INTERNATIONAL MARITIME ORGANIZATION

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SUB-COMMITTEE ON SHIP DESIGN AND CONSTRUCTION
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REPORT TO THE MARITIME SAFETY COMMITTEE

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LIST OF ANNEXES

1 GENERAL

1.1 The Sub-Committee on Ship Design and Construction (SDC) held its third session from 18 to 22 January 2016 under the chairmanship of Mr. K. Hunter (United Kingdom). The Vice-Chairman, Mrs T. Stemre (Norway), was also present.

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

Opening address

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

Chairman's remarks

1.4 In responding, the Chairman 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.

Statement by the delegation of Antigua and Barbuda

1.5 The Sub-Committee noted the statement by the delegation of Antigua and Barbuda on the sinking of the **Thorco Cloud**, which occurred on 16 December 2015 in the Singapore Strait after a collision involving the Antigua and Barbuda-flagged ship **Thorco Cloud** and the Cayman Island-registered ship **Stolt Commitment**. The full text of its statement is set out in annex 25.

Statement by the delegation of Ukraine

1.6 The Sub-Committee also noted the statement by the delegation of Ukraine on the sovereign rights of Ukraine related to two jack-up oil rigs, B-312 and B-319, and the oil platform **Tavryda**, located in the Black Sea off the coast of Odessa. The full text of its statement is set out in annex 25.

Statement by the delegation of the Islamic Republic of Iran

1.7 The Sub-Committee also noted the statement by the delegation of the Islamic Republic of Iran on the entry into force of the Joint Comprehensive Plan of Action (JCPOA), which is an international agreement on the nuclear programme of the Islamic Republic of Iran. The JCPOA was agreed upon in Vienna on 14 July 2015 between the Islamic Republic of Iran, and the countries of the P 5+1 (the five permanent Members of the United Nations Security Council (China, France, Russia, United Kingdom, United States, plus Germany), as well as the High Representative of the European Union for Foreign Affairs and Security Policy. The full text of its statement is set out in annex 25.

1.8 In the context of the above, the Secretary-General welcomed the development of the JCPOA and stated that he was looking forward to further cooperation between IMO and the Islamic Republic of Iran.

Adoption of the agenda and related matters

1.9 The Sub-Committee adopted the agenda (SDC 3/1) and agreed to be guided in its work, in general, by the annotations contained in document SDC 3/1/1 (Secretariat) and the arrangements in document SDC 3/1/2 (Secretariat). The agenda, as adopted, together with the list of documents considered under each agenda item, is set out in document SDC 3/INF.16.

2 DECISIONS OF OTHER IMO BODIES

2.1 The Sub-Committee noted the decisions and comments pertaining to its work made by SSE 2, MEPC 68 and MSC 95, as reported in document SDC 3/2 (Secretariat), and took them into account in its deliberations when dealing with the relevant agenda items.

2.2 The Sub-Committee also noted that MSC 95, having considered documents MSC 94/17/1 and MSC 95/19/11 (Secretariat) containing a recommendation to transfer all outputs related to SOLAS chapter II-2 from the SDC Sub-Committee to the SSE Sub-Committee, had agreed that the existing outputs on the SDC Sub-Committee's biennial agenda and provisional agenda for SDC 3 should remain under the SDC Sub-Committee's coordination. However, MSC 95 had also agreed that, in future, new outputs related to SOLAS chapter II-2 would, in principle, be assigned to the SSE Sub-Committee, but would be considered on a case-by-case basis.

2.3 The Sub-Committee further noted that the Assembly, at its twenty-ninth session, had:

.1 approved 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)); and

.2 adopted, by resolution A.1107(29), the *Entry into force and implementation of the 2012 Cape Town Agreement*, in order to promote the ratification of the Agreement.

3 AMENDMENTS TO SOLAS REGULATIONS II-1/6 AND II-1/8-1

General

3.1 The Sub-Committee recalled that SDC 2 had re-established the SDS Correspondence Group with terms of reference as set out in paragraph 3.34 of document SDC 2/25, and had instructed the group to submit a report to this session.

3.2 The Sub-Committee also recalled that SDC 2 had noted that, owing to time constraints and taking into account the need for further input from the validation of the results of the EMSA 3 project, the SDS Working Group was unable to consider the report of the correspondence group (SDC 2/3/11) and documents SDC 2/3/5 and SDC 2/3/6, SDC 2/INF.3, SDC 2/INF.4, MSC 93/6/2 and MSC 93/10/20 related to the survivability of passenger ships. In this context, SDC 2 had endorsed the group's recommendation to further consider this issue at SDC 3.

Outcome of MSC 95

3.3 The Sub-Committee noted that MSC 95 had considered the draft amendments to SOLAS chapter II-1 subdivision and damage stability regulations, prepared by the Sub-Committee (SDC 2/25, annex 1), together with documents MSC 95/10/1 (United States), proposing not to adopt the draft amendments at that time, since several additional amendments to SOLAS chapter II-1 were still under consideration by the Sub-Committee, and MSC 95/10/3 (United Kingdom), proposing editorial improvements to the draft amendments and expressing concern that the application date did not comply with the *Guidance on drafting of amendments to the 1974 SOLAS Convention and related mandatory instruments* (MSC.1/Circ.1500). Following discussion, MSC 95 had decided to refer the draft amendments and documents MSC 95/10/1 and MSC 95/10/3 to SDC 3 for further consideration of the scope of application, with a view to approval at MSC 96.

3.4 The Sub-Committee also noted that MSC 95 had approved, in principle, the draft amendments to SOLAS regulation II-1/22 on watertight doors, prepared by the Sub-Committee (SDC 2/25, annex 1) with a view to approval at MSC 96 in conjunction with the approval of draft amendments to SOLAS chapter II-1 on subdivision and damage stability regulations.

3.5 The Sub-Committee further noted that MSC 95 had also approved, in principle, the draft *Guidance for watertight doors on passenger ships which may be opened during navigation*, prepared by the Sub-Committee (SDC 2/25, annex 11) with a view to approval at MSC 97 in conjunction with the adoption of the draft amendments to SOLAS regulation II-1/22.

Draft amendments to SOLAS chapter II-1 subdivision and damage stability regulations, prepared by SDC 2

Scope of application of the draft amendments

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

.1 SDC 3/3/1 (Secretariat), providing the outcome of MSC 95 regarding the draft amendments to SOLAS chapter II-1 subdivision and damage stability regulations; and

.2 SDC 3/3/3 (United States), providing details of the proposed changes to the draft amendments regarding the scope of application that received general support at MSC 95, with the intention to facilitate a swift resolution of this issue. In this context, the proposed modifications to draft amendments to SOLAS chapter II-1, as contained in document MSC 95/10/3 (United Kingdom), were refined and reformatted to show only the impacted amendment text contained in document SDC 2/25, annex 1 (i.e. parts A and C).

3.7 During the discussion, the Sub-Committee noted the following views expressed:

.1 MSC 95 had clearly instructed the Sub-Committee to consider only the scope of application of the draft amendments (see paragraph 3.3); therefore, it reopening the discussion on the remaining parts of the draft amendments to SOLAS chapter II-1, as prepared by SDC 2, should be avoided; and

.2 any editorial and/or consequential amendments should be considered accordingly.

Availability of a passenger ship's electrical power supply in cases of flooding from side raking damage

3.8 The Sub-Committee considered document SDC 3/3/6 (United States) providing an update to the proposal contained in document SDC 2/3/9, based on the consideration and comments from SDC 2, concerning an amendment to regulation II-1/8-1.2 to improve the availability of a passenger ship's electrical power supply in cases of flooding from side raking damage, with a view to its finalization at SDC 3 for inclusion in the comprehensive package of amendments to the SOLAS chapter II-1 "Subdivision and damage stability" regulations.

3.9 Having considered the aforementioned document and following an in-depth discussion in which the proposed prescriptive double side requirement was generally not supported and it was suggested that options more in line with the probabilistic approach should be considered, the Sub-Committee instructed the working group to examine the draft amendments to regulation II-1/8-1.2, taking into account these views and document SDC 3/3/6 (United States).

The result of the work on the amendments to SOLAS chapter II-1

3.10 The Sub-Committee noted with appreciation document SDC 3/INF.9 (Norway), providing information on some inconsistencies and ambiguities in the regulations now found in parts B-2 to B-4 of SOLAS chapter II-1. In particular, this applied to the requirements for watertight integrity and prevention and control of water ingress, as a result of the introduction of the probabilistic stability standard. In this connection, the Sub-Committee also noted that the delegation of Norway will submit a document to MSC 96 on the observations made with proposals for possible solutions.

Report (part 4) of the working group established at SDC 2

3.11 The Sub-Committee considered part 4 of the report of the SDS Working Group at SDC 2 (SDC 3/3) and, having approved it in general, noted that the group's report had been considered in detail by the SDS Correspondence Group (SDC 3/3/2) established at SDC 2.

Report of the correspondence group and related submission

3.12 The Sub-Committee considered the report of the correspondence group (SDC 3/3/2) and, having approved it in general, noted that the group had progressed considerably the work on the revision of the SOLAS chapter II-1 subdivision and damage stability regulations and the associated Explanatory Notes, as set out in the annex to the report, but that a considerable amount of work still remained. With regard to the Explanatory Notes (EN) for SOLAS regulations II-1/13.2.3 and II-1/17.1, the Sub-Committee also noted the following (subparagraphs .1 and .2, respectively):

.1 It had been agreed to by a clear majority of the group. However, concerns had been expressed about the lack of clarity regarding the terms "open" and "closed" piping systems and "adequate arrangement of valves", and that an approval/testing criterion for the penetrations was needed. These issues had been noted by the group for further consideration. In addition, given the regulation II-1/13.2.3 linkage to fire protection matters, the group recommended that this proposed new EN be reviewed by the Working Group on Fire Protection, if established, at SDC 3; and

.2 It had been revised and agreed to by a large majority of the group. It should be noted that the revision of this EN is intended to replace the outdated guidance in MSC/Circ.541, which references the SOLAS 90 damage stability requirements. With this revised EN, the footnote to MSC/Circ.541 in regulation II-1/17.1 should be deleted.

3.13 In the context of the above, the Sub-Committee also considered document SDC 3/3/5 (Norway), providing in the annex draft explanatory notes related to heat-sensitive piping under SOLAS regulation II-1/13.2.3, based on the discussions in the SDS Correspondence Group. The Sub-Committee noted that two proposals had been considered by the group and that the delegation of Norway was in favour of basing the explanatory notes to this regulation on the draft prepared by France, with some modifications to the wording, in order to be consistent with the definition of "watertight" in regulation II-1/2.17.

3.14 Following consideration of the report of the correspondence group, the above document and discussion, the Sub-Committee:

.1 instructed the SDS Working Group to further consider the proposals contained in the annex to document SDC 3/3/5, including whether the principles in the draft EN for SOLAS regulations II-1/13.2.3 may be applied also in the case of retrofits in ships constructed before 1 January 2009;

.2 instructed the Working Group on Fire Protection, established under agenda item 8, to consider the notes on fire safety testing, in particular the footnote in paragraph 4 of the annex to document SDC 3/3/5, and advise the Sub-Committee accordingly;

.3 instructed the SDS Working Group to consider thin-walled piping and ducts according to regulation II-2/9.3.1; and

.4 instructed the SDS Working Group to consider whether use of heat-sensitive materials in other types of systems penetrating watertight bulkheads, such as cable transits, may need to be addressed in the future.

3.15 In the context of the above, the Sub-Committee noted that the delegation of Spain was of the view that paragraph 4 of the annex to document SDC 3/3/5 should be read along with paragraph 3 of the same annex, as those paragraphs might be related. It seemed that thin-walled piping, piping which might be heat-sensitive, and the definition of the systems in which the piping is used as open systems, were being mixed together. It was therefore difficult to agree to all of that. There was uncertainty, for example, that scantling for the piping should be directly related to an open system. The Sub-Committee also noted the delegation's opinion that this matter should be carefully considered by the working group.

Survivability of passenger ships

Report of the FSA Experts Group and related submissions

3.16 The Sub-Committee considered the report of the Experts Group on Formal Safety Assessment (FSA) (SDC 3/3/4) and, having approved it in general, noted that the report summarizes the work of the group, as per the instructions of MSC 93, to validate the EMSA 3 study related to survivability of passenger ships, taking into account the risk models and calculated risk and the validity of the data and assumptions that were used, based on the Revised FSA Guidelines (MSC-MEPC.2/Circ.12/Rev.1).

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

.1 SDC 3/3/7 (Austria, et al.), focusing on the results of the EMSA 3 study, but also including the findings of the study submitted by Germany and CESA (SDC 2/INF.3), the GOALDS study (SLF 55/INF.7) and a study done by Denmark (SDC 3/INF.4). Based on the findings of these studies and on a proposal made by the United States (SDC 1/7/2), a new level of required subdivision index "R" was proposed;

.2 SDC 3/3/8 (Japan), reviewing the results of the EMSA 3 study and proposing a formula for the required subdivision index "R", taking into account the risk level of small passenger ships;

.3 SDC 3/3/9 (United States), commenting on the proposal in document SDC 3/3/7 regarding a new required subdivision index "R" for passenger ships and providing an alternate proposal intended to reflect a more suitable requirement for smaller passenger ships;

.4 SDC 3/3/10 (CESA, SYBAss), commenting on the proposals to increase the required subdivision index "R" contained in document SDC 3/3/7, supporting technically feasible and cost-effective measures to improve passenger ship survivability after damage, and presenting concerns about some elements of the proposed "R" level which are not fully justified for all ship types and ship sizes;

.5 SDC 3/3/11 (CESA, SYBAss), reviewing the results of the EMSA 3 study provided in document SDC 3/INF.3, and highlighting important shipyards' views, which deviate from the EMSA 3 views and regulatory recommendations;

.6 SDC 3/INF.3 (EC), providing information on the outcome of the EMSA 3 study on damage stability of passenger ships and, in particular, including combined assessment of the cost-effectiveness of previous parts, FSA compilation and recommendations for decision making; and

.7 SDC 3/INF.4 (Denmark), providing information on the outcome of a study into the damage stability of small ro/pax passenger ships, carried out in Denmark in 2015 by a consortium of interested parties and financed by a grant from the Danish Maritime Foundation.

3.18 During the discussion, the Sub-Committee noted the following views expressed:

.1 the proposal in the EMSA 3 study is conservative, due to the difficulties in designing subdivision for smaller ships. However, it is possible to find a compromise solution for ships carrying up to 400 persons;

.2 extrapolation does not account for underlying causes and structural conditions. Therefore, the EMSA 3 results cannot be directly extrapolated to ships carrying fewer than 400 persons on board. Document SDC 3/3/8 (see paragraph 3.17.2) proposes a modified formula taking into account the risk level of smaller ships, and document SDC 3/3/9 (see paragraph 3.17.3) proposes another modified formula in regard to other studies. The required subdivision index of small passenger ships should be defined on the basis of those documents; and

.3 it is necessary to try and find a compromise, in order to finalize this important work for the safety of passenger ships.

3.19 In considering the above views in conjunction with the report of the FSA Experts Group (SDC 3/3/4), the Sub-Committee:

.1 noted that the scope of the EMSA 3 study was clearly defined in section 1 of the annex to document SDC 3/INF.3 and was focused primarily on risk to persons on board, and that the study was within the scope of this planned output;

.2 encouraged Member Governments to upload more specific casualty information onto GISIS as per the Casualty Investigation Code, including root causes, damage penetrations, etc.;

.3 noted the adequacy of the expertise of the experts that participated in the EMSA 3 study;

.4 noted that sensitivity and uncertainty were properly covered by expert judgement;

.5 noted that the selection of RCOs was appropriate;

.6 noted that extrapolation of the proposed RCOs to passenger ships having fewer than 400 persons on board was indicative only and requires further technical consideration;

.7 noted that the cost-benefit analysis was generally conducted in line with the FSA Guidelines;

.8 noted that the methodology for attained subdivision index A, as agreed at SLF 55, appropriately reflected the probability to survive after damage;

.9 noted that the EMSA 3 study was adequately conducted in accordance with the FSA Guidelines;

.10 noted that no deficiency affecting the outcome had been identified in the EMSA 3 study;

.11 considered, from a technical point of view, the conclusions and recommendations, as set out in document SDC 3/INF.3 and instructed the SDS Working Group to further consider the aforementioned conclusions and recommendations and advise the Sub-Committee accordingly;

.12 noted that the conclusions and recommendations, as set out in document SDC 3/INF.3, were credible; and

.13 noted the group's view that it may be appropriate, at this stage, to have all the reports previously made by the FSA Experts Group collected and uploaded onto IMODOCS for ease of reference, and requested the Secretariat to investigate this possibility.

Establishment of the Subdivision and Damage Stability (SDS) Working Group

3.20 In light of the above decisions, the Sub-Committee established the Subdivision and Damage Stability (SDS) Working Group and instructed it, taking into account the comments made and decisions taken in plenary, to:

.1 further consider the scope of application of the draft amendments to SOLAS chapter II-1 subdivision and damage stability regulations, including related consequential amendments and editorial modifications, based on annex 1 to document SDC 2/25, taking into account documents SDC 3/3/1, SDC 3/3/3, MSC 95/10/1 and MSC 95/10/3, with a view to finalization of the complete package of draft amendments to SOLAS chapter II-1;

.2 finalize the draft amendments to regulation II-1/6 (Required subdivision index *R*) related to the survivability of passenger ships and paragraph 2.2 of chapter 2 of the SPS Code, taking into account the report of the FSA Experts Group (SDC 3/3/4) and documents SDC 3/3/7, SDC 3/3/8, SDC 3/3/9, SDC 3/3/10, SDC 3/3/11, SDC 3/INF.3, SDC 3/INF.4 and SDC 2/INF.3;

.3 if time permits, examine the draft amendments to regulation II-1/8-1.2 to improve the availability of a passenger ship's electrical power supply in cases of flooding from side raking damage, based on annex 1 to document SDC 2/25, taking into account document SDC 3/3/6;

.4 if time permits, finalize the the draft Explanatory Notes, based on part 4 of the report of the working group at SDC 2 (SDC 3/3) and the report of the correspondence group (SDC 3/3/2), taking into account document SDC 3/3/5 and the outcome of the work carried out under subparagraphs .1 to .3 above;

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

.6 submit a written report (part 1), and continue working through the week and submit part 2 of the report to SDC 4, as soon as possible after this session, so that it can be taken into account by a correspondence group, if established.

Instructions for the Working Group on Fire Protection

3.21 Subsequently, the Sub-Committee instructed the Working Group on Fire Protection, established under agenda item 8, taking into account comments made and decisions taken in plenary, to:

.1 consider the draft Explanatory Notes for SOLAS regulation II-1/13.2.3 on matters related to fire protection, based on the report of the SDS Correspondence Group (SDC 3/3/2) and taking into account document SDC 3/3/5; and

.2 consider the notes on fire safety testing, in particular the footnote in paragraph 4 of the annex to document SDC 3/3/5, and advise the Sub-Committee accordingly.

Report of the SDS Working Group

3.22 Having considered the part of the report of the SDS Working Group (SDC 3/WP.4) dealing with the agenda item, the Sub-Committee took action as outlined below.

Draft amendments to SOLAS chapter II-1

3.23 The Sub-Committee endorsed the following draft amendments to SOLAS:

.1 regulations II-1/1, II-1/2 and II-1/35-1 concerning the scope of application;

.2 regulation II-1/6 (Required subdivision index *R*) related to the survivability of passenger ships;

.3 regulations II-1/19, II-1/22 and II-1/22-1 concerning editorial amendments; and

.4 regulation II-1/21 (Periodic operation and inspection of watertight doors, etc., in passenger ships),

together with the package of draft amendments to SOLAS chapter II-1 (SDC 2/25, annex 1) approved, in principle, by MSC 95 (see also paragraph 3.3), as set out in annex 1, for submission to MSC 96 for approval with a view to subsequent adoption.

3.24 In this context, the Sub-Committee invited the Committee, at its ninety-sixth session, when deciding on the application dates of the draft amendments to SOLAS chapter II-1, to take into account that while a four-year delivery window may be appropriate for most ships, it may not be appropriate for large and complex passenger ships, and take action as appropriate.

3.25 With regard to the draft amendment to SOLAS regulation II-1/6 (Required subdivision index *R*), the Sub-Committee noted that the delegation of Japan had expressed strong concern that the compromise formula for the required subdivision index *R* for small ships has not been verified based on a Formal Safety Assessment. The formula therefore had the possibility to introduce requirements that cannot be implemented for actual designs. The Sub-Committee also noted that the delegation of Japan had introduced its trial design and evaluation of the attained subdivision index A for such designs. Based on those findings, Japan was of the view that the compromise R formula agreed to by the group was not rational and that further technical evaluation, especially for smaller ships, was needed.

3.26 Subsequently, taking into account the provisions in paragraphs 3.2.1.3.16.2, 3.2.1.3.18 and 3.2.1.3.19 of the *Guidance on drafting of amendments to the 1974 SOLAS Convention and related mandatory instruments* (MSC.1/Circ.1500), the Sub-Committee requested the Secretariat to update the records for regulatory development set out in appendix 2 of annex 1 to document SDC 2/25, with a view to submitting them to MSC 96 together with the draft amendments to SOLAS chapter II-1.

Draft amendments to chapter 2 of the 2008 SPS Code

3.27 The Sub-Committee endorsed the draft amendments to chapter 2 of the 2008 SPS Code, as set out in annex 2, for submission to MSC 96 for adoption.

Editorial amendments to SOLAS regulations II-1/42.2.6.1 and II-1/42.4.2

3.28 Having noted that consequential amendments to SOLAS regulations II-1/42.2.6.1 and II-1/42.4.2 were necessary, the Sub-Committee agreed that:

.1 the references to SOLAS regulation II-1/15 should be replaced with references to SOLAS regulation II-1/13; and

.2 the footnotes should be included to indicate that, prior to 1 January 2009, regulation 13 was regulation 15,

and requested the Secretariat to issue a corrigendum to resolution MSC.216(82) accordingly.

