their own propulsion	2017	MSC	SSE	CCC	Completed		MSC 96/25, paragraph 23.6; CCC 3/15, section 7
5.2.1.2	Amendments to the IGF Code and development of guidelines for low-flashpoint fuels	2016	MSC	HTW/PPR/SDC/SSE	CCC	Extended		MSC 94/21, paragraphs 18.5 and 18.6; MSC 96/25, paragraphs 10.1 to 10.3; CCC 3/15, section 3
Notes: Extension of target completion year to 2017 requested								

SUB-COMMITTEE ON CARRIAGE OF CARGOES AND CONTAINERS (CCC)								
Output number	Description	Target completion year	Parent organ(s)	Associated organ(s)	Coordinating organ(s)	Status of output for Year 1	Status of output for Year 2	References
5.2.1.9	Safety requirements for carriage of liquefied hydrogen in bulk	2016	MSC	CCC		Completed		MSC 94/21, paragraph 18.3; CCC 3/15, section 4
5.2.1.26	Suitability of high manganese austenitic steel for cryogenic service and development of any necessary amendments to the IGC Code and IGF Code	2017	MSC	CCC		In progress		MSC 96/25, paragraph 23.4; CCC 3/15, section 8
5.2.3.3	Amendments to the IMSBC Code and supplements	Continuous	MSC/MEPC	CCC		Ongoing		MSC 86/26, paragraph 7.2; CCC 3/15, section 5
5.2.3.4	Amendments to the IMDG Code and supplements	Continuous	MSC	CCC		Ongoing		MSC 75/24, paragraph 7.36; CCC 3/15, section 6
7.1.1.1	Mandatory requirements for classification and declaration of solid bulk cargoes as harmful to the marine environment	2017	MEPC	CCC		Completed		MEPC 68/21, paragraphs 12.35, 17.16 and 17.17; MSC 95/22, paragraph 19.1; MEPC 69/21, paragraphs 13.13 to 13.21; MSC 96/25, paragraphs 10.14 and 10.15; CCC 3/15, section 9



SUB-COMMITTEE ON CARRIAGE OF CARGOES AND CONTAINERS (CCC)								
Output number	Description	Target completion year	Parent organ(s)	Associated organ(s)	Coordinating organ(s)	Status of output for Year 1	Status of output for Year 2	References
12.3.1.1	Consideration of reports of incidents involving dangerous goods or marine pollutants in packaged form on board ships or in port areas	Annual	MSC/MEPC	III	CCC	Completed		MSC 79/23, paragraph 12.7; CCC 3/15, section 11
14.0.1.1	Analysis and consideration of recommendations to reduce administrative burdens in IMO instruments including those identified by the SG-RAR	2017	Council	III/HTW/PPR/CCC/SDC/SSE/NCSR	MSC/MEPC/FAL/LEG	No work requested		MSC 96/25, paragraphs 19.4.5, 19.4.9 and 19.4.10

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## ANNEX 9

### PROPOSED PROVISIONAL AGENDA FOR CCC 4

- Opening of the session
- 1 Adoption of the agenda
  - 2 Decisions of other IMO bodies
  - 3 Amendments to the IGF Code and development of guidelines for low-flashpoint fuels (5.2.1.2)
  - 4 Suitability of high manganese austenitic steel for cryogenic service and development of any necessary amendments to the IGC Code and IGF Code (5.2.1.26)
  - 5 Amendments to the IMSBC Code and supplements (5.2.3.3)
  - 6 Amendments to the IMDG Code and supplements (5.2.3.4)
  - 7 Unified interpretation of provisions of IMO safety, security and environment-related conventions (1.1.2.3)
  - 8 Consideration of reports of incidents involving dangerous goods or marine pollutants in packaged form on board ships or in port areas (12.3.1.1)
  - 9 Biennial status report and provisional agenda for CCC 5
  - 10 Election of Chair and Vice-Chair for 2018
  - 11 Any other business
  - 12 Report to the Committees

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## ANNEX 10

### STATEMENTS BY DELEGATIONS AND OBSERVERS\*

#### AGENDA ITEM 3

##### Statement by the delegation of the United Kingdom

"First, the United Kingdom would like to thank the Distinguished Delegation of Sweden as Coordinator and the members of the correspondence group for their work and the report to CCC 3. The United Kingdom has some general comments regarding fuel cells that the Sub-Committee might like to note during their further discussions.

We would point out fuel cells commonly utilize fuels other than natural gas as the feed fuel. The IGF Code amendments as proposed within CCC 3/3 would not permit future IGF Code fuels such as Methyl and ethyl alcohols to be used within fuel cells. We consider that if the fuel cell requirements were outside of Part A-1 of the proposed Code, this would make future revisions to the Code simpler.