Availability of a passenger ship's electrical power supply in cases of flooding from side raking damage

3.29 Having considered the group's recommendation to continue the work on availability of a passenger ship's electrical power supply in cases of flooding from side raking damage, not only by for "double-hull in way of main engine-room" but also for other alternatives under this output, and following discussion, the Sub-Committee endorsed this recommendation. In this context, the Sub-Committee noted the concern expressed by one delegation that the recommended change in the scope of the work from "double hull in way of main engine-room" to "availability of a passenger ship's power supply in cases of flooding from side-raking damage" may not be contained in the *Guidelines on the organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.4/Rev.4) and that, therefore, a justification for extension of the scope of this output may be necessary.

3.30 Having considered the above concern, the Sub-Committee agreed that the change of scope recommended by the SDS Working Group better reflected the remaining work under this item. Bearing in mind that the instruction of MSC 93 was to consider only "double hull in way of main engine-room", the Sub-Committee decided to advise MSC 96 that a double hull may not be the only solution and that, therefore, other solutions need to be further considered. Consequently, the Sub-Committee requested the Committee to endorse the view that the recommended change of the existing scope of the output is acceptable and does not require any specific justification.

Draft Explanatory Notes to the SOLAS chapter II-1 subdivision and damage stability regulations

3.31 The Sub-Committee noted that, due to time constraints, the group was unable to finalize the draft Explanatory Notes to the SOLAS chapter II-1 subdivision and damage stability regulations. Therefore, the group decided to continue consideration of the draft Explanatory Notes with a view to reporting to SDC 4 and recommended that a correspondence group (see paragraph 3.35) be instructed to further consider this issue with a view to it being finalized at SDC 4.

Report of the Working Group on Fire Protection

3.32 Having considered the part of the report of the Working Group on Fire Protection (SDC 3/WP.6) dealing with the agenda item, the Sub-Committee took action as outlined below.

Draft Explanatory Notes to SOLAS regulation II-1/13.2.3

3.33 The Sub-Committee noted that the group had considered the draft Explanatory notes to SOLAS regulation II-1/13.2.3, as set out in the annex to document SDC 3/3/2, in conjunction with the proposals in the annex to document SDC 3/3/5. In this context, the group agreed that no comment was necessary with regard to the note in document SDC 3/3/2. The Sub-Committee also noted that, with regard to the proposals in the annex to document SDC 3/3/5, the group had provided comments on the five items included in the table in paragraph 4 of document SDC 3/WP.6, with a view to informing the SDS Working Group.

3.34 Subsequently, having noted that a correspondence group would further consider the draft Explanatory Notes to the SOLAS chapter II-1 subdivision and damage stability regulations, with a view to finalization at SDC 4 (see paragraph 3.31), the Sub-Committee agreed to instruct the correspondence group to consider the comments contained in the table in paragraph 4 of document SDC 3/WP.6.

Re-establishment of the SDS Correspondence Group

3.35 In order to further progress the work on this output intersessionally, the Sub-Committee re-established the Correspondence Group on Subdivision and Damage Stability (SDS), under the coordination of the United States,[*] and instructed it to:

.1 consider the comments on the draft Explanatory Notes for SOLAS regulation II-1/13.2.3 contained in the table in paragraph 4 of document SDC 3/WP.6, with a view to finalization of this draft Explanatory Note;

.2 finalize the draft Explanatory Notes, based on the report of the correspondence group (SDC 3/3/2) and part 2 of the report of the SDS Working Group at SDC 3, taking into account document SDC 3/3/5; and

.3 submit a report to SDC 4.

4 COMPUTERIZED STABILITY SUPPORT FOR THE MASTER IN CASE OF FLOODING FOR EXISTING PASSENGER SHIPS

General

4.1 The Sub-Committee recalled that MSC 94, following consideration of document MSC 94/6/1 (Bahamas et al.), had agreed to include a new output in the post-biennial agenda of the Committee, on "Computerized stability support for the master in case of flooding for existing passenger ships", assigning the SDC Sub-Committee as the coordinating organ, with a view to including provisions in SOLAS chapter II-1 for ships constructed before 1 January 2014.

4.2 In the context of the above, the Sub-Committee noted that proposed amendments to SOLAS chapter II-1 are set out in annex 2 to document MSC 94/6/1.

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Proposed amendments to SOLAS regulation II-1/8-1.3

4.3 In considering document MSC 94/6/1, the Sub-Committee noted that a number of issues still required careful consideration in order that the practicability, feasibility and proportionality of the proposal could be assessed in terms of its impact on the relevant industry stakeholders (MSC 94/6/1, paragraphs 8, 12 and 13). In this regard, the Sub-Committee noted that acceptance criteria for the software needs to be developed and, given that there are a number of different damage stability standards (pre-SOLAS 90, SOLAS 90 and SOLAS 2009), different acceptance criteria will be needed (MSC 94/6/1, paragraph 10).

4.4 In considering how best to proceed, the Sub-Committee noted the views expressed by the delegations of Germany and Norway that, at this stage, it was premature to agree on the proposed amendments to SOLAS regulation II-1/8-1.3, as set out in annex 2 to document MSC 94/6/1, because the scope of application of the proposed amendments still needed to be clarified, taking into account that the current SOLAS chapter II-1 applies to ships constructed on or after 1 January 2009 and the revised chapter II-1 will apply to ships built on or after 1 January 2020 (see also paragraph 4.3). In addition, it was noted that MSC.1/Circ.1400 may need to be revised and that, possibly, additional guidance may need to be developed, and this will require new outputs.

4.5 Following the discussion, the Sub-Committee decided that the scope of work to be undertaken, and the timeline for such work, still needed to be clarified in order to move forward on this output.

Instructions to the SDS Working Group

4.6 Having considered the above issues, the Sub-Committee instructed the SDS Working Group established under agenda item 3 (see paragraph 3.20), if time permits, to further consider the proposal to extend to existing passenger ships the SOLAS requirement relating to computerized stability support for the master in case of flooding, and advise the Sub-Committee accordingly.

Report of the SDS Working Group

4.7 Having considered the relevant part of the report of the SDS Working Group (SDC 3/WP.4), the Sub-Committee approved it in general and took action as described below.

4.8 The Sub-Committee noted that, due to time constraints, the group had only been able to briefly discuss the proposal to extend the requirement in SOLAS regulation II-1/8-1.3 regarding computerized stability support for the master in case of flooding to existing passenger ships. In this regard, several views were expressed in the group that the proposed draft amendments to SOLAS regulation II-1/8-1.3, as set out in annex 2 to document MSC 94/6/1 (Bahamas, et al.), were sufficient to be considered for finalization at SDC 4. However, the Sub-Committee also noted that further consideration would be necessary regarding implementation of the draft revised *Guidelines on operational information for masters of passenger ships for safe return to port by own power or under tow* (MSC.1/Circ.1400) on existing passenger ships.

4.9 In the context of the above, the Sub-Committee invited Member Governments and international organizations to submit proposals on this matter to SDC 4.

5 GUIDELINES ON SAFE RETURN TO PORT FOR PASSENGER SHIPS

General

5.1 The Sub-Committee recalled that SDC 2, owing to time constraints, had been unable to progress the work on the draft revised *Guidelines on operational information for masters of passenger ships for safe return to port by own power or under tow* (MSC.1/Circ.1400) and had instructed the SDS Correspondence Group (SDC 2/25, paragraph 4.8) to finalize the draft revised guidelines and submit a report to this session.

Report of the correspondence group and related submission

5.2 The Sub-Committee considered the report of the correspondence group (SDC 3/5) and, having approved it in general, noted that the draft text set out in the annex to the report was a complete rewrite of the *Guidelines on operational information for masters of passenger ships for safe return to port by own power or under tow* and, therefore, cannot be compared directly to the current text in MSC.1/Circ.1400. The Sub-Committee also noted that, although the group had progressed the work considerably, there were still matters to be further considered and resolved at this session.

5.3 In the context of the above, the Sub-Committee also considered document SDC 3/5/1 (ITF), proposing that matters identified in the revised action plan for long-term work on passenger ship safety, as set out in table 1 of document MSC 95/6/1, which are critical to survivability and the safe return to port, should be fully considered before the revised guidelines are completed. Additionally, ITF was of the opinion that the Sub-Committee should seek to encompass within its current work programme all issues outstanding within the revised action plan on the survivability of a passenger ship and the issues affecting the safe return to port after a major fire or flooding.

5.4 Following consideration of the report from the correspondence group and the above document, the Sub-Committee noted the following views expressed:

.1 the contents of table 1 of document MSC 95/6/1 were suggestions, which may have merit; however, there would be a need for a full justification for a new output; and

.2 the work done by the correspondence group was supported, although it would need detailed consideration by the working group.

5.5 With regard to table 1 of document MSC 95/6/1, the Sub-Committee recalled that MSC 95 had agreed that those potential issues for which full justification was not submitted by MSC 96 (11 to 20 May 2016) should be deleted from table 1 of the revised action plan for long-term work on passenger ship safety (MSC 95/22, paragraph 6.3). Notwithstanding the above, MSC 95 had noted that the information contained in table 1 was always available to assist Member Governments to prepare proposals for unplanned outputs at any future date.

5.6 The Sub-Committee also noted that the delegation of Spain supported, in general, the outcome of the correspondence group; however, the delegation was of the opinion that in addition to the pending issues already indicated in the report (SDC 3/5), the group should consider carefully the issue of the number of stability computers and the post-damage residual structural strength information support systems that are stated in the draft revised guidelines (SDC 3/5, annex, paragraphs 1 and 4). In this context, according to paragraph 4, when the option chosen is the installation of stability computers on board, there should be two independent stability computers plus one post-damage residual structural strength information

support system (as per document SDC 3/5, annex, paragraph 1). In the view of the delegation, there should be a clear provision in the revised guidelines stating the distribution and number of stability computers and structural strength support systems for each possible option, both on board and ashore.

Instructions to the SDS Working Group

5.7 Having considered the above views, the Sub-Committee instructed the SDS Working Group established under agenda item 3 (see paragraph 3.20) to finalize the draft revised *Guidelines on operational information for masters of passenger ships for safe return to port by own power or under tow* (MSC.1/Circ.1400), taking into account the report of the correspondence group (SDC 3/5).

Report of the SDS Working Group

5.8 Having considered the relevant part of the report of the SDS Working Group (SDC 3/WP.4), the Sub-Committee took action as described below.

Draft Revised guidelines on operational information for masters of passenger ships for safe return to port

5.9 The Sub-Committee endorsed the draft *Revised guidelines on operational information for masters of passenger ships for safe return to port*, and the associated draft MSC circular, as set out in annex 3, for submission to MSC 96 for approval.

5.10 Subsequently, the Sub-Committee noted that a footnote should be added to SOLAS regulation II-1/8-1.3 referring to the aforementioned revised guidelines.

Completion of the work on the output

5.11 The Sub-Committee invited the Committee to note that the work on the output had been completed.

6 FINALIZATION OF SECOND-GENERATION INTACT STABILITY CRITERIA

General

6.1 The Sub-Committee recalled that SDC 2 had agreed to the draft amendments to chapter 6 of part B of the 2008 IS Code and the associated MSC resolution, regarding ice accretion on cargo ships carrying timber deck cargoes (SDC 2/25, annex 2), for submission to MSC 95 for adoption. Subsequently, MSC 95 had adopted the aforementioned amendments (MSC 95/22/Add.2, annex 11), by resolution MSC.398(95).

6.2 The Sub-Committee also recalled that SDC 2 had agreed, in principle, to the draft amendments to the 2008 IS Code regarding vulnerability criteria and the standards (levels 1 and 2) related to parametric roll, pure loss of stability and surf-riding / broaching (SDC 2/WP.4, annexes 1 to 3). In this context, SDC 2 had invited Member Governments and international organizations to bring the criteria to the attention of ship designers, shipyards, shipowners and other interested parties, and to observe and test the application of the finalized vulnerability criteria, in order to gain experience in their use.

6.3 The Sub-Committee further recalled that SDC 2 had re-established the Correspondence Group on Intact Stability (IS), with terms of reference as set out in paragraph 5.17 of document SDC 2/25, to continue the work to develop second generation intact stability criteria, taking into account the updated plan of action agreed at that session (SDC 2/WP.4, annex 5).

Report (part 2) of the IS Working Group established at SDC 2

6.4 The Sub-Committee considered part 2 of the report of the IS Working Group at SDC 2 (SDC 3/6) and, having approved it in general, noted that the group's report had been considered in detail by the IS Correspondence Group (SDC 3/6/1 and SDC 3/INF.10) established at SDC 2.

Report of the correspondence group and related submissions

6.5 The Sub-Committee considered the report of the correspondence group (SDC 3/6/1 and SDC 3/INF.10) and noted that the group had prepared the draft amendments to the 2008 IS Code regarding vulnerability criteria and standards (levels 1 and 2) related to deadship condition and excessive accelerations (SDC 3/INF.10, annexes 1 and 2) and the draft Explanatory Notes for all five failure modes (SDC 3/INF.10, annexes 15 to 20) with a view to finalization at this session, and had progressed the work on the draft Guidelines on operational limitation/guidance (SDC 3/INF.10, annex 21). In this context, the Sub-Committee also noted that there were still matters to be further considered at this session.

6.6 In the context of the above, the Sub-Committee considered the following documents:

.1 SDC 3/6/2 (Germany), presenting further validation of the draft criteria in levels 1 and 2 for pure loss and parametric roll situations, resulting in unexpected results (inconsistencies), and proposing that further sample calculations, preferably by matrix calculations or GM limiting curves instead of single load cases, be performed to get a better understanding of the behaviour of the failure modes for the widest range of ship types possible;

.2 SDC 3/6/4 (Norway), presenting the result of additional sample calculations carried out in order to evaluate the practicability of the calculation methods and the applicability of the proposed amendments to the 2008 IS Code and providing comments and proposals on the way ahead. In this connection, the calculation results showed inconsistencies for the vulnerability criteria of levels 1 and 2 for the pure loss of stability failure mode;

.3 SDC 3/6/5 (China), providing comments on the current draft dead ship criteria regarding improvement of calculation method of equivalent capsize angle and selection of standard value. In this context, China conducted a sample calculation study on draft dead ship criteria (SDC 3/INF.10, annex 4). It was found in the study that the calculation methods of equivalent capsize angle in the current draft criteria did not apply to some ships with a special type of *GZ* curves;

.4 SDC 3/6/6 (China), providing the sample calculation results for vulnerability of ships to surf-riding/broaching, and further commenting on the surf-riding/broaching draft criteria based on the analysis of the calculation results;

.5 SDC 3/6/7 (Germany, Italy, Sweden), providing considerations regarding some open aspects associated with the development of operational limitations and operational guidance in the framework of second-generation intact stability criteria, and suggesting higher-priority topics to be discussed at SDC 3;

.6 SDC 3/6/8 (Japan), reporting model experiments of an offshore supply vessel in astern waves and providing comments on the definition of a vessel with extended low weather deck for the draft Explanatory Notes of the vulnerability criteria for pure loss of stability failure mode;

.7 SDC 3/6/9 (Japan), providing comments on document SDC 3/6/2 which included new sample calculation results of vulnerability criteria for pure loss of stability and parametric roll failure mode, due to inconsistencies found in this failure mode, and proposing that the direct GM calculation in the level 1 criteria of pure loss of stability and parametric roll should not be executed;

.8 SDC 3/INF.6 (China), presenting results of supplementary sample calculation, based on which the practicability of the latest draft vulnerability criteria for pure loss of stability was evaluated;

.9 SDC 3/INF.7 (China), presenting results of supplementary sample calculation, based on which the practicability of the latest draft vulnerability criteria for parametric rolling was evaluated;

.10 SDC 3/INF.8 (China), providing results of validation conducted on the accuracy of numerical prediction method for direct stability assessment criteria of parametric rolling (PR);

.11 SDC 3/INF.11 (Germany), providing information regarding excessive acceleration failure mode of second-generation intact stability criteria, in addition to the information collected by the correspondence group (SDC 3/INF.10);

.12 SDC 3/INF.12 (Germany), providing considerations regarding some open aspects associated with the development of operational limitations and operational guidance in the framework of second-generation intact stability criteria; and

.13 SDC 3/INF.15 (Germany, Italy, Sweden), providing information regarding operational measures for the improvement of ship safety in intact condition, which was considered to be relevant for the discussion on operational guidance and operational limitations as part of the second-generation intact stability criteria.

6.7 Following consideration of the report of the IS Correspondence Group and the above related documents, the Sub-Committee noted that documents had been submitted to the correspondence group which were not included in the report (SDC 3/INF.10), and agreed that those documents could be considered by the working group.

Proposed new part B-1 of the 2008 IS Code

6.8 Having considered document SDC 3/6/3 (Norway), proposing that the necessary amendments to the 2008 IS Code, based on the outcome of the discussions on second generation intact stability criteria, should be included as a new part B-1 in the Code, the Sub-Committee could not agree with the proposal at this stage.

Review of the action plan for intact stability work

6.9 The Sub-Committee further instructed the IS Working Group to review the plan of action for intact stability work (SDC 2/WP.4, annex 5) and prepare a revised plan, identifying priorities, time frames and objectives for the work to be accomplished.

Establishment of the Intact Stability (IS) Working Group

6.10 Following discussion, the Sub-Committee re-established the IS Working Group, taking into account part 2 of the report of the working group established at SDC 2 (SDC 3/6), the report of the correspondence group (SDC 3/6/1 and SDC 3/INF.10) and the comments made and decisions taken in plenary, in order to:

.1 further consider the draft amendments to the 2008 IS Code regarding the draft criteria in levels 1 and 2 for pure loss of stability, parametric roll resonance, broaching-to, dead-ship condition and excessive accelerations, taking into account documents SDC 3/6/2, SDC 3/6/3, SDC 3/6/4, SDC 3/6/5, SDC 3/6/6, SDC 3/6/9, SDC 3/INF.6, SDC 3/INF.7, SDC 3/INF.8 and SDC 3/INF.11;

.2 further develop the draft Explanatory Notes for all five failure modes, taking into account documents SDC 3/6/4 and SDC 3/6/8;

.3 further develop the draft Guidelines of direct stability assessment procedures and operational limitation/guidance, taking into account documents SDC 3/6/7, SDC 3/INF.12 and SDC 3/INF.15;

.4 review the plan of action contained in annex 5 to document SDC 2/WP.4, taking into account the progress made during the session, and prepare a revised plan, identifying the priorities, time frames and objectives for the work to be accomplished;

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

.6 submit a written report (part 1), continue working through the week and submit part 2 of the report to SDC 4, as soon as possible after the current session, so that it can be taken into account by the correspondence group, if established.

Report of the IS Working Group

6.11 Having considered the part of the report of the working group (SDC 3/WP.5) dealing with this agenda item, the Sub-Committee approved it in general and took action as outlined below.

Draft amendments to the 2008 IS Code regarding vulnerability criteria and the standards (levels 1 and 2) for pure loss of stability and surf-riding/ broaching

6.12 The Sub-Committee noted that the group had prepared minor improvements/adjustments to the draft amendments to the 2008 IS Code regarding vulnerability criteria and the standards (levels 1 and 2) for pure loss of stability and surf-riding/ broaching (SDC 2/WP.4, annexes 1 to 3), which were agreed, in principle, by SDC 2 (see also paragraph 6.2). In this context, the proposed modifications are contained in paragraphs 8 to 10 of document SDC 3/WP.5.

Draft amendments to the 2008 IS Code regarding vulnerability criteria and the standards (levels 1 and 2) related to dead ship condition and excessive accelerations

6.13 The Sub-Committee agreed, in principle, to the draft amendments to the 2008 IS Code regarding vulnerability criteria and the standards (levels 1 and 2) related to dead ship condition and excessive accelerations (SDC 3/WP.5, annexes 1 and 2).

6.14 Subsequently, the Sub-Committee noted that, with regard to the dead ship condition criteria, the delegation of Greece had stated that, as this failure mode would be related to the mandatory part of the 2008 IS Code, more confidence was needed on its use and that there was no reason for having the methodology for the calculation of the parameter λ_{EA} in the main text, while, for the other modes, the formulas had been moved to the explanatory notes. The delegation further added that the main concern was the uniformity of the standard (when defined) between ships outside and within the weather criterion ranges.

Explanatory notes for pure loss of stability, parametric roll, surf-riding / broaching, dead ship condition and excessive accelerations failures

6.15 The Sub-Committee noted the progress made by the group on the development of the draft explanatory notes for pure loss of stability, parametric roll, surf-riding / broaching, dead ship condition and excessive accelerations failures (SDC 3/WP.5, annexes 3 to 7).

Guidelines of direct stability assessment procedures and operational limitation/guidance

6.16 The Sub-Committee noted that, owing to time constraints, the group could not consider in detail the draft Guidelines of direct stability assessment procedures and operational limitation/guidance, taking into account the report of the correspondence group (SDC 3/6/1 and SDC 3/INF.10) and documents SDC 3/6/7, SDC 3/INF.12 and SDC 3/INF.15. In this context, the Sub-Committee also noted that the group had considered documents SDC 1/INF.8, annex 27, and SDC 3/INF.8, relevant to this subject.

Review of the plan of action

6.17 The Sub-Committee endorsed the revised plan of action for this output (SDC 3/WP.5, annex 8) which had been prepared by the group on the basis of the progress made during the session.

Re-establishment of the IS Correspondence Group

6.18 The Sub-Committee, taking into account the progress made at this session, agreed to re-establish the Correspondence Group on Intact Stability, under the coordination of Japan*, and instructed it to:

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.1 on the basis of the decisions taken at SDC 3, continue to work on the items contained in the revised plan of action for the second-generation intact stability criteria (SDC 3/WP.5, annex 8), taking into account relevant documents from this and previous sessions, and, in particular:

.1 collect sample ship calculation results of the five modes of stability failure of the second-generation intact stability criteria for a range of ship types and proportions and for the full matrix of operational draughts, trims and GM values;

.2 recommend and/or confirm standards to be used with each level of vulnerability criteria for the five modes of stability failure;

.3 identify elements of the vulnerability criteria that may benefit from future refinement or revision, including cases of inconsistency between levels 1 and 2;

.4 further develop, harmonize and refine the draft explanatory notes for the second-generation intact stability criteria, with a view to their finalization at SDC 4. This includes improving calculation examples, addressing the applicability of the criteria for pure loss of stability, propulsor models and estimation of resistance for surf-riding/broaching, the impact of appendages on roll damping, and further developing the guidance on the use of the numerical time domain simulation in parametric roll;

.5 further develop and refine the guidelines and specifications for direct stability assessment; and

.6 further develop guidelines for the preparation of ship specific operational limitations based on outcomes of the second level of vulnerability criteria and operational guidance based on outcomes of direct stability assessment; and

.2 submit a report to SDC 4.

7 AMENDMENTS TO PART B OF THE 2008 IS CODE ON TOWING, LIFTING AND ANCHOR HANDLING OPERATIONS

General

7.1 The Sub-Committee recalled that SDC 2 had agreed to the following draft amendments regarding vessels engaged in anchor-handling operations:

.1 the introduction of the 2008 IS Code (SDC 2/25, annex 3) for submission to MSC 95 for approval with a view to subsequent adoption; and

.2 part B of the 2008 IS Code (SDC 2/25, annex 4) for submission to the Committee for adoption in conjunction with the adoption of the above amendments to the introduction of the Code.

7.2 The Sub-Committee also recalled that SDC 2 had re-established the IS Correspondence Group with terms of reference, as set out in paragraph 7.10 of document SDC 2/25, and instructed the group to submit a report to this session.

Outcome of MSC 95

7.3 The Sub-Committee recalled that MSC 95 had approved the draft amendments to the introduction of the 2008 IS Code regarding vessels engaged in anchor-handling operations (MSC 95/22, annex 12), in accordance with SOLAS regulation II-1/2.27 (resolution MSC.269(85)) and regulation 3(16) of the 1988 LL Protocol (resolution MSC.270(85)). In this connection, MSC 95 had also approved, in principle, the related draft amendments to part B of the 2008 IS Code (SDC 2/25, annex 4), with a view to adoption in conjunction with the adoption of the associated above-mentioned amendments.

Report (part 2) of the working group established at SDC 2

7.4 The Sub-Committee considered the relevant part 2 of the report of the IS Working Group at SDC 2 (SDC 3/6) and, having approved it in general, noted that the group's report had been considered in detail by the IS Correspondence Group (SDC 3/7) established at SDC 2.

Report of the correspondence group and related submissions

7.5 The Sub-Committee considered the report of the correspondence group (SDC 3/7) and, having approved it in general, noted that with regard to the draft amendments concerning towing, including escort towing, as set out in annex 1 to document SDC 3/7, the group had agreed that the draft requirements would apply to new ships and to ships with newly installed equipment for towing. The Sub-Committee also noted that the group had also agreed, in principle, that the draft requirements concerning lifting, as set out in annex 2 to document SDC 3/7, should apply to new ships and to major conversions involving large cranes being newly fitted to existing ships.

7.6 In the context of the above, the Sub-Committee also had the following related documents for consideration:

.1 SDC 3/7/1 (China), containing proposals for the development of weather criteria for vessels engaged in ocean-towing operations based on paragraph 2.3 of part A of the 2008 IS Code;

.2 SDC 3/7/2 (Germany), commenting on the report of the correspondence group (SDC 3/7) with respect to the stability of vessels engaged in lifting operations and proposing to delete the definition of the term "waters that are not exposed", as contained in paragraph 2.9.1.4 of annex 2 to document SDC 3/7;

.3 SDC 3/INF.13 (Germany), providing updated information about the DNV GL rules for stability of crane vessels, which is discussed in document SDC 3/7, as the basis for stability regulations for ships during lifting operations; and

.4 SDC 3/INF.14 (Germany), containing the result of an analysis performed for accidental loss of crane load events in exposed waters for ships engaged in lifting operations, following the proposed amendments to part B of the 2008 IS Code (SDC 3/7, annex 2).

7.7 Following consideration of the report of the correspondence group and the above documents, the Sub-Committee noted the following views expressed:

.1 the proposal for supplementary weather criteria for vessels engaged in ocean-going towing operations (SDC 3/7/1) provides for effective increase of the safety for such vessels;

.2 some of the proposals contained in square brackets in the annexes to the report of the correspondence group (SDC 3/7) could be resolved, taking into account the proposals contained in paragraphs 8 and 9 of document SDC 3/7/2;

.3 it should be considered which method was used for determining the peak wave period in the proposals contained in document SDC 3/7/2; and

.4 further detailed work is necessary in order to finalize the draft amendments concerning towing and lifting operations, which is challenging when the proposals apply to all types of ships.

Instructions to the Working Group on Intact Stability (IS)

7.8 Having considered the above views, the Sub-Committee instructed the IS Working Group, established under agenda item 6 (see paragraph 6.10), taking into account comments made and decisions taken in plenary, part 2 of the report of the IS Working Group (SDC 3/6) and documents SDC 3/7/1, SDC 3/7/2, SDC 3/INF.13 and SDC 3/INF.14, to finalize the draft amendments to part B of the 2008 IS Code concerning towing (including escort towing) and lifting operations, based on annexes 1 and 2 to document SDC 3/7, with a view to approval by MSC 96.

Report of the IS Working Group

7.9 Having considered the relevant part of the report of the IS Working Group (SDC 3/WP.5), the Sub-Committee took action as described in the following paragraphs.

Draft amendments to the introduction and parts A and B of the 2008 IS Code regarding vessels engaged in lifting and towing operations, including escort towing

7.10 The Sub-Committee endorsed the draft amendments to the introduction and part A of the 2008 IS Code regarding vessels engaged in lifting and towing operations, including escort towing, as set out in annex 4, for submission to MSC 96 for approval with a view to subsequent adoption.

7.11 In light of the above decision, and recalling that MSC 95 had approved the draft amendments to the introduction of the Code regarding vessels engaged in anchor-handling operations (see also paragraph 7.3), the Sub-Committee noted that the group had prepared the following editorial modifications to the chapeau of paragraph 1.2 of the Introduction, in order to make the text more concise and clear:

> "1.2 Unless otherwise stated, ~~T~~this Code contains intact stability criteria ~~for the following types of~~ applicable to ships and other marine vehicles of 24m in length and above, as listed below~~, unless otherwise stated~~. The Code also provides intact stability criteria applicable to the same ships and marine vehicles when engaged in certain operations:"

Subsequently, the Sub-Committee endorsed the aforementioned editorial modifications and invited the Committee to include the modified chapeau of paragraph 1.2 of the Introduction to the Code in conjunction with the adoption of the amendments to the Introduction of the 2008 IS Code regarding vessels engaged in anchor-handling operations.

7.12 The Sub-Committee also endorsed the draft amendments to part B of the 2008 IS Code regarding vessels engaged in in lifting and towing operations, including escort towing, as set out in annex 5, for submission to the Committee for adoption in conjunction with the adoption of the related amendments to the Introduction of the Code (see also paragraph 7.10).

7.13 In light of the above decision, the Sub-Committee noted that the observer from IACS had urged delegations to undertake a careful review of paragraph 2.9.1.3 of the draft amendments to part B of the 2008 IS Code, as provided in annex 10 to document SDC 3/WP.5, before this text was considered by MSC 96, especially as to how the global and consistent implementation of the phrase "where the environmental impact on the lifting operation is negligible" will be facilitated.

Completion of the work on the output

7.14 The Sub-Committee invited the Committee to note that the work on the output had been completed.

8 AMENDMENTS TO SOLAS AND THE FSS CODE TO MAKE EVACUATION ANALYSIS MANDATORY FOR NEW PASSENGER SHIPS AND REVIEW OF THE RECOMMENDATION ON EVACUATION ANALYSIS FOR NEW AND EXISTING PASSENGER SHIPS

General

8.1 The Sub-Committee recalled that SDC 2 had agreed to the draft amendments to SOLAS regulation II-2/13 on evacuation analysis, as set out in annex 9 to document SDC 2/25, for submission to MSC 95 for approval with a view to subsequent adoption. Consequently, MSC 95 had approved the aforementioned draft amendments (MSC 95/22, annex 14) with a view to subsequent adoption at MSC 96.

8.2 The Sub-Committee also recalled that SDC 2 had re-established the Correspondence Group on Evacuation Analysis with terms of reference as set out in paragraph 14.13 of document SDC 2/25, and had instructed the group to submit a report to this session.

Report of the correspondence group and related submission

8.3 The Sub-Committee considered the report of the correspondence group (SDC 3/8) and, having approved it in general, noted that the group had progressed the work on the draft amendments to the *Guidelines for evacuation analysis for new and existing passenger ships* (MSC.1/Circ.1238), as set out in annex 1 to document SDC 3/8, to address mandatory application of evacuation analysis to passenger ships; however, there were still matters to be further considered by the Working Group on Fire Protection, if established.

8.4 In the context of the above, the Sub-Committee also considered document SDC 3/8/1 (Germany), commenting on the report of the correspondence group (SDC 3/8), specifically on the following:

.1 in the FSS Code, chapter 13, paragraph 2.1.2.2.2.1, case 2 seems to be misleading as it refers to "members of the crew in public spaces occupied to 1/3 of the maximum capacity". It should be amended to "1/3 of the crew distributed in public spaces", since the idea is not to fill public spaces to 1/3 of their capacity with crew; and

.2 in the *Guidelines on evacuation analyses for new and existing passenger ships* (MSC.1/Circ.1238), annex 2, appendix 4.2, and in the FSS Code, chapter 13, paragraph 2.1.2.2.2.1, case 2, the day case in the guidelines definition does not explicitly address the occupation of public spaces designed for crew only, while the FSS Code states "crew accommodation" which is also open to interpretation. It should be clarified where the 1/3 of the crew currently distributed in the "public spaces" should be distributed.

8.5 During the discussion, the Sub-Committee noted the following views expressed:

.1 computer simulation cannot be accepted as the only means for the analysis of the real life scenario. In this context, the criteria for abandoning the ship should include human behaviour;

.2 the response time is not considered realistic; and

.3 with regard to the proposed amendments to the guidelines related to open decks, SOLAS regulation II-2/13 and chapter 13 of the FSS Code do not have such provisions.

8.6 In considering the above views in conjunction with the report of the correspondence group (SDC 3/8), the Sub-Committee:

.1 agreed, in principle, to the draft revised guidelines for evacuation analysis for new and existing passenger ships (SDC 3/8, annex 1). In this connection, the revised guidelines should have simplicity and clarity of language and the definitions need further consideration;

.2 endorsed the group's view that further discussion might be necessary in order to finalize the draft revised guidelines;

.3 noted the group's discussions on the response time distribution (SDC 3/8, paragraphs 6 to 9);

.4 noted the discussions on the minimum number of simulations and instructed the working group to consider the proposal made in the draft revised guidelines as well as the additional proposal for a convergence criterion made by France (SDC 3/8, paragraphs 14 to 16 and annex 2);

.5 instructed the working group to consider the decision made on the consideration of open deck areas within evacuation analyses (SDC 3/8, paragraph 33);

.6 noted the discussions on additional scenarios addressing the loss of one MVZ (SDC 3/8, paragraphs 37 to 41);

.7 noted the discussions on the consideration of heel and trim within evacuation analyses (SDC 3/8, paragraph 44); and

.8 noted the discussions on an updated congestion criterion and instructed the working group to consider the statement made (paragraphs 45 to 47) and the additional proposal by the United Kingdom (SDC 3/8, paragraph 45 to 48).

8.7 In the context of the above, the Sub-Committee also noted that the delegation of Sweden did not participate in the correspondence group, although Sweden is listed as one of the participants.

Establishment of the Working Group on Fire Protection

8.8 In light of the above decisions, the Sub-Committee established the Working Group on Fire Protection and instructed it, taking into account the comments made and decisions taken in plenary, to:

.1 finalize the draft amendments to the *Guidelines for evacuation analysis for new and existing passenger ships* (MSC.1/Circ.1238), taking into account documents SDC 3/8 and SDC 3/8/1;

.2 further consider the development of draft amendments to the FSS Code and SOLAS regulation II-2/13, taking into account documents SDC 3/8 and SDC 3/8/1; and

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

Report of the Working Group on Fire Protection

8.9 Having considered the relevant part of the report of the working group (SDC 3/WP.6), the Sub-Committee approved it in general and took action as described in the following paragraphs.

Draft Revised guidelines on evacuation analysis for new and existing passenger ships

Operational measures

8.10 The Sub-Committee noted that the group had agreed that the company and/or the Administration should decide on their preferred way of presenting the outcome of the evacuation analysis to the crew. In this context, having also noted the view that if the analysis is mandatory, then operational information arising from it must be incorporated in the Safety Management System, the Sub-Committee agreed that the company or the Administration should decide the way of presenting this information, rather than leaving it open to interpretation.

Open deck areas

8.11 The Sub-Committee noted that the group had further developed the simulation case for open decks in the draft *Revised guidelines on evacuation analysis for new and existing passenger ship*.

8.12 In the context of the above, the Sub-Committee also noted that the group was unable to develop amendments to SOLAS regulation II-2/13 and chapter 13 of the FSS Code with regard to open decks.

Draft Revised guidelines on evacuation analysis for new and existing passenger ships

8.13 The Sub-Committee endorsed the draft *Revised guidelines on evacuation analysis for new and existing passenger ships*, and the associated MSC circular prepared by the group, as set out in annex 6, for submission to MSC 96 for approval. Consequently, the Sub-Committee authorized the Secretariat to carry out any editorial corrections that may be identified in the draft *Revised guidelines*.

8.14 Subsequently, the Sub-Committee agreed to refer the aforementioned draft *Revised guidelines* to SSE 3 for information, as the definitions contained in section 2 of annex 1 may be of interest in developing the functional requirements of SOLAS chapter III.

8.15 Noting paragraph 25 of document SDC 3/WP.6 and the text of paragraphs 9.3 and 11 of the draft MSC circular, the Sub-Committee concurred that ro-ro passenger ships constructed before the date of approval of these revised guidelines and already evaluated in accordance with SOLAS regulations II-2/13.7.4 and II-2/28-1.3, using MSC.1/Circ.1033 or MSC.1/Circ.1238 need not be re-evaluated using these revised guidelines. There is also no intention to re-evaluate passenger ships that have applied these existing circulars on a voluntary basis.

8.16 In the context of the above decision, the Sub-Committee noted that the delegation of the Bahamas had noted the failure of the group to explicitly define the terms "E" and "L" as it had requested before the working group was established and had questioned the relationship of the combination to the 30 minute criterion contained in SOLAS regulation III/21.1.3, since this provision does not include the action of launching a survival craft. In this context, the delegation had also noted the different terms used in SOLAS chapter II-2 ("means of escape" and "escape routes") and chapter 13 of the FSS Code ("evacuation routes") and had questioned the relationship between the concepts of "escape" and "evacuation", bearing in mind that the FSS Code specifies that evacuation routes lead to embarkation decks. The Sub-Committee also noted that the delegation of the Bahamas had stated that fundamental concepts should be agreed before re-examination of the draft guidelines, SOLAS amendments and the FSS Code amendments and had informed the Sub-Committee of its intention to submit a document to MSC 96 on these issues.

Draft amendments to paragraph 2.1.2.2.2.1 of chapter 13 of the FSS Code

8.17 The Sub-Committee endorsed the draft amendment to paragraph 2.1.2.2.2.1 of chapter 13 of the FSS Code, regarding clarification of the crew distribution in public spaces, as set out in annex 7, for submission to MSC 96 for approval with a view to subsequent adoption.

Draft amendments to SOLAS and/or the FSS Code on matters related to open decks

8.18 The Sub-Committee endorsed the recommendation of the group to maintain this output on the agenda for SDC 4 for consideration of draft amendments to SOLAS regulation II-2/13 and chapter 13 of the FSS Code with regard to open decks (see also paragraph 8.12). Consequently, the Sub-Committee invited Member Governments and international organizations to submit specific proposals to SDC 4 on matters related to open decks.

Extension of target completion year and title of the output

8.19 In light of the above decisions, the Committee was invited to extend the target completion year for this output to 2017. Additionally, in order to reflect the remaining work on this output, the Committee was invited to change the title of the output to "Amendments to SOLAS and the FSS Code to make evacuation analysis mandatory for new passenger ships".

9 AMENDMENTS TO SOLAS CHAPTER II-1 AND ASSOCIATED GUIDELINES ON DAMAGE CONTROL DRILLS FOR PASSENGER SHIPS

General

9.1 The Sub-Committee recalled that SDC 2 had re-established the SDS Correspondence Group with terms of reference as set out in paragraph 17.7 of document SDC 2/25, and had instructed the group to submit a report to this session.

Report of the correspondence group

9.2 The Sub-Committee considered the report of the correspondence group (SDC 3/9) and, having approved it in general, noted that the group had progressed the work on the amendments to SOLAS chapter II-1 and associated guidelines on damage control drills for passenger ships. The Sub-Committee also noted that with regard to:

.1 the SOLAS amendments, the group had agreed on a draft new regulation II-1/19.1 and to add a new provision to regulation III/30 that will provide a cross-reference to the draft new regulation II-1/19.1 and will serve to connect the passenger ship fire, abandon ship and damage control emergency drill requirements. In this connection, the group had also agreed to add a new provision to regulation III/37.3 that will require the assignment of crew damage control duties on the muster list; and

.2 the draft *Guidelines for damage control drills*, the large majority of the group had agreed that the purpose of the draft guidelines should be to provide guidance on conducting the damage control drill, and not to provide damage control theory. It had been agreed by the group that this principle should be used in further development of the guidelines.

9.3 Following consideration of the report of the correspondence group, the Sub-Committee noted the following views expressed:

.1 the time interval for the drills should not be discussed by the working group as it is a matter within the scope of the HTW Sub-Committee and should therefore be left in square brackets for consideration by HTW 3;

.2 the time between drills is arbitrary and, taking into account the *Principles to be considered when drafting IMO instruments* (resolution A.1103(29)) (e.g. use of existing requirements), this could be addressed under paragraph 8.2 of the ISM Code; and

.3 the draft guidelines are too prescriptive and may be unnecessary. However, if they are to be finalized, they should take into account the administrative impact as well as the hours of rest of seafarers.

Instructions to the SDS Working Group

9.4 Having considered the above views, the Sub-Committee instructed the SDS Working Group established under agenda item 3, to:

.1 finalize the draft amendments to SOLAS regulations II-1/19-1, II-1/21, III/30 and III/37; and

.2 if time permits, finalize the draft *Guidelines for conducting damage control drills on passenger ships.*

Report of the SDS Working Group

9.5 Having considered the relevant part of the report of the SDS Working Group (SDC 3/WP.4), the Sub-Committee took action as described below.

Draft amendments to SOLAS chapter II-1

9.6 The Sub-Committee endorsed the draft amendments to SOLAS regulation II-1/1.2 and the draft new regulation II-1/19-1, as set out in annex 1, for submission to MSC 96 for approval, with a view to subsequent adoption.

9.7 In the context of the above decision, the Sub-Committee requested HTW 3 to further consider and take into account the damage control drill frequency requirements in the draft SOLAS regulation II-1/19-1.2 for crew workload and fatigue issues, and submit the finalized draft amendment to MSC 96 for approval in conjunction with the approval of the draft amendments to SOLAS chapter II-1 subdivision and damage stability requirements, with a view to subsequent adoption.

Draft amendments to SOLAS chapter III

9.8 The Sub-Committee endorsed the draft amendments to SOLAS regulations III/1.4, III/30 and III/37, as set out in annex 8, for submission to MSC 96 for approval with a view to subsequent adoption.

Draft Guidelines for conducting damage control drills on passenger ships

9.9 The Sub-Committee endorsed the group's decision that the draft *Guidelines for conducting damage control drills on passenger ships* were not necessary at this stage, as the finalized draft amendments to SOLAS regulations II-1/19.1, III/30 and III/37 were sufficiently detailed (see also paragraphs 9.6 and 9.8). However, it was recognized that in the future, after some experience has been gained conducting these drills on a range of passenger ship types and sizes, the development of guidelines might be considered appropriate.

Completion of the work on the output

9.10 In light of the above decisions, the Sub-Committee invited the Committee to note that the work on the output had been completed.

10 REVISION OF SECTION 3 OF THE GUIDELINES FOR DAMAGE CONTROL PLANS AND INFORMATION TO THE MASTER (MSC.1/CIRC.1245) FOR PASSENGER SHIPS

10.1 The Sub-Committee recalled that MSC 93, following consideration of the recommendations of the Working Group on Passenger Ship Safety (MSC 93/WP.6), had agreed to include in the post-biennial agenda of the Committee a new output on "Revision of section 3 of the *Guidelines for damage control plans and information to the master* (MSC.1/Circ.1245) *for passenger ships*", with two sessions needed to complete the item, assigning the SDC Sub-Committee as the coordinating body.

10.2 The Sub-Committee also recalled that MSC 93, following discussion, had agreed that:

.1 the scope of the output should not be extended to ships other than passenger ships; and

.2 the scope was for new passenger ships and for those existing passenger ships that would need to update the damage control plan following significant alterations to the ship.

10.3 The Sub-Committee further recalled that MSC 93 had agreed that the results of the work on "Amendments to SOLAS chapter II-1 and associated guidelines on damage control drills for passenger ships" (agenda item 9) should be available before conducting work under this output (MSC 93/22, paragraph 6.28.3).

10.4 In light of the outcome of MSC 93 and following discussion, the Sub-Committee noted that document MSC 93/6/12 (CLIA), presenting a tangible output from the Cruise Ship Safety Forum related to proposed enhancements to the damage control plan based on experience of the global cruise industry and use on board during damage response drills, provided a strong basis for further consideration of this output.

10.5 Having noted that no relevant documents had been submitted to this session, the Sub-Committee invited Member Governments and international organizations to submit specific proposals on this matter to SDC 4.