There are, of course, many different types of fuel cell. The fundamental principles of operation, though, are common to all types and the core components of the fuel cell power system can be generalized. If we adopt an approach along this principle, consideration of the safety requirements of a range of fuel cell types could be undertaken using high level functional and performance requirements which would be equally applicable whether the feed fuel be natural gas or any other low flashpoint fuel.

We believe that concerns expressed in earlier discussions may be resolved if the Sub-Committee were to agree that only fuels permitted within the IGF Code may be utilized as the feed fuel for fuel cells.

It is believed that if the fuel cell requirements were outside of part A-1, they would be independent of any specific requirements for ships using natural gas as fuel. This would reduce the time and effort required for future amendments of the IGF Code and will open a way in the future to address fuel cell systems that use other low-flashpoint fuels. This should also prevent the necessity to amend text which has already been adopted. Perhaps, we would suggest, this could be accomplished by introducing a new section into the Code with the relevant content.

We would ask that the working group take this statement into account in their subsequent discussion."

#### AGENDA ITEM 5

##### Statement by the delegation of Chile

La delegación de Chile agradece a Australia la presentación del documento 3/5/17 y la información adicional presentada en los documentos 3/INF.17, 3/INF.18 y 3/INF.19. El análisis de la información adicional nos ha indicado que el método utilizado, DIN 50929-3, es un buen estimador de la corrosividad potencial de una sustancia con características similares a un suelo. Atendiendo a esto último, y por las razones expuestas en el documento 3/INF.18 (primer párrafo, sección 3, página 7) este método podría ser utilizado para evaluar el potencial

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\* Statements have been included in this annex in the order in which they are listed in the report, sorted by agenda items, and in the language of submission (including translation into any other language if such translation was provided).

corrosivo de las distintas formas del mineral de hierro. Sin embargo, creemos que el método en su presente forma no debería ser utilizado para la evaluación de sustancias que, como los concentrados de minerales sulfurados, tienen características y métodos de producción que los alejan de la definición de lo que se considera un suelo no procesado. Nosotros apoyamos una actualización o alternativa al método C1 y esperamos que los problemas técnicos y de confiabilidad identificados sean solucionados en el más breve plazo.

### **Statement by the delegation of Trinidad and Tobago**

Trinidad and Tobago, as a producing nation, is in support of the proposed new schedule for DRI (D). We believe that based on our experiences over the last ten (10) years, which have been supported by relevant exemptions, that the carriage of DRI (D) with moisture content between 0.3% and 12% is safe, once the procedures as detailed in this new schedule are followed.

The Committee will recall that in 2010, it was recommended by Trinidad and Tobago that a new schedule for Iron Fines (Blend) be accepted by the IMO Sub-Committee on Dangerous Goods, Solid Cargoes and Containers. Although relevant stakeholder consultation and data verification was done at that stage, the IMO did not deem the proposal sufficiently sound, citing a lack of supporting historical data analyses.

Furthermore, it was recommended by the E&T Committee that Amendments to the IMSBC Code be submitted prior to CCC 3, detailing the proposed schedule for DRI (D); a new entry, separate and apart from DRI (C). This new proposal has effectively been drafted, with inadequacies addressed, and has been submitted with the requisite background information, physical and chemical properties and industry statistical data analysed over the past 10 years.

Trinidad and Tobago believes that the implementation of this standard would improve the safety in the carriage of DRI above 0.3% moisture in the global arena. It would also have the added effect of improving safety standards and levelling the playing field for doing business.

Trinidad and Tobago is aware that, in the past, there have been accidents which involved DRI with moisture content above 0.3%, however, its transportation remains unabated, with international practice in the carriage of DRI in excess of 0.3% remaining a constant over the last 10 years. This new schedule proposes the use of mechanical ventilation to alleviate hydrogen build up; and based on the data collected over the last 10 years, it can be concluded that the proposed practices and procedures have been successful at reducing, and possibly eliminating the risk.

DRI (D) fines as described in the schedule are a by-product of iron production. However, it has uses in other industrial productions. The inability to transport it safely to these markets presents an environmental hazard in countries where it is stock piled. As a producing nation, we implore the Committee to give favourable consideration to the implementation of this schedule as it will allow for a safer and more environmentally sound method for the carriage of DRI (D).

In closing, we would like to reiterate that the new proposed schedule provides for the necessary safety for crew, ship and cargo when transporting DRI (D), while also ensuring that iron production and its other downstream industries remain environmentally friendly.