11 CLASSIFICATION OF OFFSHORE INDUSTRY VESSELS AND A REVIEW OF THE NEED FOR A NON-MANDATORY CODE FOR OFFSHORE CONSTRUCTION SUPPORT VESSELS

General

11.1 The Sub-Committee recalled that SDC 2 had re-established the Correspondence Group on Offshore Industry Vessels with terms of reference as set out in paragraph 9.8 of document SDC 2/25, and had instructed it to submit a report to this session.

11.2 The Sub-Committee also recalled that MSC 95, recognizing the need to make progress on the output on "Mandatory instrument and/or provisions addressing safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages" (agenda item 16) and taking into account the heavy workload for SDC 3, had authorized SDC 3 to establish an expert group (i.e. in addition to three working and two drafting groups expected to be established) to examine submissions from Member States and international organizations on their regulatory regimes and procedures for transporting industrial personnel. Taking into account that this output is directly related to the aforementioned output, the Sub-Committee agreed that the expert group would also consider matters related to this output.

Report of the correspondence group and related submissions

11.3 The Sub-Committee considered the report of the correspondence group (SDC 3/11) and, having approved it in general, noted that the group had recognized that progress towards a conclusion on development of the guidelines would be made more difficult before resolution was reached on the closely related issue of industrial personnel and as a result of discussions and outcome of MSC 95. However, this may be seen to be beneficial to the eventual outcomes on this issue as further development of the guidelines is at least partially dependent on resolving issues related to industrial personnel. In light of the above, the Sub-Committee also noted that the group was unable to complete its formal work within the time required for submission of this report to the Sub-Committee. In this context, the current status of the guidelines is essentially as contained in the report of the correspondence group established at SDC 1 (SDC 2/9).

11.4 In the context of the above, the Sub-Committee also considered the following related documents:

.1 SDC 3/11/1 (CESA), commenting on the decision of MSC 95 not to approve the draft definition of industrial personnel from the industry perspective, reiterating the urgent need for internationally harmonized safety standards for Offshore Service Crafts (OSC) and providing main elements of recommendatory guidance to be considered as an interim solution towards the development of mandatory requirements merging the draft definition of industrial personnel with elements of a related safety standard suitable for high-speed OSC; and

.2 SDC 3/11/2 (Denmark), commenting on the report of the correspondence group (SDC 3/11) by providing information on an analysis of technical and manning requirements in the offshore sector, with the intention to map out the interaction between "conventional" maritime regulation and offshore regulations and standards as applied in Denmark, Germany, the Netherlands and the United Kingdom.

11.5 In considering the report of the correspondence group and the above documents, the Sub-Committee noted the following views expressed during the discussion:

.1 that this output and the output on "Mandatory instrument and/or provisions addressing safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages" (agenda item 16) are linked, but that priority should be given to agenda item 16, which would allow for a way forward on this output;

.2 document SDC 1/INF.14 (Germany), proposing an interim solution for the carriage of more than 12 persons on board a vessel "who are not carried on board in connection with the special purpose of that ship or because of special work being carried out aboard that ship", and that a draft Code for the Construction, Equipment and Operation of Offshore Service Vessels should also be considered within the scope of this output as it provides useful information for further development of this work; and

.3 if the work on this output is delayed due to the related work under agenda item 16, an interim solution may be appropriate at this stage.

11.6 The Sub-Committee also noted the concerns expressed by the delegation of Australia regarding document SDC 2/9/1, specifically section 5 (Construction and equipment – High-speed service craft), paragraph 5.5 (Fire protection), which states that the vessel should comply with the provisions of sections A and B of chapter 7 of the 2000 HSC Code. In this regard, the delegation pointed out that high-speed craft have no enclosed sleeping berth for passengers, which allowed for a substantial reduction in fire detection and extinction requirements compared with SOLAS ships, since a fire could be rapidly detected and extinguished in passenger accommodation spaces. Therefore, the delegation of Australia was of the opinion that, if industrial personnel are to be provided with enclosed sleeping berths, as proposed in the draft OSC Guidelines, then paragraph 5.5 should be amended to ensure that those accommodation spaces comply with SOLAS regulations II-2/7 to II-2/11.

Instructions to the expert group

11.7 Having considered the above matters, the Sub-Committee instructed the Expert Group on Carriage of more than 12 Industrial Personnel on board Vessels engaged on International Voyages, established under agenda item 16 (see paragraph 16.8), taking into account the comments made and decisions taken in plenary, the reports of the correspondence groups (SDC 2/9 and SDC 3/11) and documents SDC 3/11/1 and SDC 3/11/2, to:

.1 if time permits, further develop the draft *Guidelines for offshore service craft (OSC) used in windfarm service*, based on the annex to document SDC 2/9/1 and;

.2 if time permits, further develop the draft *Guidelines for offshore construction vessels (OCV) used in windfarm service*, based on document SDC 1/WP.6, taking into account document SDC 1/INF.14.

Report of the expert group

11.8 Having considered the relevant part of the report of the expert group (SDC 3/WP.7), the Sub-Committee noted that, owing to time constraints, the group was unable to consider the matters under this output.

Extension of target completion year

11.9 Consequently, the Committee was invited to extend the target completion year for this output to 2017.

12 GUIDELINES FOR WING-IN-GROUND CRAFT

Background

12.1 The Sub-Committee recalled that SDC 2 had established the Correspondence Group on Wing-in-Ground Craft with terms of reference as set out in paragraph 18.5 of document SDC 2/25, and instructed the group to submit a report to this session.

Report of the correspondence group

12.2 The Sub-Committee considered the report of the correspondence group (SDC 3/12) and, having approved it in general, noted that the group had made considerable progress on the draft *Guidelines for wing-in-ground (WIG) craft*, but acknowledged that many issues still needed further consideration by the Sub-Committee. With regard to the scope of application of the draft Guidelines, the Sub-Committee noted that the group had not reached consensus on this matter, but had agreed that special requirements should be developed within the draft *Guidelines for small WIG craft*, which still needed to be defined.

12.3 In considering document SDC 3/12, the Sub-Committee noted the following views expressed during the discussion:

.1 that the work to be undertaken could be continued by means of either a working or correspondence group, as long as it leads to finalization of the draft guidelines within a reasonable time frame;

.2 the similarities between wing-in-ground craft and aircraft may necessitate the establishment of a joint working group with ICAO to benefit from the expertise of that specialized organization;

.3 given the number of unresolved issues, the target completion year of this output should be extended; and

.4 even though the Interim Guidelines have been in use for many years, finalization of the new guidance should be expedited.

12.4 In considering the views expressed that ICAO should be invited to participate in the work on this output, the Sub-Committee decided that, at this stage, it was premature to involve outside organizations such as ICAO, given that the draft guidelines still needed considerable work.

12.5 Subsequently, the Sub-Committee invited interested Member Governments and international organizations to work informally* between sessions, based on document SDC 3/12, and submit a document reporting on the progress made on the draft *Guidelines for wing-in-ground (WIG) craft* to SDC 4 under the agenda item on "Any other business", in order to inform the planning process for SDC 5.

Transfer of output to the Committee's post-biennial agenda

12.6 In light of the above decision, the Sub-Committee invited the Committee to maintain this output in its post-biennial agenda, for inclusion in the provisional agenda of SDC 5, with a view to finalization during the 2018-2019 biennium.

13 AMENDMENTS TO THE 2011 ESP CODE

General

13.1 The Sub-Committee recalled that SDC 2 had agreed to draft amendments to the 2011 ESP Code, as set out in annex 12 to document SDC 2/25, prepared by IACS in order to deal with updates to the IACS UR Z10 series. Subsequently, the aforementioned draft amendments had been approved by MSC 95 with a view to adoption at MSC 96.

Proposed amendments to the 2011 ESP Code

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

.1 SDC 3/13 (IACS), containing proposed amendments to the 2011 ESP Code, which takes into account the procedure agreed at DE 57, and endorsed by MSC 92, in order to deal with updates to the IACS UR Z10 series; and

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.2 SDC 3/INF.2 (IACS), providing in its annex a "track changes" version of the 2011 ESP Code, according to the agreed procedure at DE 57, showing proposed updates to the Code to provide alignment with the IACS UR Z10 series.

13.3 In considering the list of proposed amendments set out in paragraph 7 of document SDC 3/13, the Sub-Committee concurred with the following:

.1 insertion of the reference to annex 2 to clarify that every time thickness measurements are required to be taken of elements subject to the close-up survey, they should be performed at the same time as the close-up survey in annexes A and B, parts A and B, paragraph 1.5;

.2 correction of the reference to annex 1 as well as annex 2 regarding the close-up survey of hatch covers and insertion of the relevant explanatory footnote in annex A, parts A and B, paragraph 2.4.4;

.3 insertion of explanatory text to note (D) in annex A, part A, annex 1;

.4 insertion of requirements for longitudinally and transversally framed structures of the double skin and insertion of an explanatory text to note (D) in annex A, part B, annex 1, appendix 1;

.5 insertion of explanatory text to note (D) in annex A, part B, annex 1, appendix 2;

.6 editorial clarification of the reference tables for items subject to the close-up surveys in annex A, part B, annex 2;

.7 editorial correction of an error in a cross reference in annex B, part A, paragraph 2.5.6;

.8 insertion of explanatory text in annex B, parts A and B, paragraph 2.6.1.1; and

.9 modification of annex 1, note (7) in annex B, part A.

13.4 Subsequently, the Sub-Committee endorsed draft amendments to the 2011 ESP Code, as set out in annex 9, for submission to MSC 96 for approval with a view to subsequent adoption.

14 UNIFIED INTERPRETATION TO PROVISIONS OF IMO SAFETY, SECURITY, AND ENVIRONMENT-RELATED CONVENTIONS

General

14.1 The Sub-Committee recalled that this is a continual item on the Sub-Committee's biennial agenda, established by MSC 78 so that IACS could submit any newly developed or updated unified interpretation for the consideration of the Sub-Committee with a view to developing an appropriate IMO interpretation.

14.2 The Sub-Committee also recalled 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 consideration by the Sub-Committee with a view to developing an appropriate IMO interpretation.

14.3 The Sub-Committee further recalled that SDC 2, in considering document SDC 2/21 (IACS) on matters related to possible need for revision of the *Guidelines on the means of access to structures for inspection and maintenance of oil tankers and bulk carriers* (MSC/Circ.686), and having noted the views expressed that this matter needs further consideration in order to clarify if there is a need for a new output, had requested the Secretariat to prepare a proposal for submission to SDC 3.

Possible need for revision of the *Guidelines on the means of access to structures for inspection and maintenance of oil tankers and bulk carriers* (MSC/Circ.686)

14.4 The Sub-Committee considered document SDC 3/WP.3 prepared by the Secretariat, providing consideration of the *Guidelines on the means of access to structures for inspection and maintenance of oil tankers and bulk carriers* (MSC/Circ.686), in the context of the 2011 ESP Code, in order to first verify if the text of the Guidelines had been incorporated into the Code, and if not, whether there was a need for revising them. In this connection, the Sub-Committee noted that there are aspects of the Guidelines that have not been incorporated into the 2011 ESP Code, and that, throughout the text, there are some references that need to be updated. However, the relevance of SOLAS regulation II-1/3-6 and of *Technical provisions for means of access for inspections* (resolution MSC.133(76)) may also need to be considered. The Guidelines could still be considered as an independent instrument which may or may not need a complete revision.

14.5 Following an in-depth discussion, the Sub-Committee noted the document and invited interested Member Governments and international organizations to further consider document SDC 3/WP.3 with a view to providing an effective solution to this matter, which may not necessarily be a new output, and to submit proposals to SDC 4.

Sill and coaming heights for openings on top of deckhouses and companionways

14.6 The Sub-Committee, further to the discussions at SDC 1 (SDC 1/26, paragraph 21.14), considered document SDC 3/14 (IACS), providing a draft unified interpretation on the minimum height of sills and coamings for various openings on the top of deckhouses or companionways on the freeboard deck. Following discussion, the Sub-Committee agreed to the draft unified interpretations relating to the International Convention on Load Lines, 1966, and the Protocol of 1988 relating to the International Convention on Load Lines, 1966, and the associated draft MSC circulars, set out in annexes 10 and 11, respectively, for submission to MSC 96 for approval.

14.7 Subsequently, the Sub-Committee noted that the delegation of Australia was of the opinion that IACS was effectively proposing to replace the definitions of positions 1 and 2 in the 1966 Load Lines Convention, regulation 13, with an interpretation. The delegation considered that such an interpretation was inappropriate and that the definitions themselves should be changed. The Administrations that had not yet adopted the 1988 Load Lines Protocol would not benefit from this interpretation and amendment of the 1966 Convention was problematic. The delegation had noted that IACS had adopted the proposals itself and named them draft unified interpretations. While the delegation understood the reasoning behind the preparation of the proposed interpretation, there were concerns about the proposal. The proposal did not refer to other regulations such as 15, 16, 17, 23, 27 and 40 that use the

defined terms "position 1 and position 2", and while regulations 14-1, 18, 19 and 20 were mentioned, the interpretation only referred to regulation 20. The proposal did not cover the securing of the weathertightness of openings that are "position 1 or position 2" under the Convention/Protocol, but no proposals were made to address this issue. Further consideration should be given to the detailed implications of this proposal, such as the need to take account of green seas taken over the bow of a vessel with forward superstructure to flow vertically up the front of the superstructure – that was not covered by the simple position 1 and 2 approach.

14.8 The Sub-Committee also noted that the delegation of Spain had concerns. In the delegation's view, according to the unified interpretation proposed by IACS, some air pipes located in position 1 would comply with the less stringent requirement of height from the deck to the point where water might have access below, i.e. 450 mm, which could be understood as inappropriate from a safety point of view. However, that was not an issue created by the unified interpretation, but by the current regulation 20 (Air pipes) of the Load Lines Convention and Protocol. One of the reasons that could explain this issue might be that the provisions included in regulation 20 are not based on the positions defined in regulation 13. Additionally, the delegation was of the opinion that perhaps some design arrangements, such as those where air pipes extend above exposed decks at least two standard heights of superstructure above the freeboard deck, were not dealt with by the proposed interpretation, which should be carefully considered.

Steering gear test with vessel not at its deepest seagoing draught

14.9 The Sub-Committee considered document SDC 3/14/1 (IACS), discussing the development of an IACS unified interpretation to define the methods for predicting steering gear performance in the required SOLAS condition, based on trial data taken in the ballast condition. In this context, the Sub-Committee noted that IACS societies will uniformly implement this revision to its UI SC246 on ships contracted for construction on or after 1 January 2017 to which the amended SOLAS regulations II-1/29.3.2 and 29.4.2 are applicable, unless they are provided with written instructions to apply a different interpretation by an Administration on whose behalf they are authorized to act as a recognized organization.

14.10 Following consideration, the Sub-Committee agreed to the draft unified interpretations of SOLAS regulations II-1/29.3 and II-1/29.4, with minor modifications, and the associated draft MSC circular, set out in annex 12, for submission to MSC 96 for approval.

14.11 In light of the above decision, the Sub-Committee noted that the above draft unified interpretation may affect the *Unified interpretation of SOLAS regulations II-1/29.3 and 29.4* (MSC.1/Circ.1425). Subsequently, the Sub-Committee invited Member Governments and international organizations to submit comments to MSC 96 on this matter for consideration in conjunction with the approval of the aforementioned draft unified interpretation.

Harmonization of IMO Instruments on damage stability verification for tankers

14.12 The Sub-Committee considered document SDC 3/14/2 (IACS), discussing the application of the damage stability verification for tankers in the *Guidelines for verification of damage stability requirements for tankers* (MSC.1/Circ.1461) and advocating the need to harmonize the related IMO instruments on damage stability verification. In this context, the Sub-Committee noted that SLF 55, in considering the report of the Drafting Group on Development of Mandatory Carriage Requirements for Stability Instruments on Board Tankers (SLF 55/WP.6), had concurred with the drafting group's recommendation that potential amendments to the International Convention on Load Lines, 1966, and the 2008 IS Code would need to be considered under a new planned output, in accordance with the *Guidelines on the methods of work of the MSC and the MEPC and their subsidiary bodies*

(MSC-MEPC.1/Circ.4/Rev.2), as they may have wide-ranging consequences affecting ship types other than tankers (SLF 55/17, paragraph 5.10). Subsequently, the Sub-Committee also noted that IACS had noted that there has been no action on this issue since SLF 55.

14.13 Following discussion, the Sub-Committee agreed to the draft unified interpretations of the 2008 IS Code, and the associated draft MSC circular, set out in annex 13, for submission to MSC 96 for approval. In this connection, the Sub-Committee agreed that this is a short-term solution and that this matter calls for consideration of a long-term solution. Consequently, the Sub-Committee invited Member Governments and international organizations to submit a proposal on this issue to a future session of the MSC.

Treatment of ventilators for machinery space openings incapable of being closed weathertight

14.14 In considering document SDC 3/14/3 (IACS), providing in the annex draft IACS unified interpretations concerning the treatment of ventilators fitted with weathertight closing appliances serving machinery spaces which are required to remain open and are, therefore, considered as a point of down-flooding, the Sub-Committee agreed to the following:

.1 draft unified interpretations relating to the International Convention on Load Lines, 1966, as set out in annex 10;

.2 draft unified interpretations of the 2008 IS Code, as set out in annex 13;

.3 a draft unified interpretation relating to the International Grain Code, as set out in annex 14;

.4 draft unified interpretations of SOLAS chapter II-1, as set out in annex 15;

.5 a draft unified interpretation relating to the IBC Code, as set out in annex 16; and

.6 a draft unified interpretation relating to the IGC Code, as set out in annex 17,

for submission to MSC 96 for approval.

14.15 Consequently, the Sub-Committee also agreed to the draft unified interpretations relating to MARPOL Annex I, and the associated draft MEPC circular, set out in annex 18, for submission to MEPC 69 for approval.

Application of chapter 2 of the MODU Code and the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78))

14.16 The Sub-Committee considered document SDC 3/14/4 (IACS), providing in the annex a copy of the IACS Unified Interpretation for the application of the 2009 MODU Code, chapter 2, paragraphs 2.1 to 2.4, and the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78)), and agreed to the aforementioned draft unified interpretations, and the associated draft MSC circular, set out in annex 19, for submission to MSC 96 for approval.

14.17 Subsequently, the Sub-Committee noted that, according to the analysis contained in paragraph 4 of document SDC 3/14/4, MSC.1/Circ.1464/Rev.1 and its Corr.1 will need to be amended to exclude MODU's. In this context, the Sub-Committee invited the Committee to consider the matter and take action, as appropriate.

Application of SOLAS regulation II-1/3-6, as amended, and the *Revised technical provisions for means of access for inspections*

14.18 The Sub-Committee had for its consideration document SDC 3/14/5 (IACS), providing in the annex a copy of the latest version of IACS UI SC191 relating to the application of SOLAS regulation II-1/3-6, as amended, and the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78)).

14.19 Following consideration, the Sub-Committee agreed to the draft Unified Interpretations relating to the application of SOLAS regulation II-1/3-6, as amended, and the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78)), and the associated draft MSC circular, set out in annex 20, for submission to MSC 96 for approval.

14.20 Subsequently, the Sub-Committee noted that when the aforementioned draft unified interpretation is approved, there may be a need to amend MSC.1/Circ.1464/Rev.1 and Corr.1, as amended by MSC.1/Circ.1507. In this context, the Sub-Committee invited the Committee to consider the matter and take action, as appropriate.

Heat exchangers (coolers) fitted on the hull

14.21 The Sub-Committee, further to the discussions at SDC 2 (SDC 2/25, paragraph 11.4), considered document SDC 3/14/6 (IACS), providing in the annex a copy of IACS UI TM2, an IACS unified interpretation of the 1969 TM Convention, relating to heat exchangers (coolers) fitted on the hull, and agreed to the draft Unified Interpretation of the 1969 TM Convention , and the associated draft MSC circular, set out in annex 21, for submission to MSC 96 for approval.

14.22 In this connection, the Sub-Committee noted the comment by the delegation of Japan that this matter had been considered at the last session, and it was agreed that more experience with the implementation of the *Unified interpretations relating to the International Convention on Tonnage Measurement of Ships, 1969* (TM.5/Circ.6) was necessary; in one year the situation had not changed in that regard.

Determination of the deadweight of a ship

14.23 The Sub-Committee considered document SDC 3/14/7 (IACS), which sought clarification on two different ways to determine the deadweight of a ship (even-keel or trimmed hydrostatics) for inclusion on the ship's certificates, and confirming the willingness of IACS to develop a unified interpretation, based on the Sub-Committee's discussion on the matter, with a view to clarifying the situation.

14.24 Following an in-depth discussion, the Sub-Committee agreed that even-keel hydrostatics should be used to determine the regulatory deadweight to be entered on relevant statutory certificates. The Sub-Committee also agreed that it is acceptable for a loading manual and stability information to include a loading condition at a trimmed waterline with a corresponding deadweight that exceeds the even-keel deadweight. To address concerns that were raised in the discussion, the Sub-Committee agreed that further consideration should be given to addressing the application of deadweight-dependent regulations if a deadweight at a trimmed waterline exceeds the even-keel deadweight.

Open deck spaces bounded by partitions or bulkheads for different types of ships

14.25 The Sub-Committee considered document SDC 3/14/8 (IACS), providing in the annex a copy of IACS UI TM3 on an interpretation of the International Convention on Tonnage Measurement of Ships, 1969 (1969 TM Convention), for open deck spaces bounded by partitions or bulkheads for different types of ships.

14.26 Following discussion, the Sub-Committee noted the views that the same method of tonnage measurement should be applied to all ships and that, therefore, the draft unified interpretation would not lead to uniform implementation of the aforementioned provision. Consequently, the Sub-Committee did not agree to the draft unified interpretations contained in the annex to document SDC 3/14/8.

14.27 The Sub-Committee noted the concerns of the delegation of Norway as to the consequences of the above decision. The delegation pointed out that paragraph 8 of document SDC 3/14/8 stated that "IACS societies will uniformly implement IACS UI TM3 from 1 January 2017, unless they are provided with written instructions to apply a different interpretation by the Administration on whose behalf they are authorized to act as a recognized organization." In this connection, the Sub-Committee also noted the delegation's view that by not agreeing to an IMO unified interpretation on this matter, there may be situations where identical OSVs under different flags will have different tonnage. This would be a non-desirable situation on such an important parameter. The Sub-Committee further noted the confirmation by the observer from IACS that the views that had been expressed and the decision of the Sub-Committee regarding IACS UI TM3 would be reported to IACS members as a priority matter.

Inclusion of firefighting system medium in the lightweight and lightship condition

14.28 The Sub-Committee considered document SDC 3/14/9 (IACS), providing an IACS unified interpretation on the inclusion of the firefighting system medium under lightweight, as defined in SOLAS regulations II-1/2.21 and SOLAS II-2/3.28; and in lightship condition, as defined in paragraph 2.23 of the introduction to the International Code on Intact Stability, 2008 (2008 IS Code), and agreed to the draft unified interpretations of the 2008 IS Code and the draft unified interpretations of SOLAS chapter II-1, with minor modifications, and the associated draft MSC circulars, set out in annexes 13 and 15, respectively, for submission to MSC 96 for approval.

Dedicated seawater ballast tanks

14.29 The Sub-Committee recalled that DE 51 had agreed that there was a need for a unified interpretation on dedicated seawater ballast tanks and invited IACS to submit such an interpretation to DE 52 for consideration (DE 51, paragraph 22.5). Subsequently, DE 52 had considered document DE 52/17/6 (IACS), which provided an IACS unified interpretation (UI SC227) on the application of the *Performance Standard for Protective Coatings (PSPC)* (resolution MSC.215(82)) to tanks that are not dedicated solely to the carriage of seawater ballast. Having supported the interpretation in principle, DE 52 had agreed to take no further action on the matter (DE 52/21, paragraph 17.12).

14.30 The Sub-Committee noted that IACS members had considered the comments received from the industry regarding the implementation of this SOLAS regulation and had further developed IACS UI SC227. In this context, the Sub-Committee recalled that DE 56 had considered document DE 56/13/2, providing in the annex revision 1 of this IACS unified interpretation. Subsequently, DE 56 had agreed to a draft MSC circular for submission to MSC 90 for approval (DE 56/25, paragraph 13.7). However, following concerns expressed by

several delegations and observers at MSC 90, the Committee had not approved the draft MSC circular, and DE 57 had been requested to reconsider it (MSC 90/28, paragraph 9.38). However, this issue was not discussed at DE 57, SDC 1 or SDC 2.

14.31 In light of the above, the Sub-Committee considered document SDC 3/14/10 (IACS), providing a unified interpretation of dedicated seawater ballast tanks in SOLAS regulation II-1/3-2, and agreed to the draft unified interpretations of SOLAS chapter II-1, and the associated draft MSC circular, set out in annex 15, for submission to MSC 96 for approval.

14.32 Subsequently, the Sub-Committee noted that while the delegation of Australia can agree with IACS on the way in which net tonnage excluded spaces are proposed to be used in the interpretation, the delegation has concerns with exempting all subject tanks purely because they are assumed to have higher standard of coating. These tanks are subject to more onerous conditions than dedicated ballast water tanks and, in the absence of any specified international standards for them, exempting them from the application of the PSPC will leave them with a gap in regard to their protection. This will also mean that there would be total reliance on the manufacturer's word for protection of the subject tanks. In this context, the Sub-Committee also noted that the delegation of Australia could not support the proposed interpretation.

15 REVISED SOLAS REGULATION II-1/3-8 AND ASSOCIATED GUIDELINES (MSC.1/Circ.1175) AND NEW GUIDELINES FOR SAFE MOORING OPERATIONS FOR ALL SHIPS

General

15.1 The Sub-Committee recalled that MSC 95 had considered documents MSC 95/19/2 (Austria, et al.) and MSC 95/INF.3 (Denmark), proposing to prepare amendments to SOLAS regulation II-1/3-8 and associated guidelines, as appropriate, to prevent unsafe and unhealthy work situations during mooring operations on new ships, together with document MSC 95/19/13 (Japan), commenting on the proposal. Subsequently, MSC 95 had agreed to include in the 2016-2017 biennial agenda of the SDC Sub-Committee and the provisional agenda for SDC 3 a new output on "Revised SOLAS regulation II-1/3-8 and associated guidelines (MSC.1/Circ.1175) and new guidelines for safe mooring operations for all ships", with a target completion year of 2017, in association with the SSE and HTW Sub-Committees as and when requested by the SDC Sub-Committee.

15.2 The Sub-Committee, also recalled that MSC 95 had further agreed, in accordance with MSC.1/Circ.1481 and MSC.1/Circ.1500, that:

.1 the amendments to be developed should apply to all new ships of 3,000 gross tonnage and upwards, and that new ships of less than 3,000 gross tonnage should comply as far as practicable;

.2 the instrument to be amended is the 1974 SOLAS Convention (i.e. SOLAS regulation II-1/3-8 and any other consequential amendments); and

.3 that the amendments to be developed should enter into force on 1 January 2020, provided that the amendments are adopted before 1 July 2018.

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

.1 SDC 3/15 (Austria, et al., EC), proposing draft amendments to SOLAS regulation II-1/3-8, draft amendments to the *Guidance on shipboard towing and mooring equipment* (MSC/Circ.1175) (annexes 1 and 2, respectively) and the establishment of a correspondence group on safe mooring operations that would treat innovative design features and more appropriate equipment for mooring operations for new ships, together with the proposal on maintenance of mooring lines for all ships contained in document SDC 3/15/1 (see subparagraph .2 below);

.2 SDC 3/15/1 (Japan), proposing draft amendments to SOLAS regulation II-1/3-8 and associated guidelines on maintenance of mooring lines for all ships (annexes 1 and 2, respectively) and the establishment of a correspondence group on safe mooring operation;

.3 SDC 3/15/2 (OCIMF, BIMCO) pointing out that in paragraph 29 of document MSC 95/19/2 it is stated that "no generally applicable industry standards exist" and informing that, while this statement may be true for some vessel types and trades, OCIMF has published guidance on mooring equipment and safe mooring practices; and supporting the intention of the proposed new provisions in the draft text for the revised SOLAS regulation II-1/3-8 (SDC 3/15, annex 1); and

.4 SDC 3/INF.15 (OCIMF), providing a copy of the OCIMF publication "The hazards of snap-back – Initial learnings from a serious incident of mooring line failure".

15.4 In considering the above documents, the Sub-Committee noted the following views expressed during the discussion:

.1 despite the existence of regulations and guidance, there are still far too many accidents occurring, often fatal or life changing, to ship and shore workers alike, and many of these could be avoided by devoting more attention to design ashore and afloat, working arrangements, training, better selection and maintenance, and more effective planning and communication between ship and shore and response to dynamic changes;

.2 the documents submitted to this session were a good basis to progress the work on this output; however, regulatory work from other organizations (e.g. ILO) should be carefully considered as well as the introduction of ISM matters, which would lead to port State control issues;

.3 it is necessary to take into account the administrative burden when considering maintenance and identification of mooring lines;

.4 towing should not be considered under this output, as this matter was already discussed at MSC 95 and it was agreed that it would be only mooring; and

.5 a correspondence group should be established to progress the work.

15.5 Subsequently, the Sub-Committee noted the information from the observer of ICHCA that a private and confidential survey on accidents with mooring ropes had recently been carried out by ICHCA on behalf of one of its senior members, and that, for reasons of

confidentiality, it was unable to present the findings to the Sub-Committee. In this context, the Sub-Committee also noted that, with the permission of its members, ICHCA would provide the survey findings and conclusions to the correspondence group, if established, with a view to supporting the group's work.

Establishment of the drafting group

15.6 In light of the above, the Sub-Committee established a drafting group on safe mooring operations and instructed it, taking into account the comments and decisions made in plenary and documents SDC 3/15, SDC 3/15/1, SDC 3/15/2, SDC 3/INF.5, to develop draft terms of reference for a correspondence group on safe mooring operations.

Report of the drafting group

15.7 Having considered the report of the drafting group (SDC 3/WP.8), the Sub-Committee approved it in general and took action as described below.

Establishment of a correspondence group

15.8 After considering the draft terms of reference for a correspondence group, as prepared by the group, following discussion and in order to make further progress on this output intersessionally, the Sub-Committee established a correspondence group on safe mooring operations, under the coordination of Denmark and Japan,* and instructed it, taking into account documents MSC 95/19/2, MSC 95/19/13, MSC 95/INF.3, MSC 95/22, paragraph 19.2, SDC 3/15, SDC 3/15/1, SDC 3/15/2 and SDC 3/INF.5 and the discussion at SDC 3, to:

.1 prepare draft SOLAS amendments regarding safe mooring operations, using annex 1 to document SDC 3/15 as a base document;

.2 develop draft guidelines on the design of safe mooring arrangements, using annex 2 to document SDC 3/15 as a base document;

.3 when developing SOLAS amendments and guidelines on the design of the mooring arrangements, consider information concerning selection, identification and use of mooring lines;

.4 based on information made available, consider the need for guidelines on the inspection and/or maintenance of mooring lines; and

.5 submit a report to SDC 4.

15.9 Following subsequent discussion, the Sub-Committee agreed that, notwithstanding the views outlined in paragraph 15.4.4 above, when considering the draft guidelines contained in annex 2 to document SDC 3/15, references made to "towing" should be taken to mean "harbour tug operations related to mooring", and that this is within the scope of the output.

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16 MANDATORY INSTRUMENT AND/OR PROVISIONS ADDRESSING SAFETY STANDARDS FOR THE CARRIAGE OF MORE THAN 12 INDUSTRIAL PERSONNEL ON BOARD VESSELS ENGAGED ON INTERNATIONAL VOYAGES

General

16.1 The Sub-Committee recalled that SDC 2 had agreed to the draft MSC circular on *Definition of industrial personnel,* as set out in annex 5 to document SDC 2/25, for submission to MSC 95 for approval.

Outcome of MSC 95

16.2 The Sub-Committee recalled that MSC 95, having considered the draft MSC circular on *Definition of industrial personnel*, prepared by SDC 2, in conjunction with documents MSC 95/10/2 (Argentina), MSC 95/10/4 (France), MSC 95/10/8 (United States) and MSC 95/10/9 (Vanuatu) and following discussion, had decided to prepare a justification for a new planned output for consideration under the agenda item on "Work programme".

16.3 The Sub-Committee also recalled that MSC 95, in considering the aforementioned proposed justification for a new output (MSC 95/WP.12, annex 1), had agreed that the scope of application of the work to be undertaken should not be limited to ships of the offshore energy sector, but to all ships engaged on international voyages, and that due consideration should be given to ensure that any proposed standards do not conflict with other requirements of other organizations and/or conventions.

16.4 The Sub-Committee further recalled that subsequently, MSC 95 had agreed to include, in the 2016-2017 biennial agendas of the Maritime Safety Committee and the SDC Sub-Committee and provisional agendas for MSC 96 and SDC 3, a new planned output on "Mandatory instrument and/or provisions addressing safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages", with a target completion year of 2017. In this connection, MSC 95 had also agreed that it should discuss policy issues before any detailed technical work is undertaken by the Sub-Committee.

16.5 The Sub-Committee noted that MSC 95, recognizing the need to make progress on this important matter and taking into account the heavy workload for SDC 3, had authorized SDC 3 to establish an expert group (i.e. in addition to the three working and two drafting groups expected to be established) to examine submissions from Member States and international organizations on their regulatory regimes and procedures for transporting industrial personnel, so that the Sub-Committee could identify suitable examples, including pros and cons on the best way forward, for consideration by MSC 96. Consequently, MSC 95 had invited Member States and international organizations to submit documents on their regulatory and standards regimes to SDC 3.

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

.1 SDC 3/16 (Secretariat), containing the outcome of MSC 95 regarding a mandatory instrument and/or provisions addressing safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages;

.2 SDC 3/16/1 (ITF), providing possible ways forward on the subject matter and presenting proposed amendments to the 2008 SPS Code and a partial list of the international instruments that may be affected if carriage of industrial personnel is not restricted or limited to a specific category of vessels (annexes 1 and 2, respectively);

.3 SDC 3/16/2 (Antigua and Barbuda, Australia, Chile, France), providing a possible way forward to address the proposals made to, and issues raised at, MSC 95 in relation to annex 5 to document SDC 2/25;

.4 SDC 3/16/3 (United States), providing a basis for discussions related to a regulatory framework providing for the safe carriage of persons that are transported by ship to an industrial workplace offshore;

.5 SDC 3/16/4 (United States), presenting an overview of the United States' legislative and regulatory framework providing for the safe carriage of persons that are transported by ship to an industrial workplace offshore;

.6 SDC 3/16/5 (IMCA, CESA), highlighting some common elements in existing domestic regulations dealing with the carriage of more than 12 industrial personnel on offshore industry vessels, which could be considered in the scope of MSC 95 deliberations on the new output on industrial personnel;

.7 SDC 3/16/6 (Argentina), presenting an approach for developing mandatory provisions for the carriage of industrial personnel on vessels engaged on international voyages; proposing the definition of the terms "industrial personnel" as a special type of passenger and "industrial personnel vessel"; and proposing that the mandatory provisions applicable to an "industrial personnel vessel" (definition to be developed) be included in the SOLAS Convention or in a separate code through a set of rules referring to that Convention;

.8 SDC 3/16/7 (IADC), presenting concerns regarding implications of this new output for the *Code for the construction and equipment of mobile offshore drilling units, 2009* (2009 MODU Code) (resolution A.1023(26), as amended) and the *Recommendations for the training and certification of personnel on mobile offshore units (MOUs)* (resolution A.1079(28)), a scheme that has been continually evolving for more than 35 years to address the safety of MODUs and the personnel employed on MODUs;

.9 SDC 3/16/8 (China), commenting on document SDC 3/16 (see paragraph 16.6.1), and presenting four suggestions for the policy issues that should be discussed by the Sub-Committee, concerning the carriage of more than 12 industrial personnel on board vessels engaged on international voyages;

.10 SDC 3/16/9 (Vanuatu), providing some background based upon research into the formation of the current codes and guidelines related to the carriage of industrial persons on all ship types engaged on international voyages and recommending a way forward for work on broadening "industrial personnel" for application to all types of ships on international voyages; and

.11 SDC 3/16/10 (Vanuatu), providing the Vanuatu regime and procedures for transporting industrial personnel and containing the working definitions used by the Vanuatu Administration (industrial personnel and industrial vessel) and two examples of authorization letters (annexes 1 and 2, respectively).

16.7 In considering the above documents, the Sub-Committee noted the following views expressed during the discussion:

.1 document SDC 3/16/9 (see paragraph 16.6.10) provides useful references to previous decisions made, such as provisions of the 2006 OSV Guidelines which exclude ships carrying more than 12 industrial personnel from its application, noting that these decisions were intended to reinforce the SOLAS definition of passenger ships. However, there were concerns with the assumptions on exclusion made under the aforementioned document, in particular that Administrations should set their own standards for vessels carrying more than 12 industrial personnel or that they may be allowed to issue authorization documents, such as those contained in document SDC 3/16/10 (see paragraph 16.6.11), as it was considered that such authorizations were inappropriate and outside the SOLAS regulatory structure;

.2 there were also concerns about paragraph 10 of document SDC 3/16/9, which states that "the SPS and the MODU Codes were the driving force for consideration of practical issues concerning the carriage of persons not meeting the definition of 'passenger' in SOLAS". In this connection, it was pointed out that vessels under the MODU Code are a special case of unique non-SOLAS vessels required by the offshore industry, whereas the provisions of other codes and guidelines were framed to support the SOLAS definition of passengers and passenger ships, and thus the application of the SOLAS passenger ship requirements;

.3 the 2008 SPS Code states, in sections 1 to 3, that the Code is not intended for ships used to transport and accommodate industrial personnel that are not working on board. This was intended to reinforce the application of SOLAS passenger ship requirements to crew boards by ensuring that the Code would not be applied to crew boards on international voyages simply because of the type of passengers being carried;

.4 the definition of "passengers" in SOLAS chapter I should not be amended, as it is a longstanding definition and it is not possible to ensure that the amendments would enter into force;

.5 with reference to documents SDC 3/16/1 and SDC 3/16/3 (see paragraphs 16.6.2 and 16.6.4, respectively), there was support for the SPS Code to be the instrument for consideration as it allows for the appropriate level of safety;

.6 there were also concerns about the proposed draft amendments to the SPS Code (SDC 3/16/1, annex 1) due to the scope of application of the Code, as there are a number of ships of more than 6,000 gross tonnage featured as special-purpose ships. In order to avoid affecting other kinds of special-purpose ships, limitations should be considered or the application of the Code, for example the limitation of ship size and number of persons on board, if amendments to the SPS Code were to be considered;

.7 in considering vessels built recently, limitation of ship size is not appropriate and would need to be based on a clear rationale;

.8 there is an urgent need for an interim solution, as the development of a long-term solution is expected to take some time. In this connection, document SDC 1/INF.14 (Germany) provides sample provisions for an interim solution;

.9 the development of a solution that is fit for purpose in the longer term should be considered; however, it seems that a relatively narrow problem which affected the offshore energy sector is now being considered as having a wider scope relating to larger issues, without there being a clear understanding of the implications of this approach;

.10 with regard to document document SDC 3/16/7 (see paragraph 16.6.8), about the potential to disrupt wellaccepted regimes for persons working on MODUs, the work on this output should not seek to change the accepted regime for personnel working on MODUs orthe personnel working on other types of offshore support vessels;

.11 the instructions of MSC 95 were clear that the scope of application of the work to be undertaken should not be limited to ships of the offshore energy sector, but should apply to all ships engaged on international voyages, and that due consideration should be given to ensure that any proposed standards do not conflict with the requirements of other organizations and/or conventions (see paragraph 16.3); and

.12 the instructions of MSC 95 were also clear: SDC 3 was to examine submissions from Member States and international organizations on their regulatory regimes and procedures for transporting industrial personnel, so that the Sub-Committee could identify suitable examples, including pros and cons on the best way forward, for consideration by MSC 96 (see paragraph 16.5).

Establishment of the expert group

16.8 Having considered the above views, the Sub-Committee established the Expert Group on Carriage of more than 12 Industrial Personnel on Board Vessels Engaged on International Voyages and instructed it, taking into account the comments made and decisions taken in plenary and documents SDC 3/16, SDC 3/16/1, SDC 3/16/2, SDC 3/16/3, SDC 3/16/4, SDC 3/16/5, SDC 3/16/6, SDC 3/16/7, SDC 3/16/8, SDC 3/16/9 and SDC 3/16/10, to:

.1 examine the regulatory regimes and procedures for transporting industrial personnel as outlined in the aforementioned documents; and

.2 identify suitable examples, their advantages and disadvantages, and potential ways forward, for consideration by the Sub-Committee with a view to referral to the Committee.

Report of the expert group

16.9 Having considered the relevant part of the report of the expert group (SDC 3/WP.7), the Sub-Committee approved it in general and took action as described below.

Safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages

16.10 Following discussion, the Sub-Committee:

.1 noted the deliberations of the group regarding the examination of the mandatory instrument and/or provisions addressing safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages, as set out in paragraphs 5 to 41 of document SDC 3/WP.7;

.2 noted the group's decision on the structure of the debate and that all proposed options prepared by the group should be taken forward for consideration by the Committee;

.3 noted the group's views on the "scope", "time frame/interim/mandatory", "existing code/new code", "definition of industrial personnel", "ship type", "road map", "advantages", "disadvantages" and "potential way forward", as set out in paragraphs 11 to 37 of document SDC 3/WP.7; and

.4 endorsed the group's comments on the advantages and disadvantages of each option prepared by the group.

16.11 Having considered the above matters, the Sub-Committee agreed to refer the eight options on the regulatory regimes and procedures for transporting industrial personnel and table of comparison of criteria within proposed options, as set out in annex 22, together with the group's views under criteria "scope", "time frame/interim/mandatory", "existing code/new code", "definition of industrial personnel", "ship type", "road map", "advantages", "disadvantages" and "potential way forward" to MSC 96 for consideration. In this regard, the Sub-Committee encouraged Member Governments and international organizations to submit comments to MSC 96 with a view to further refining the above options and proposals prepared by the group.

16.12 The Sub-Committee also requested the Secretariat to provide legal advice to MSC 96 on the consequences of using the existing terms "unless expressly provided otherwise" in SOLAS regulation I/2 or other approaches (such as SOLAS regulation II-1/1.5), without amending SOLAS chapter I, to achieve a mandatory instrument and/or provisions addressing safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages.

Mobile Offshore Drilling Units

16.13 With regard to the concerns expressed by IADC (SDC 3/16/7) (see also paragraph 16.6.8), the Sub-Committee endorsed the group's views that this new output was seeking neither a fundamental review of resolutions A.1023(26) and A.1079(28) nor further work to address ships covered by these resolutions and that, therefore, no further amendments were required with regard to personnel transported on MODUs. In this context, the development of safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages would not affect MODUs.

Statement by the delegation of Vanuatu

16.14 The Sub-Committee noted that the delegation of Vanuatu, without preempting the discussion at MSC 96 on matters related to this output as to which of the eight options prepared by the group should be favoured, pointed out that paragraph 35 of document SDC 3/WP.7 indicated that the majority of the group had reached a consensus on amending the 2008 SPS Code. In this context, the delegation stated that amending the 2008 SPS Code and making it mandatory would imply a major revision of the Code, and in the opinion of the delegation the current Code, as it stands, is not viable to be considered for mandatory enforcement.

17 GUIDELINES FOR USE OF FIBRE REINFORCED PLASTIC (FRP) WITHIN SHIP STRUCTURES

General

17.1 The Sub-Committee recalled that SDC 2 had prepared the draft *Interim guidelines for use of Fibre Reinforced Plastic (FRP) elements within ship structures: Fire safety issues*, as set out in annex 6 to document SDC 2/25, for submission to MSC 95 for approval. In this connection, SDC 2 had invited the Committee to note that the work on the output had been completed.

17.2 The Sub-Committee also recalled that MSC 95, having considered the aforementioned draft MSC circular together with document MSC 95/10/7 (United States), expressed the view that it would be premature to approve the draft interim guidelines at that stage because due consideration had not been given to the background of the fire safety objectives and functional requirements in part A of SOLAS chapter II-2. Following discussion, MSC 95 had decided to reinstate the existing output 5.2.1.21, "*Guidelines for use of Fibre Reinforced Plastic (FRP) within ship structures*", in the agenda of SDC 3 and had referred document MSC 95/10/7 to SDC 3 for further consideration.

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

.1 SDC 3/17 (Germany), providing discussions and proposals for consideration of the background to the fire safety objectives and functional requirements as set out in part A of SOLAS chapter II-2, and providing discussions on the need to further develop the draft *Interim Guidelines for use of Fibre Reinforced Plastic (FRP) elements within ship structures: Fire safety issues* to include more solutions, limitations and acceptance criteria relating to the use of FRP;

.2 SDC 3/17/1 (United States), proposing an approach to the draft *Interim guidelines*, in accordance with the direction given by MSC 95, and advising that it is necessary to balance progress with caution in further development of the guidelines;

.3 SDC 3/17/2 (Sweden), commenting on document MSC 95/10/7 regarding the draft *Interim guidelines*, and that the current draft *Interim guidelines* do not present solutions, limitations, test procedures or criteria under which FRP composite structures should be approved; and

.4 SDC 3/17/3 (CESA), supporting and complementing the position of Germany to continue the development of the FRP Guidelines with a view to addressing the concerns raised at MSC 95 and increasing the maturity of the guidance in order to perform the alternative design approval in a consistent manner.

17.4 Following discussion, the Sub-Committee noted the following views expressed:

.1 there were still concerns regarding the draft guidelines and the functional requirements and safety objectives of SOLAS chapter II-2, which should be further considered by the working group;

.2 there were also concerns regarding the FRP on tankers, and that, if it is left for Administrations to decide on its use, there could be a problem, for example, when reflagging a ship;

.3 there is a need for more flexibility and consistency in the guidelines; and

.4 the draft Guidelines should be finalized as a matter of urgency, as they were developed considering alternative design and arrangements as per SOLAS regulation II-2/17.

Instructions for the Working Group on Fire Protection

17.5 In light of the above, the Sub-Committee instructed the Working Group on Fire Protection, established under agenda item 8, taking into account comments made and decisions taken in plenary, to:

.1 further develop the draft *Interim guidelines for use of Fibre Reinforced Plastic (FRP) elements within ship structures: Fire safety issues*, and the associated MSC draft circular, based on annex 6 to document SDC 2/25, taking into account documents MSC 95/10/7, SDC 3/17, SDC 3/17/1, SDC 3/17/2 and SDC 3/17/3, for consideration by the Sub-Committee; and

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

Report of the Working Group on Fire Protection

17.6 Having considered the part of the report of the Working Group on Fire Protection (SDC 3/WP.6) dealing with the agenda item, the Sub-Committee took action as outlined below.

Draft Interim Guidelines

17.7 The Sub-Committee noted that, due to time constraints, the group had been unable to further develop the text of the draft *Interim guidelines*, as contained in annex 6 to document SDC 2/25. In this connection, the Sub-Committee also noted that the group had acknowledged that the *Interim guidelines* should be finalized as soon as possible. However, there were still issues to be further considered, as outlined in paragraph 31 of document SDC 3/WP.6.

Standard fire test for FRP elements

17.8 Subsequently, the Sub-Committee did not agree to take forward the proposals on the need to identify and compile a list of test procedures, methods and criteria for a standard fire test for FRP elements, and to assess if the need to develop specific tests to be incorporated in the FTP Code, since these were considered beyond the scope of this item and would require new outputs of the Committee.

Establishment of a correspondence group

17.9 After considering the draft terms of reference for a correspondence group, prepared by the group, following discussion and in order to make further progress on this output intersessionally, the Sub-Committee established the Correspondence Group on Development of Interim Guidelines for Use of Fibre Reinforced Plastic (FRP) elements within ship structures,

under the coordination of Sweden*, and instructed it, taking into account documents SDC 3/17, SDC 3/17/1, SDC 3/17/2, SDC 3/17/3 and MSC 95/10/7, noting the functional requirements listed in SOLAS regulation II-2/2.2, and the decisions taken at SDC 3, to:

.1 update the draft *Interim guidelines for use of Fibre Reinforced Plastic (FRP) elements within ship structures*: *Fire safety issues* (SDC 2/25, annex 6) with explicit statements regarding the need to consider the fire safety objectives and functional requirements of SOLAS chapter II-2;

.2 reconsider the scope of the draft Interim guidelines and develop an explanation of the term "element";

.3 further develop the draft interim guidelines with a focus on matters related to combustibility and structural integrity; and

.4 report to SDC 4.

18 BIENNIAL STATUS REPORT AND PROVISIONAL AGENDA FOR SDC 4

Outcome of A 29

18.1 The Sub-Committee noted that A 29 had approved the Strategic plan for the Organization (for the six-year period 2016 to 2021) (resolution A.1097(29)) and the High-level Action Plan for the 2016-2017 biennium (resolution A.1098(29)).

Biennial status report for the 2016-2017 biennium

18.2 The Sub-Committee prepared the biennial status report (SDC 3/WP.2, annex 1), as set out in annex 23, for consideration by MSC 96.

18.3 In this connection, taking into account that any requirements for hoist winches can be further developed under the existing output 5.2.1.22 (Requirements for onboard lifting appliances and winches), which is currently on the 2016-2017 biennial agenda of the SSE Sub-Committee, the Sub-Committee removed item 45 on "Development of a requirement for hoist winches to be tested following any maintenance, repair or modification (MSC.1/Circ.1331)" from the post-biennial agenda and invited MSC 96 to endorse the action taken as an editorial correction.

Proposed provisional agenda for SDC 4

18.4 Taking into account the progress made at the session, the Sub-Committee prepared the proposed provisional agenda for SDC 4 (SDC 3/WP.2, annex 2), as set out in annex 24, for consideration by MSC 96.

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Correspondence groups established at the session

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

.1 subdivision and damage stability (see paragraph 3.35);

.2 intact stability (see paragraph 6.18);

.3 safe mooring operations (see paragraph 15.8); and

.4 fire protection (see paragraph 17.9).

Arrangements for the next session

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

.1 subdivision and damage stability (agenda items 3 and 4);

.2 intact stability (agenda item 5);

.3 fire protection (agenda items 6 and 13);

.4 carriage of more than 12 industrial personnel (agenda items 8and 9); and

.5 safe mooring operations (agenda item 12),

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

Date of next session

18.7 The Sub-Committee noted that the fourth session of the Sub-Committee has been tentatively scheduled to take place from 13 to 17 February 2017.

19 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2017

19.1 In accordance with the Rules of Procedure of the Maritime Safety Committee, the Sub-Committee unanimously re-elected Mr. K. Hunter (United Kingdom) as Chairman and Mrs. T. Stemre (Norway) as Vice-Chairman, both for 2017.

20 ANY OTHER BUSINESS

Inconsistencies and ambiguities in SOLAS chapter II-1

20.1 The Sub-Committee considered document SDC 3/INF.9 (Norway) under item 3 (see paragraph 3.10) and noted that no other documents were submitted under this item.

Reminder to use proxy emails for submissions to Sub-Committee meetings

20.2 In order to facilitate the processing of submissions to Sub-Committee sessions and expert group meetings, the delegates were reminded to submit documents to SDC 4 via the Sub-Committee's proxy email at sdc@imo.org, as stated in the invitation letter and the provisional agenda, in lieu of info@imo.org, which is now only used for general queries and submissions to committee meetings and other IMO organs.

Expressions of appreciation

20.3 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:

- Captain Mario Rubén Farinón (Argentina) (on transfer)
- Mr. Sylvain Lachance (Canada) (on retirement)
- Mr. Guangling Li (China) (on return home)
- Mr. Chris van Hooren (SYBAss) (on retirement)
- Mr. Andrew Winbow (IMO) (on retirement)
- Ms. Wilma Pereira (IMO) (on retirement)

21 ACTION REQUESTED OF THE COMMITTEE

21.1 The Maritime Safety Committee, at its ninety-sixth session, is invited to:

.1 approve the draft amendments to SOLAS chapter II-1 on subdivision and damage stability regulations, with a view to adoption at MSC 97, taking into account the check/monitoring sheet and records for regulatory development prepared by the Sub-Committee (paragraphs 3.23 and 3.26 and annex 1);*

.2 decide on the application dates of the draft amendments to SOLAS chapter II-1, taking into account that while a four-year delivery window may be appropriate for most ships, it may not be appropriate for large and complex passenger ships, and take action as appropriate (paragraph 3.24);

.3 approve the draft amendments to chapter 2 of the 2008 SPS Code related to the reference to the current index *R* formula (paragraph 3.27 and annex 2);

.4 bearing in mind that the instruction of MSC 93 was to only consider "double hull in way of main engine-room" in the remaining work under output 5.2.1.13 (Amendments to SOLAS regulations II-1/6 and II-1/8/1), and the Sub-Committee's opinion that the double hull may not be the only solution and that, therefore, other alternative solutions need to be further considered; endorse the Sub-Committee's view that the recommended change to the existing scope of the output is acceptable and does not require any specific justification (paragraph 3.30);

.5 approve the draft *Revised guidelines on operational information for masters of passenger ships for safe return to port*, and the associated draft MSC circular (paragraph 5.9 and annex 3);

* Refer to the *Guidance on drafting of amendments to the 1974 SOLAS Convention and related mandatory instruments* (MSC.1/Circ.1500).

.6 approve the draft amendments to the introduction of the 2008 IS Code regarding vessels engaged in lifting and towing operations, including escort towing, with a view to subsequent adoption at MSC 97 (paragraph 7.10 and annex 4);

.7 while adopting the amendments to the introduction of the 2008 IS Code regarding vessels engaged in anchor handling operations, under agenda item 3 (Consideration and adoption of amendments to mandatory instruments), include the modified chapeau of paragraph 1.2 of the introduction to the 2008 IS Code (paragraph 7.11);

.8 approve, in principle, the draft amendments to part B of the 2008 IS Code regarding vessels engaged in lifting and towing operations, including escort towing, with a view to adoption in conjunction with the adoption of associated amendments to the introduction of the 2008 IS Code (paragraphs 7.10 and 7.12 and annex 5);

.9 approve the draft *Revised guidelines on evacuation analysis for new and existing passenger ships*, and the associated MSC circular (paragraph 8.13 and annex 6);

.10 endorse the Sub-Committee's decision to refer the draft *Revised guidelines on evacuation analysis for new and existing passenger ships* to SSE 3 for information, as the definitions contained in section 2 of annex 1 to the draft *Revised guidelines* may be of interest in the development of the functional requirements of SOLAS chapter III (paragraph 8.14);

.11 approve the draft amendment to paragraph 2.1.2.2.2.1 of chapter 13 of the FSS Code, regarding clarification of the crew distribution in public spaces, with a view to subsequent adoption at MSC 97 (paragraph 8.17 and annex 7);

.12 approve the draft amendments to SOLAS regulation II-1/1.2 and the draft new regulation II-1/19-1 regarding damage control drills for passenger ships, with a view to subsequent adoption at MSC 97 (paragraph 9.6 and annex 1);

.13 endorse the Sub-Committee's decision to refer the aforementioned draft amendments to HTW 3 to further consideration, taking into account the damage control drill frequency requirements in the draft SOLAS regulation II-1/19-1.2 for crew workload and fatigue issues, and submit the finalized draft amendment to MSC 96 for approval, in conjunction with the approval of the draft amendments to SOLAS chapter II-1 subdivision and damage stability requirements (paragraphs 9.6 and 9.7 and annex 1);

.14 approve the draft amendments to SOLAS regulations III/1.4, III/30 and III/37, regarding damage control drills for passenger ships, with a view to subsequent adoption at MSC 97 (paragraph 9.8 and annex 8);

.15 endorse the decision that associated draft guidelines for conducting damage control drills on passenger ships were not necessary at this stage, as the finalized draft amendments to SOLAS regulations II-1/19-1, III/30 and III/37 were sufficiently detailed (paragraphs 9.6, 9.8 and 9.9);

.16 approve the draft amendments to the 2011 ESP Code, with a view to subsequent adoption at MSC 97 (paragraph 13.4 and annex 9);

.17 approve the draft unified interpretations relating to:

.1 the International Convention on Load Lines, 1966, and the associated draft MSC circular (paragraphs 14.14.1 and 14.6 and annex 10);

.2 the Protocol of 1988 relating to the International Convention on Load Lines, 1966 and the associated draft MSC circular (paragraph 14.6 and annex 11);

.3 SOLAS regulations II-1/29.3 and II-1/29.4 and the associated draft MSC circular (paragraph 14.10 and annex 12);

.4 the 2008 IS Code and the associated draft MSC circular (paragraphs 14.13 and 14.14.2 and annex 13);

.5 the International Grain Code and the associated draft MSC circular (paragraph 14.14.3 and annex 14);

.6 SOLAS chapter II-1 and the associated draft MSC circular (paragraphs 14.14.4, 14.28 and 14.31 and annex 15);

.7 the IBC Code and the associated draft MSC circular (paragraph 14.14.5 and annex 16);

.8 the IGC Code and the associated draft MSC circular (paragraph 14.14.6 and annex 17);

.9 application of the 2009 MODU Code, chapter 2, paragraphs 2.1 to 2.4, the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78)) and the associated draft MSC circular (paragraph 14.16 and annex 19);

.10 the application of SOLAS regulation II-1/3-6, as amended, and the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78)), and the associated draft MSC circular (paragraph 14.19 and annex 20); and

.11 the 1969 TM Convention and the associated draft MSC circular (paragraph 14.21 and annex 21);

.18 consider whether MSC.1/Circ.1464/Rev.1 and Corr.1 will need to be amended to exclude MODU's and take action as appropriate (paragraphs 14.16 and 14.17);

.19 consider the need to amend MSC.1/Circ.1464/Rev.1 and Corr.1, as amended by MSC.1/Circ.1507, in light of the approval of the aforementioned draft unified interpretations and take action as appropriate (paragraphs 14.19 and 14.20);

.20 note the progress made on matters related to the revised SOLAS regulation II-1/3-8 and associated guidelines (MSC.1/Circ.1175) and on new guidelines for safe mooring operations for all ships (paragraphs 15.6 to 15.8);

.21 note that the eight options on the regulatory regimes and procedures for transporting industrial personnel and table of comparison of criteria within proposed options, including the advantages and disadvantages and the potential way forward, will be considered under agenda item 7 (Mandatory instrument and/or provisions addressing safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages) at MSC 96 (paragraphs 16.10 to 16.12 and annex 22);

.22 note the progress made on matters related to the draft *Interim guidelines for use of Fibre Reinforced Plastic (FRP) elements within ship structures: Fire safety issues* (paragraphs 17.5 to 17.9);

.23 approve the biennial status report of the Sub-Committee (paragraph 18.2 and annex 23);

.24 endorse the Sub-Committee's decision to remove item 45 on "Development of a requirement for hoist winches to be tested following any maintenance, repair or modification (MSC.1/Circ.1331)" from the post-biennial agenda (it is currently on the 2016-2017 biennial agenda of the SSE Sub-Committee) as an editorial correction (paragraph 18.3 and annex 23);

.25 approve the proposed provisional agenda for SDC 4 (paragraph 18.4 and annex 24); and

.26 approve the report in general.

21.2 The Marine Environment Protection Committee, at its sixty-ninth session, is invited to approve the draft unified interpretations relating to MARPOL Annex I and the associated draft MEPC circular (paragraph 14.15 and annex 18).

***

ANNEX 1

DRAFT AMENDMENTS TO SOLAS CHAPTER II-1[1]

PART A
GENERAL

Regulation 1 – Application

1 The following new paragraphs 1.1.1 and 1.1.2 are added after the existing paragraph 1.1:

"1.1.1 Unless expressly provided otherwise, parts B, B-1, B-2 and B-4 of this chapter shall only apply to ships:

.1 for which the building contract is placed on or after [date 1]; or

.2 in the absence of a building contract, the keel of which is laid or which are at a similar stage of construction on or after [date 2]; or

.3 the delivery of which is on or after [date 3].

1.1.2 Unless expressly provided otherwise, for ships not subject to the provisions of subparagraph 1.1.1 but constructed on or after 1 January 2009, the Administration shall ensure that the requirements for parts B, B-1, B-2 and B-4 which are applicable under chapter II-1 of the International Convention for the Safety of Life at Sea, 1974, as amended by resolutions MSC.216(82), MSC.269(85) and MSC.325(90) are complied with."

2 The existing paragraph 1.3.4 is deleted.

3 The text of existing paragraph 2 is amended to read as follows:

"Unless expressly provided otherwise, for ships constructed before 1 January 2009, the Administration shall ensure that the requirements which are applicable under chapter II-1 of the International Convention for the Safety of Life at Sea, 1974, as amended by resolutions MSC.1(XLV), MSC.6(48), MSC.11(55), MSC.12(56), MSC.13(57), MSC.19(58), MSC.26(60), MSC.27(61), Resolution 1 of the 1995 SOLAS Conference, MSC.47(66), MSC.57(67), MSC.65(68), MSC.69(69), MSC.99(73), MSC.134(76), MSC.151(78), ~~and~~ MSC.170(79) and MSC.[…](99) are complied with."

Regulation 2 – Definitions

4 The existing text of paragraph 2 is replaced with the following:

"2 *Amidships* is at the middle of the length (*L*)."

[1] Tracked changes are created using "strikeout" for deleted text and "grey shading" to highlight all modifications and new insertions, including deleted text.

5 The existing paragraphs 9, 10, 13 and 19 are amended to read as follows:

"9 *Draught (d)* is the vertical distance from the keel line at:

.1 ~~mid-length~~amidships, for ships subject to the provisions of regulation II-1/1.1.1.1; and

.2 the mid-point of the subdivision length (L_s), for ships not subject to the provisions of regulation II-1/1.1.1.1 but constructed on or after 1 January 2009;

to the waterline in question.

10 *Deepest subdivision draught (ds)* is the ~~waterline which corresponds to the~~ summer load line draught of the ship.

…

13 *Trim* is the difference between the draught forward and the draught aft, where the draughts are measured at the forward and aft:

.1 ~~terminals~~perpendiculars respectively, as defined in the International Convention on Load Lines in force, for ships subject to the provisions of regulation II-1/1.1.1.1; and

.2 terminals respectively, for ships not subject to the provisions of regulation II-1/1.1.1.1 but constructed on or after 1 January 2009;

disregarding any rake of keel.

…

19 *Bulkhead deck* in a passenger ship means the uppermost deck:

.1 ~~at any point in the subdivision length (L_s)~~ to which the main bulkheads and the ship's shell are carried watertight~~and the lowermost deck from which passenger and crew evacuation will not be impeded by water in any stage of flooding for damage cases defined in regulation 8 and in part B-2 of this chapter~~, for ships subject to the provisions of regulation II-1/1.1.1.1;

.2 at any point in the subdivision length (L_s) to which the main bulkheads and the ship's shell are carried watertight and the lowermost deck from which passenger and crew evacuation will not be impeded by water in any stage of flooding for damage cases defined in regulation 8 and in part B-2 of this chapter, for ships not subject to the provisions of regulation II-1/1.1.1.1 but constructed on or after 1 January 2009.

The bulkhead deck may be a stepped deck. ~~In a cargo ship the freeboard deck may be taken as the bulkhead deck.~~In a cargo ship not subject to the provisions of regulation II-1/1.1.1.1 but constructed on or after 1 January 2009, the freeboard deck may be taken as the bulkhead deck."

6 The existing paragraph 26 is deleted and remaining paragraphs are renumbered respectively.

PART B
SUBDIVISION AND STABILITY

Regulation 4 – General

7 The existing paragraph 1 and the footnote to existing paragraph 1 are deleted.

8 The following new paragraphs 1 and 2 are introduced before the existing paragraph 2:

"1 Unless expressly provided otherwise, the requirements in parts B-1 to B-4 shall apply to passenger ships.

2 For cargo ships, the requirements in parts B-1 to B-4 shall apply as follows:

2.1 In part B-1:

2.1.1 Unless expressly provided otherwise, regulation 5 shall apply to cargo ships and regulation 5-1 shall apply to cargo ships other than tankers, as defined in regulation I/2(h);

2.1.2 Regulation 6 to regulation 7-3 shall apply to cargo ships having a length (*L*) of 80 m and upwards, but may exclude those ships subject to the following instruments and shown to comply with the subdivision and damage stability requirements of that instrument:

.1 Annex I to MARPOL, except that combination carriers (as defined in SOLAS regulation II-2/3.14) with type B freeboards shall be in compliance with regulation 6 to regulation 7-3*; or

.2 the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code)*; or

.3 the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code)*; or

.4 the damage stability requirements of regulation 27 of the 1966 Load Lines Convention as applied in compliance with resolutions A.320(IX) and A.514(13), provided that in the case of cargo ships to which regulation 27(9) applies, main transverse watertight bulkheads, to be considered effective, are spaced according to paragraph (12)(f) of resolution A.320(IX), except that ships intended for the carriage of deck cargo shall be in compliance with regulation 6 to regulation 7-3; or

.5 the damage stability requirements of regulation 27 of the 1988 Load Lines Protocol, except that ships intended for the carriage of deck cargo shall be in compliance with regulation 6 to regulation 7-3; or

.6 the subdivision and damage stability standards in other instruments** developed by the Organization.

2.2 Unless expressly provided otherwise, the requirements in parts B-2 and B-4 shall apply to cargo ships.

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* *Guidelines for verification of damage stability requirements for tankers* (MSC.1/Circ.1461).

** .1 For offshore supply vessels of not more than 100 m in length (*L*), the *Guidelines for the design and construction of offshore supply vessels, 2006* (resolution MSC.235(82), as amended by resolution MSC.335(90)); or

.2 For special purpose ships, the *Code of safety for special purpose ships, 2008* (resolution MSC.266(84)).**"**

9 The existing paragraphs 2 to 4 are renumbered respectively.

PART B-1
STABILITY

10 The existing regulation 5 is amended to read as follows:

"**Regulation 5 – Intact stability***

1 Every passenger ship, regardless of size and every cargo ship having a length (*L*) of 24 m and upwards, shall be inclined upon its completion ~~and the elements of its stability determined~~. The light ship displacement and the longitudinal, transverse and vertical position of its centre of gravity shall be determined. In addition to any other applicable requirements of the present regulations, ships having a length of 24 m and upwards ~~constructed on or after 1 July 2010~~ shall as a minimum comply with the requirements of part A of the 2008 IS Code.

2 The Administration may allow the inclining test of an individual cargo ship to be dispensed with provided basic stability data are available from the inclining test of a sister ship and it is shown to the satisfaction of the Administration that reliable stability information for the exempted ship can be obtained from such basic data, as required by regulation 5-1. A lightweight survey shall be carried out upon completion and the ship shall be inclined whenever in comparison with the data derived from the sister ship, a deviation from the lightship displacement exceeding 1% for ships of 160 m or more in length and 2% for ships of 50 m or less in length and as determined by linear interpolation for intermediate lengths or a deviation from the lightship longitudinal centre of gravity exceeding 0.5% of ~~L_s~~*L* is found**.**

…

5 At periodical intervals not exceeding five years, a lightweight survey shall be carried out on all passenger ships to verify any changes in lightship displacement and longitudinal centre of gravity. The ship shall be re-inclined whenever, in comparison with the approved stability information, a deviation from the lightship displacement exceeding 2% or a deviation of the longitudinal centre of gravity exceeding 1% of ~~L_s~~*L* is found or anticipated.

~~* Refer to the Code on Intact Stability for All Types of Ships covered by IMO Instruments, adopted by the Organization by resolution A.749(18), as amended. From 1 July 2010, the International Code on Intact Stability, 2008, adopted by resolution MSC.267(85), is expected to enter into force.~~"

Regulation 5-1 – Stability information to be supplied to the master

11 The existing footnote to the title of the regulation is amended to read as follows:

"* Refer also to the *Guidelines for the preparation of intact stability information* (MSC/Circ.456)~~;~~ ~~Guidance on the intact stability of existing tankers during transfer operations (MSC/Circ.706);~~ and the *Revised guidance to the master for avoiding dangerous situations in following and quartering seas* (MSC.1/Circ.1228)."

12 The existing paragraph 2.1 is amended to read as follows:

".1 curves or tables of minimum operational metacentric height (*GM*) and maximum permissible trim versus draught which assures compliance with the ~~relevant~~ intact and damage stability requirements where applicable, alternatively corresponding curves or tables of the maximum allowable vertical centre of gravity (*KG*) and maximum permissible trim versus draught, or with the equivalents of either of these curves or tables;"

13 The existing paragraphs 3 and 4 are replaced with the following:

"3 The intact and damage stability information required by regulation 5-1.2 shall be presented as consolidated data and encompass the full operating range of draught and trim. Applied trim values shall coincide in all stability information intended for use on board. Information not required for determination of stability and trim limits should be excluded from this information.

4 If the damage stability is calculated in accordance with regulation 6 to regulation 7-3 and, if applicable, with regulations 8 and 9.8, a stability limit curve is to be determined using linear interpolation between the minimum required *GM* assumed for each of the three draughts *ds*, *dp* and *dl*. When additional subdivision indices are calculated for different trims, a single envelope curve based on the minimum values from these calculations shall be presented. When it is intended to develop curves of maximum permissible *KG* it shall be ensured that the resulting maximum *KG* curves correspond with a linear variation of *GM*.

5 As an alternative to a single envelope curve, the calculations for additional trims may be carried out with one common *GM* for all of the trims assumed at each subdivision draught. The lowest values of each partial index A_s, A_p and A_l across these trims shall then be used in the summation of the attained subdivision index *A* according to regulation 7.1. This will result in one *GM* limit curve based on the *GM* used at each draught. A trim limit diagram showing the assumed trim range shall be developed."

14 The existing paragraph 5 is renumbered and amended to read as follows:

"~~5~~6 When curves or tables of minimum operational metacentric height (*GM*) or maximum allowable *KG* versus draught are not ~~appropriate~~provided, the master ~~should~~shall ensure that the operating condition does not deviate from ~~a~~ ~~studied~~approved loading conditions, or verify by calculation that the stability ~~criteria~~requirements are satisfied for this loading condition."

Regulation 6 – Required subdivision index R*[*]

15 In paragraph 2, the existing chapeau and paragraph 2.2 are amended to read as follows:

"2 For ~~all~~ ships to which the damage stability requirements of this ~~chapter~~part apply, the degree of subdivision to be provided shall be determined by the required subdivision index *R*, as follows:

…

.2 In the case of cargo ships not less than 80 m in length (L_s) and not greater than 100 m in length (L_s):

…"

16 The text in the existing paragraph 2.3 is amended to read as follows:

"2.3 In the case of passenger ships:

Persons on Board	*R*
$N \leq 1{,}000$	$R = 0.000088 * N + 0.7488$
$1{,}000 < N \leq 6{,}000$	$R = 0.0369 * \ln(N + 89.048) + 0.579$
$N > 6{,}000$	$R = 1 - (C1 * 6{,}200)/(4 * N + 20{,}000)$ with: $C1 = 0.8 - (0.25 / 10{,}000) * (10{,}000 - N)$

Where:

N = total number of persons on board"

17 The existing paragraph 2.4 is deleted.

Regulation 7 – Attained subdivision index *A*

18 The first sentence of the existing paragraph 1 is amended to read as follows:

"1 An~~The~~ attained subdivision index *A* is obtained by the summation of the partial indices A_s, A_p and A_l, ~~(~~weighted as shown and~~)~~ calculated for the draughts d_s, d_p and d_l defined in regulation 2 in accordance with the following formula:"

19 The existing paragraphs 2 and 3 are amended to read as follows:

"2 As a minimum, ~~In~~ the calculation of *A*~~, the level trim~~ shall be ~~used~~carried out at level trim for the deepest subdivision draught d_s and the partial subdivision draught d_p. The ~~actual~~estimated service trim ~~shall~~may be used for the light service draught d_l. If, in any anticipated service condition within the draught range from d_s to d_l, the trim variation in comparison with the calculated trims is greater than 0.5% of L_s, one or more additional calculations of *A* are to be ~~submitted~~performed for the same draughts but ~~different~~including sufficient trims ~~so~~ to ensure that, for all intended service conditions, the difference in trim in comparison with the reference trim used for one calculation will be ~~less~~not more than 0.5% of L_s. Each additional calculation of *A* shall comply with regulation 6.1.

3 When determining the positive righting lever (*GZ*) of the residual stability curve in the intermediate and final equilibrium stages of flooding, the displacement used should be that of the intact loading condition. All calculations should be done with the ship freely trimming. ~~That is, the constant-displacement method of calculation should be used.~~"

Regulation 7-1 – Calculation of the factor p_i

20 In the existing paragraph 1, the text of the notation for the mean transverse distance *b* is amended to read as follows:

"*b* = the mean transverse distance in metres measured at right angles to the centreline at the deepest subdivision ~~loadline~~draught between the shell and an assumed vertical plane extended between the longitudinal limits used in calculating the factor p_i and which is a tangent to, or common with, all or part of the outermost portion of the longitudinal bulkhead under consideration. This vertical plane shall be so orientated that the mean transverse distance to the shell is a maximum, but not more than twice the least distance between the plane and the shell. If the upper part of a longitudinal bulkhead is below the deepest subdivision ~~loadline~~draught the vertical plane used for determination of *b* is assumed to extend upwards to the deepest subdivision waterline. In any case, b is not to be taken greater than *B/2*."

Regulation 7-2 – Calculation of the factor s_i

21 The existing paragraphs 2 to 5 are amended to read as follows:

"2 For passenger ships and cargo ships fitted with cross-flooding devices the factor $s_{\text{intermediate},i}$ is ~~applicable only to passenger ships (for cargo ships $s_{\text{intermediate},i}$ should be taken as unity) and shall be~~ taken as the least of the *s*-factors obtained from all flooding stages including the stage before equalization, if any, and is to be calculated as follows:

$$S_{\text{intermediate},i} = \left[\frac{GZ_{\max}}{0.05} \cdot \frac{Range}{7}\right]^{\frac{1}{4}}$$

where GZ_{max} is not to be taken as more than 0.05 m and *Range* as not more than 7. $s_{\text{intermediate},i} = 0$, if the intermediate heel angle exceeds 15º for passenger ships and 30° for cargo ships.

For cargo ships not fitted with cross-flooding devices the factor $s_{intermediate,i}$ is taken as unity, except if the Administration considers that the stability in intermediate stages of flooding may be insufficient, it should require further investigation thereof.

For passenger and cargo ships, w~~W~~here cross-flooding devices are fitted~~fittings are required~~, the time for equalization shall not exceed 10 min.

3 The factor $s_{final,i}$ shall be obtained from the formula:

$$s_{final,i} = K \cdot \left[\frac{GZ_{max}}{0.12} \cdot \frac{Range}{16}\right]^{\frac{1}{4}}$$

~~where:~~

~~GZ_{max} is not to be taken as more than 0.12 m;~~

~~*Range* is not to be taken as more than 16°;~~

$$s_{final,i} = K \cdot \left[\frac{GZ_{max}}{TGZ_{max}} \cdot \frac{Range}{TRange}\right]^{\frac{1}{4}}$$

where:

GZ_{max} is not to be taken as more than TGZ_{max};

Range is not to be taken as more than *TRange*;

TGZ_{max} = 0.20 m, for ro-ro passenger ships each damage case that involves a ro-ro space,

TGZ_{max} = 0.12 m, otherwise;

TRange = 20º, for ro-ro passenger ships each damage case that involves a ro-ro space,

TRange = 16º, otherwise;

$K = 1$ if $\theta_e \leq \theta_{min}$

$K = 0$ if $\theta_e \geq \theta_{max}$

$$K = \sqrt{\frac{\theta_{max} - \theta_e}{\theta_{max} - \theta_{min}}} \text{ otherwise,}$$

where:

θ_{min} is 7° for passenger ships and 25° for cargo ships; and

θ_{max} is 15° for passenger ships and 30° for cargo ships.

4 The factor $s_{mom,i}$ is applicable only to passenger ships (for cargo ships $s_{mom,i}$ shall be taken as unity) and shall be calculated at the final equilibrium from the formula:

$$S_{\mathrm{mom},i} = \frac{(GZ_{\max} - 0.04) \cdot Displacement}{M_{\mathrm{heel}}}$$

where:

Displacement is the intact displacement at the ~~subdivision~~respective draught (d_s, d_p or d_l).

M_{heel} is the maximum assumed heeling moment as calculated in accordance with subparagraph 4.1; and

$s_{mom,i} \leq 1$

4.1 The heeling moment M_{heel} is to be calculated as follows:

M_{heel} = maximum ($M_{passenger}$ or M_{wind} or $M_{survivalcraft}$)

4.1.1 $M_{passenger}$ is the maximum assumed heeling moment resulting from movement of passengers, and is to be obtained as follows:

$M_{passenger} = (0.075 \cdot N_p) \cdot (0.45 \cdot B)$ (tm)

where:

N_p is the maximum number of passengers permitted to be on board in the service condition corresponding to the deepest subdivision draught under consideration; and

B is the ~~beam~~breadth of the ship as defined in regulation 2.8.

Alternatively, the heeling moment may be calculated assuming the passengers are distributed with 4 persons per square metre on available deck areas towards one side of the ship on the decks where muster stations are located and in such a way that they produce the most adverse heeling moment. In doing so, a weight of 75 kg per passenger is to be assumed.

4.1.2 M_{wind} is the maximum assumed wind ~~force~~moment acting in a damage situation:

$M_{wind} = (P \cdot A \cdot Z) / 9{,}806$ (tm)

where:

P = 120 N/m^2;

A = projected lateral area above waterline;

Z = distance from centre of lateral projected area above waterline to $T/2$; and

T = ~~ship's~~ respective draught, (d_s, d_p or d_{il}).

…

5 Unsymmetrical flooding is to be kept to a minimum consistent with the efficient arrangements. Where it is necessary to correct large angles of heel, the means adopted shall, where practicable, be self-acting, but in any case where controls to equalization devices are provided they shall be operable from above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. These fittings together with their controls shall be acceptable to the Administration.* Suitable information concerning the use of equalization devices shall be supplied to the master of the ship.

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* Reference is made to the "*Revised ~~R~~recommendation on a standard method for* ~~establishing compliance with the requirements for~~ *evaluating cross-flooding arrangements* ~~in passengers ships~~", adopted by the Organization by resolution ~~A.266(VIII)~~MSC.362(92), as may be amended.

…

5.2 ~~In all cases,~~The factor s_i is to be taken as zero in those cases where the final waterline, taking into account sinkage, heel and trim, immerses:

…

5.3 The factor s_i is to be taken as zero if, taking into account sinkage, heel and trim, any of the following occur in any intermediate stage or in the final stage of flooding:

.1 immersion of any vertical escape hatch in the bulkhead deck of passenger ships and the freeboard deck of cargo ships intended for compliance with chapter II-2;

.2 any controls intended for the operation of watertight doors, equalization devices, valves on piping or on ventilation ducts intended to maintain the integrity of watertight bulkheads from above the bulkhead deck of passenger ships and the freeboard deck of cargo ships become inaccessible or inoperable; and

.3 immersion of any part of piping or ventilation ducts located within the assumed extent of damage and carried through a watertight boundary ~~that is located within any compartment included in damage cases contributing to the attained index *A*, if not fitted with watertight means of closure at each boundary.~~if this can lead to the progressive flooding of compartments not assumed as flooded.

…

5.5 Except as provided in paragraph 5.3.1, openings closed by means of watertight manhole covers and flush scuttles, ~~small watertight hatch covers,~~ remotely operated sliding watertight doors, sidescuttles of the non-opening type as well as watertight access doors and watertight hatch covers required to be kept closed at sea need not be considered."

Regulation 8 – Special requirements concerning passenger ship stability

22 The existing paragraphs 1 to 3 are amended to read as follows:

"1 A passenger ship intended to carry 400 or more persons shall have watertight subdivision abaft the collision bulkhead so that s_i = 1 for a damage involving all the compartments within 0.08*L* measured from the forward perpendicular for the three loading conditions used to calculate the attained ~~on which is based the calculation of the~~ subdivision index *A*. ~~and for a damage involving all the compartments within 0.08*L* measured from the forward perpendicular.~~If the attained subdivision index *A* is calculated for different trims, this requirement must also be satisfied for those loading conditions.

2 A passenger ship intended to carry 36 or more persons is to be capable of withstanding damage along the side shell to an extent specified in paragraph 3. Compliance with this regulation is to be achieved by demonstrating that s_i, as defined in regulation 7-2, is not less than 0.9 for the three loading conditions used to calculate the attained~~on which is based the calculation of the~~ subdivision index *A*. If the attained subdivision index *A* is calculated for different trims, this requirement must also be satisfied for those loading conditions.

3 The damage extent to be assumed when demonstrating compliance with paragraph 2, is to be dependent on ~~both *N* as defined in regulation 6~~the total number of persons carried, and ~~L_s~~*L* ~~as defined in regulation 2~~, such that:

…

.2 where 400 or more persons are to be carried, a damage length of 0.03~~L_s~~*L*, but not less than 3 m is to be assumed at any position along the side shell, in conjunction with a penetration inboard of 0.1*B* but not less than 0.75 m measured inboard from the ship side, at right angles to the centerline at the level of the deepest subdivision draught;

…

.4 where 36 persons are carried, a damage length of 0.015~~L_s~~*L* but not less than 3 m is to be assumed, in conjunction with a penetration inboard of 0.05*B* but not less the 0.75 m; and"

Regulation 8-1 – System capabilities and operational information after a flooding casualty on passenger ships

23 In section 2, the existing text is amended to read as follows:

"A passenger ship ~~constructed on or after 1 July 2010~~ shall be designed so that the systems specified in regulation II-2/21.4 remain operational when the ship is subject to flooding of any single watertight compartment."

24 In section 3, the existing chapeau is amended to read as follows:

"For the purpose of providing operational information to the Master for safe return to port after a flooding casualty, passenger ships ~~constructed on or after 1 January 2014~~ shall have:"

PART B-2
SUBDIVISION, WATERTIGHT AND WEATHERTIGHT INTEGRITY

Regulation 9 – Double bottoms in passenger ships and cargo ships other than tankers

25 The existing paragraph 3 is amended to read as follows:

"3.1 Small wells constructed in the double bottom in connection with drainage arrangements ~~of holds, etc.~~ shall not extend downward more than necessary. The vertical distance from the bottom of such a well to a plane coinciding with the keel line shall not be less than *h*/2 or 500 mm, whichever is greater, or compliance with paragraph 8 of this regulation shall be shown for that part of the ship. ~~A well extending to the outer bottom is, however, permitted at the after end of the shaft tunnel.~~

3.2 Other wells (e.g. for lubricating oil under main engines) may be permitted by the Administration if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this regulation. ~~In no case shall the vertical distance from the bottom of such a well to a plane coinciding with the keel line be less than 500 mm.~~

3.2.1 For a cargo ship of 80 m in length and upwards or for a passenger ship, proof of equivalent protection is to be shown by demonstrating that the ship is capable of withstanding bottom damages as specified in paragraph 8. Alternatively, wells for lubricating oil below main engines may protrude into the double bottom below the boundary line defined by the distance *h* provided that the vertical distance between the well bottom and a plane coinciding with the keel line is not less than *h*/2 or 500 mm, whichever is greater.

3.2.2 For cargo ships of less than 80 m in length the arrangements shall provide a level of safety satisfactory to the Administration."

26 The existing paragraphs 6 to 8 are amendments to read as follows:

"6 Any part of a cargo ship of 80 m in length and upwards or of a passenger ship ~~or a cargo ship~~ that is not fitted with a double bottom in accordance with paragraphs 1, 4 or 5, as specified in paragraph 2, shall be capable of withstanding bottom damages, as specified in paragraph 8, in that part of the ship. For cargo ships of less than 80 m in length the alternative arrangements shall provide a level of safety satisfactory to the Administration.

7 In the case of unusual bottom arrangements in a cargo ship of 80 m in length and upwards or a passenger ship ~~or a cargo ship~~, it shall be demonstrated that the ship is capable of withstanding bottom damages as specified in paragraph 8. For cargo ships of less than 80 m in length the alternative arrangements shall provide a level of safety satisfactory to the Administration.

8 Compliance with paragraphs 3.1, 3.2.1, 6 or 7 is to be achieved by demonstrating that s_i, when calculated in accordance with regulation 7-2, is not less than 1 for all service conditions when subject to ~~a~~ bottom damage ~~assumed at any position along the ship's bottom and~~ with an extent specified in subparagraph .2 below for any position in the affected part of the ship:

.1 Flooding of such spaces shall not render emergency power and lighting, internal communication, signals or other emergency devices inoperable in other parts of the ship.

.2 Assumed extent of damage shall be as follows:

	For 0.3 *L* from the forward perpendicular of the ship	Any other part of the ship
Longitudinal extent	1/3 $L^{2/3}$ or 14.5 m, whichever is less	1/3 $L^{2/3}$ or 14.5 m, whichever is less
Transverse extent	*B*/6 or 10 m, whichever is less	*B*/6 or 5 m, whichever is less
Vertical extent, measured from the keel line	~~B/20 or 2 m, whichever is less~~ *B*/20, to be taken not less than 0.76 m and not more than 2 m	~~B/20 or 2 m, whichever is less~~ *B*/20, to be taken not less than 0.76 m and not more than 2 m

.3 If any damage of a lesser extent than the maximum damage specified in .2 would result in a more severe condition, such damage should be considered."

Regulation 10 – Construction of watertight bulkheads

27 The existing paragraph 1 is amended to read as follows:

"1 Each watertight subdivision bulkhead, whether transverse or longitudinal, shall be constructed having scantlings as specified in regulation 2.17. In all cases, watertight subdivision bulkheads shall be capable of supporting at least the pressure due to a head of water up to the bulkhead deck in passenger ships and freeboard deck in cargo ships."

Regulation 12 – Peak and machinery space bulkheads, shaft tunnels, etc.

28 The existing paragraph 1 is amended to read as follows:

"1 A collision bulkhead shall be fitted which shall be watertight up to the bulkhead deck in passenger ships and freeboard deck in cargo ships. This bulkhead shall be located at a distance from the forward perpendicular of not less than 0.05*L* or 10 m, whichever is the less, and, except as may be permitted by the Administration, not more than 0.08*L* or 0.05*L* + 3 m, whichever is the greater."

29 The following new paragraph 2 is introduced after the existing paragraph 1:

"2 The ship shall be so designed that s_i calculated in accordance with regulation 7-2 will not be less than 1 at the deepest subdivision draught loading condition, level trim or any forward trim loading conditions, if any part of the ship forward of the collision bulkhead is flooded without vertical limits."

30 The remaining paragraphs are renumbered and amended to read as follows:

"~~2~~3 Where any part of the ship below the waterline extends forward of the forward perpendicular, e.g. a bulbous bow, the distances stipulated in paragraph 1 shall be measured from a point either:

.1 at the mid-length of such extension;

.2 at a distance 0.015L forward of the forward perpendicular; or

.3 at a distance 3 m forward of the forward perpendicular,

whichever gives the smallest measurement.

~~3~~4 The bulkhead may have steps or recesses provided they are within the limits prescribed in paragraph 1 or ~~3~~2.

~~4~~5 No doors, manholes, access openings, ventilation ducts or any other openings shall be fitted in the collision bulkhead below the bulkhead deck in passenger ships and freeboard deck in cargo ships.

~~5~~6.1 Except as provided in paragraph ~~6~~5.2, the collision bulkhead may be pierced below the bulkhead deck in passenger ships and freeboard deck in cargo ships by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a screw-down valve capable of being operated from above the bulkhead deck in passenger ships and freeboard deck in cargo ships, the valve ~~chest~~ being ~~secured~~located inside the forepeak at~~to~~ the collision bulkhead. The Administration may, however, authorize the fitting of this valve on the after side of the collision bulkhead provided that the valve is readily accessible under all service conditions and the space in which it is located is not a cargo space. Alternatively, for cargo ships, the pipe may be fitted with a butterfly valve suitably supported by a seat or flanges and capable of being operated from above the freeboard deck. All valves shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable.

~~5~~6.2 If the forepeak is divided to hold two different kinds of liquids the Administration may allow the collision bulkhead to be pierced below the bulkhead deck in passenger ships and freeboard deck in cargo ships by two pipes, each of which is fitted as required by paragraph ~~6~~5.1, provided the Administration is satisfied that there is no practical alternative to the fitting of such a second pipe and that, having regard to the additional subdivision provided in the forepeak, the safety of the ship is maintained.

~~6~~7 Where a long forward superstructure is fitted, the collision bulkhead shall be extended weathertight to the deck next above the bulkhead deck in passenger ships and freeboard deck in cargo ships. The extension need not be fitted directly above the bulkhead below provided ~~it is~~that all parts of the extension, including any part of the ramp attached to it are located within the limits prescribed in paragraph 1 or ~~3~~2,

with the exception permitted by paragraph ~~8~~7 and that the part of the deck which forms the step is made effectively weathertight. The extension shall be so arranged as to preclude the possibility of the bow door or ramp, where fitted, causing damage to it in the case of damage to, or detachment of, a bow door or any part of the ramp.

~~7~~8 Where bow doors are fitted and a sloping loading ramp forms part of the extension of the collision bulkhead above the bulkhead deck in passenger ships and freeboard deck in cargo ships the ramp shall be weathertight over its complete length. In cargo ships the part of the ramp which is more than 2.3 m above the ~~bulkhead~~ freeboard deck may extend forward of the limit specified in paragraph 1 or ~~2~~3. Ramps not meeting the above requirements shall be disregarded as an extension of the collision bulkhead.

~~8~~9 The number of openings in the extension of the collision bulkhead above the freeboard deck shall be restricted to the minimum compatible with the design and normal operation of the ship. All such openings shall be capable of being closed weathertight.

~~9~~10 Bulkheads shall be fitted separating the machinery space from cargo and accommodation spaces forward and aft and made watertight up to the bulkhead deck in passenger ships and freeboard deck in cargo ships. ~~In passenger ships~~ ~~a~~An afterpeak bulkhead shall also be fitted and made watertight up to the bulkhead deck or the freeboard deck. The afterpeak bulkhead may, however, be stepped below the bulkhead deck or the freeboard deck, provided the degree of safety of the ship as regards subdivision is not thereby diminished.

~~10~~11 In all cases stern tubes shall be enclosed in watertight spaces of moderate volume. In passenger ships the stern gland shall be situated in a watertight shaft tunnel or other watertight space separate from the stern tube compartment and of such volume that, if flooded by leakage through the stern gland, the bulkhead deck will not be immersed. In cargo ships other measures to minimize the danger of water penetrating into the ship in case of damage to stern tube arrangements may be taken at the discretion of the Administration."

Regulation 13 – Openings in watertight bulkheads below the bulkhead deck in passenger ships

31 The existing paragraph 11.1 is amended to read as follows:

"11.1 Where trunkways or tunnels for access from crew accommodation to the ~~stokehold~~machinery spaces, for piping, or for any other purpose are carried through watertight bulkheads, they shall be watertight and in accordance with the requirements of regulation 16-1. The access to at least one end of each such tunnel or trunkway, if used as a passage at sea, shall be through a trunk extending watertight to a height sufficient to permit access above the bulkhead deck. The access to the other end of the trunkway or tunnel may be through a watertight door of the type required by its location in the ship. Such trunkways or tunnels shall not extend through the first subdivision bulkhead abaft the collision bulkhead."

Regulation 15 – Openings in the shell plating below the bulkhead deck of passenger ships and the freeboard deck of cargo ships

32 The existing paragraphs 4, 5.1, 8.2.1 and 8.4 are amended to read as follows:

"4 Efficient hinged inside deadlights so arranged that they can be easily and effectively closed and secured watertight, shall be fitted to all sidescuttles except that abaft one eighth of the ship's length from the forward perpendicular and above a line drawn parallel to the bulkhead deck at side and having its lowest point at a height of 3.7 m plus 2.5% of the breadth of the ship above the deepest subdivision draught, the deadlights may be portable in passenger accommodation ~~other than that for steerage passengers~~, unless the deadlights are required by the International Convention on Load Lines in force to be permanently attached in their proper positions. Such portable deadlights shall be stowed adjacent to the sidescuttles they serve.

5.1 No sidescuttles shall be fitted in any spaces which are appropriated exclusively to the carriage of cargo ~~or coal~~.

…

8.2.1 Subject to the requirements of the International Convention on Load Lines in force, and except as provided in paragraph 8.3, each separate discharge led through the shell plating from spaces below the bulkhead deck of passenger ships and the freeboard deck of cargo ships shall be provided with either one automatic non-return valve fitted with a positive means of closing it from above the bulkhead deck of passenger ships and the freeboard deck of cargo ships or with two automatic non-return valves without positive means of closing, provided that the inboard valve is situated above the deepest subdivision draught and is always accessible for examination under service conditions. Where a valve with positive means of closing is fitted, the operating position above the bulkhead deck of passenger ships and the freeboard deck of cargo ships shall always be readily accessible and means shall be provided for indicating whether the valve is open or closed.

…

8.4 Moving parts penetrating the shell plating below the deepest subdivision draught shall be fitted with a watertight sealing arrangement acceptable to the Administration. The inboard gland shall be located within a watertight space of such volume that, if flooded, the bulkhead deck in passenger ships and freeboard deck in cargo ships will not be submerged. The Administration may require that if such compartment is flooded, essential or emergency power and lighting, internal communication, signals or other emergency devices must remain available in other parts of the ship."

Regulation 16 – Construction and initial tests of watertight closures~~doors, sidescuttles, etc.~~

33 The existing paragraphs 1 and 2 are amended to read as follows:

"~~1 In all ships:~~

1.1 T~~t~~he design, materials and construction of all watertight closures such as doors, hatches, sidescuttles, gangway and cargo ports, valves, pipes, ash-chutes and rubbish-chutes referred to in these regulations shall be to the satisfaction of the Administration;

1.2 Ssuch valves, doors, hatches, and mechanisms shall be suitably marked to ensure that they may be properly used to provide maximum safety; and

1.3 Tthe frames of vertical watertight doors shall have no groove at the bottom in which dirt might lodge and prevent the door closing properly.

2 In passenger ships and cargo ships Wwatertight doors and hatches shall be tested by water pressure to athe maximum head of water they might sustain in a final or intermediate stage of flooding. For cargo ships not covered by damage stability requirements, watertight doors and hatches shall be tested by water pressure to a head of water measured from the lower edge of the opening to one metre above the freeboard deck. Where testing of individual doors and hatches is not carried out because of possible damage to insulation or outfitting items, testing of individual doors and hatches may be replaced by a prototype pressure test of each type and size of door or hatch with a test pressure corresponding at least to the head required for the individual location. The prototype test shall be carried out before the door or hatch is fitted. The installation method and procedure for fitting the door or hatch on board shall correspond to that of the prototype test. When fitted on board, each door or hatch shall be checked for proper seating between the bulkhead, the frame and the door or between deck, the coaming and the hatch."

Regulation 16-1 – Construction and initial tests of watertight decks, trunks, etc.

34 The existing paragraphs 2 and 3 are amended to read as follows:

"2 In passenger ships, Wwhere a ventilation trunk passing through a structure penetrates a watertight area of the bulkhead deck, the trunk shall be capable of withstanding the water pressure that may be present within the trunk, after having taken into account the maximum heel angle allowable during intermediate stages of flooding, in accordance with regulation 7-2.

3 In ro-ro passenger ships, Wwhere all or part of the penetration of the bulkhead deck is on the main ro-ro deck, the trunk shall be capable of withstanding impact pressure due to internal water motions (sloshing) of water trapped on the ro-ro deck."

Regulation 17 – Internal watertight integrity of passenger ships above the bulkhead deck

35 The existing paragraph 3 is amended to read as follows:

"3 The open end of aAir pipes terminating within a superstructure which are not fitted with watertight means of closure shall be considered as unprotected openings when applying regulation 7-2.6.1.1.shall be at least 1 m above the waterline when the ship heels to an angle of 15º, or the maximum angle of heel during intermediate stages of flooding, as determined by direct calculation, whichever is the greater. Alternatively, air pipes from tanks other than oil tanks may discharge through the side of the superstructure. The provisions of this paragraph are without prejudice to the provisions of the International Convention on Load Lines in force."

PART B-4
STABILITY MANAGEMENT

Regulation 19 – Damage control information

36 The existing paragraph 2 is deleted and remaining paragraphs are renumbered accordingly.

37 The following new regulation 19-1 is introduced after the existing regulation 19:

"**Regulation 19-1** – **Damage control drills for passenger ships**

1 This regulation applies to passenger ships constructed before, on or after 1 January 2020.

2 A damage control drill shall take place at least every [six weeks]. The entire crew need not be involved in every drill, but each crew member with damage control responsibilities must participate in a damage control drill at least every [three months].

3 The damage control drill scenarios shall vary each drill so that emergency conditions are simulated for different damage conditions and shall, as far as practicable, be conducted as if there were an actual emergency.

4 Each damage control drill shall include:

.1 for crew members with damage control responsibilities, reporting to stations and preparing for the duties described in the muster list required by regulation III/8;

.2 use of the damage control information and the on-board damage stability computer, if fitted, to conduct stability assessments for the simulated damage conditions;

.3 establishment of the communications link between the ship and shore-based support, if provided;

.4 operation of watertight doors and other watertight closures;

.5 demonstrating proficiency in the use of the flooding detection system, if fitted, in accordance with muster list duties;

.6 demonstrating proficiency in the use of cross-flooding and equalization systems, if fitted, in accordance with muster list duties;

.7 operation of bilge pumps and checking of bilge alarms and automatic bilge pump starting systems; and

.8 instruction in damage survey and use of the ship's damage control systems.

5 At least one damage control drill each year shall include activation of the shore-based support, if provided in compliance with regulation II-1/8-1.3, to conduct stability assessments for the simulated damage conditions.

6 Every crew member with assigned damage control responsibilities shall be familiarized with their duties and about the damage control information before the voyage begins.

7 A record of each damage control drill shall be maintained in the same manner as prescribed for the other drills in regulation III/19.5.

38 The existing title and paragraph 1 of regulation 20 are amended to read as follows:

"**Regulation 20 – Loading of ~~passenger~~ ships**

1 On completion of loading of the ship and prior to its departure, the master shall determine the ship's trim and stability and also ascertain and record that the ship is upright and in compliance with stability criteria in relevant regulations. The determination of the ship's stability shall always be made by calculation or by ensuring that the ship is loaded according to one of the pre-calculated loading conditions within the approved stability information. The Administration may accept the use of an electronic loading and stability computer or equivalent means for this purpose."

Regulation 21 – Periodical operation and inspection of watertight doors, etc. in passenger ships

39 The text of the existing paragraph 1 is amended to read as follows:

"~~Drills for the operating~~ Operational tests of watertight doors, sidescuttles, valves and closing mechanisms of scuppers, ash-chutes and rubbish-chutes shall take place weekly. In ships in which the voyage exceeds one week in duration a complete ~~drill~~set of operational tests shall be held before ~~leaving port~~the voyage commences, and others thereafter at least once a week during the voyage."

40 The text of the existing paragraph 4 is amended to read as follows:

"A record of all ~~drills~~operational tests and inspections required by this regulation shall be entered in the logbook with an explicit record of any defects which may be disclosed."

Regulation 22 – Prevention and control of water ingress, etc.

41 In the existing paragraph 1, the words "and 4" are removed from the end of the first sentence.

42 The existing paragraph 2 is amended to read as follows:

"2 Watertight doors located below the bulkhead deck in passenger ships and freeboard deck in cargo ships having a maximum clear opening width of more than 1.2 m shall be kept closed when the ship is at sea, except for limited periods when absolutely necessary as determined by the Administration."

43 The new footnote to existing paragraph 3 is added as follows:

"3 A watertight door may be opened during navigation to permit the passage of passengers or crew, or when work in the immediate vicinity of the door necessitates it being opened. The door must be immediately closed when transit through the door is complete or when the task which necessitated it being open is finished.*

* Refer to the *Guidance for watertight doors on passenger ships which may be opened during navigation* (MSC.1/Circ.[…]."

44 The existing paragraph 4 is deleted and the subsequent paragraphs are renumbered accordingly.

45 The existing paragraphs 5 to 7 are amended to read as follows:

"5 Portable plates on bulkheads shall always be in place before the ~~ship leaves port~~voyage commences, and shall not be removed during navigation except in case of urgent necessity at the discretion of the master. The necessary precautions shall be taken in replacing them to ensure that the joints are watertight. Power-operated sliding watertight doors permitted in machinery spaces in accordance with regulation 13.10 shall be closed before the ~~ship leaves port~~voyage commences and shall remain closed during navigation except in case of urgent necessity at the discretion of the master.

6 Watertight doors fitted in watertight bulkheads dividing cargo between deck spaces in accordance with regulation 13.9.1 shall be closed before the voyage commences and shall be kept closed during navigation.~~;~~ ~~t~~The time ~~of opening~~ such doors ~~in port~~are opened or closed ~~and of closing them before the ship leaves port~~ shall be entered in the log-book.

7 Gangway, cargo and fuelling ports fitted below the bulkhead deck in passenger ships and freeboard deck in cargo ships shall be effectively closed and secured watertight before the ship leaves port, and shall be kept closed during navigation."

46 In paragraph 8, the existing chapeau is amended to read as follows:

"8 The following doors, located above the bulkhead deck in passenger ships and freeboard deck in cargo ships, shall be closed and locked before the ship proceeds on any voyage and shall remain closed and locked until the ship is at its next berth:"

47 The existing paragraph 14 is amended to read as follows:

"14 Where in a between-deck, the sills of any of the sidescuttles referred to in regulation 15.3.2 are below a line drawn parallel to the bulkhead deck at side in passenger ships and freeboard deck at side in cargo ships, and having its lowest point 1.4 m plus 2.5% of the breadth of the ship above the water when the ship departs from any port, all the sidescuttles in that between-deck~~s~~ shall be closed watertight and locked before the ship leaves port, and they shall not be opened before the ship arrives at the next port. In the application of this paragraph the appropriate allowance for fresh water may be made when applicable.

.1 The time of opening such sidescuttles in port and of closing and locking them before the ship leaves port shall be entered in such log-book as may be prescribed by the Administration.

.2 For any ship that has one or more sidescuttles so placed that the requirements of paragraph 14 would apply when it was floating at its deepest subdivision draught, the Administration may indicate the limiting mean draught at which these sidescuttles will have their sills above the line drawn parallel to the bulkhead deck at side in passenger ships and freeboard deck at side in cargo ships, and having its lowest point 1.4 m plus 2.5% of the breadth of the ship above the waterline corresponding to the limiting mean draught, and at which it will therefore be permissible to depart from port without previously closing and locking them and to open them at sea on the responsibility of the master during the voyage to the next port. In tropical zones as defined in the International Convention on Load Lines in force, this limiting draught may be increased by 0.3 m."

48 In regulation 22-1, the words "constructed on or after 1 July 2010" are removed from the end of the existing title.

49 In regulation 24, the existing title and paragraph 3 are amended to read as follows:

"**Regulation 24 – Additional requirements for ~~P~~prevention and control of water ingress, etc. in cargo ships**

…

3 Watertight doors or ramps fitted to internally subdivide large cargo spaces shall be closed before the voyage commences and shall be kept closed during navigation.~~;~~ ~~t~~The time ~~of opening~~ such doors ~~in port~~are opened or closed ~~and of closing them before the ship leaves port~~ shall be entered in the log-book."

PART C
MACHINERY INSTALLATIONS

Regulation 35-1 – Bilge pumping arrangements

50 The following new sentence is added at the end of the existing paragraph 2.6:

"For ships subject to the provisions of regulation II-1/1.1.1.1, for the special hazards associated with loss of stability when fitted with fixed pressure water-spraying fire-extinguishing systems see II-2/20.6.1.4."

51 In paragraph 3.2, the existing text of the whole volume of the passenger and crew spaces below the bulkhead deck *P* is amended to read as follows:

"*P* = the whole volume of the passenger and crew spaces below the bulkhead deck (cubic metres), which are provided for the accommodation and use of passengers and crew, excluding baggage, store~~,~~ and provision ~~and mail~~ rooms;"

52 In paragraph 3.4, the existing chapeau is amended to read as follows:

"3.4 On a ship of 91.5 m in length *L* and upwards or having a bilge pump numeral, calculated in accordance with paragraph 3.2, of 30 or more, the arrangements shall be such that at least one power bilge pump shall be available for use in all flooding conditions which the ship is required to withstand, and, for ships subject to the provisions of regulation II-1/1.1.1.1, in all flooding conditions derived from consideration of minor damages as specified in regulation 8 ~~which the ship is required to withstand~~ as follows:"

53 The following new sentence is added at the end of the existing paragraph 3.10:

"For ships subject to the provisions of regulation II-1/1.1.1.1, the deepest subdivision load line shall be taken as the deepest subdivision draught."

APPENDIX 1

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

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)**

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.	no[2]
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 *Interim guidelines for the systematic application of the grandfather clauses* (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[3]
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.	Yes

[2] Owing to the complexity of the issue two sessions initially allocated for completion of this output were not sufficient.

[3] The approach for the applicability may not be in line with the new *Guidance on drafting of amendments to the 1974 SOLAS Convention and related mandatory instruments* (MSC.1/Circ.1500).

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)**

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).	yes[4]
11	The forms of certificates and records of equipment have been harmonized, where appropriate, between the Convention and its Protocols.	not applicable
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
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

* Parts I and II should be completed by the submitter of a proposed new amendment, to the fullest extent possible.

** Part III should be completed by the drafting/working group that prepared the draft text using "yes", "no" or "not applicable".

[4] Consequential amendments to several resolutions and circulars have been examined but not included as part of the proposed amendments at this stage.

APPENDIX 2

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.

1	**Title (number and title of regulation(s))**
SOLAS chapter II-1: Construction – Structure, subdivision and stability, machinery and electrical installations	
2	**Origin of the requirement (original proposal document)**
SLF 51/17, paragraph 3.25 and annex 3 and SLF 51/3/2, paragraph 4 and the annex	
3	**Main reason for the development (extract from the proposal document)**
The Sub-Committee agreed to a justification for the inclusion of a new item on "Revision of SOLAS chapter II-1 subdivision and damage stability regulations" (not for the general revision but for refinement of the revised SOLAS chapter II-1) in the work programme of the Sub-Committee (SLF 51/17, paragraph 3.25). In the process of developing Explanatory Notes for the new SOLAS chapter II-1 subdivision and damage stability regulations, various regulations have been identified as either needing or potential candidates for future improvement. An initial list of these SOLAS chapter II-1 regulations and associated comments was provided in annex 2 to document SLF 50/3. This list has now been updated to include the additional items agreed to at SLF 50 (see SLF 50/19, paragraph 3.17), and other additional items arising from the correspondence group's further development work on the explanatory notes. The updated list of SOLAS chapter II-1 regulations identified for possible future improvement and associated comments are attached in the annex (SLF 51/3/2, paragraph 4).	
4	**Related output**
Amendments to SOLAS chapter II-1 subdivision and damage stability regulations (5.2.1.13)	
5	**History of the discussion (approval of work programmes, sessions of sub-committees, including CG/DG/WG arrangements)**
SLF 51 agreed to the justification for the inclusion of a new item on "Revision of SOLAS chapter II-1 subdivision and damage stability regulations" (not for the general revision but for refinement of the revised SOLAS chapter II-1) in the work programme of the Sub-Committee (SLF 51/17, paragraph 3.25 and annex 3 and SLF 51/3/2, paragraph 4 and the annex). **MSC 85** endorsed the proposal by SLF 51 and agreed to include, in the SLF Sub-Committee's work programme, a high-priority item on "Revision of SOLAS chapter II-1 subdivision and damage stability regulations", with two sessions needed to complete the item (MSC 85/26, paragraph 23.35). **SLF 52**, having considered documents SLF 52/17/1, SLF 52/17/2, SLF 52/17/3, SLF 52/17/4, SLF 52/17/5 and SLF 52/17/6, submitted to that session under the agenda item "Any other business", had decided to consider the aforementioned documents in detail at SLF 53, and, to progress work on the issue intersessionally, had instructed the SDS Correspondence Group to prepare relevant draft amendments to SOLAS chapter II-1 and the associated Explanatory Notes (SLF 52/19, paragraphs 17.3 and 17.4).	

SLF 53, in considering the report of the SDS Correspondence Group (SLF 53/14), the Sub-Committee, noted that the group had extensive discussions on the draft amendments to SOLAS chapter II-1 and its Explanatory Notes (resolution MSC.281(85)) and had prepared a summary table, showing the state of progress, for further consideration by the SDS Working Group. The Sub-Committee agreed to instruct the SDS Working Group to further consider the draft amendments to SOLAS chapter II-1 and its Explanatory Notes. Having considered the report of the working group (SLF 53/WP.6), SLF 53 agreed, in principle, to the proposed amendments to SOLAS chapter II-1 and its related Explanatory Notes for further consideration by the SDS Correspondence Group. (SLF 53/19, paragraphs 14.3, 14.7 and 14.9)

SLF 54 considered the report of the SDS Correspondence Group (SLF 54/8/1) and, having approved it in general, noted that the group had progressed the work on the revision of SOLAS chapter II-1 subdivision and damage stability regulations and the associated Explanatory Notes considerably; however, a vast amount of work still remained. The Sub-Committee endorsed the draft amendments to SOLAS chapter II-1 and the associated Explanatory Notes as agreed by the correspondence group, noting that further discussion was required on outstanding matters. SLF 54 instructed the SDS Working Group, established under agenda item 6 (see paragraph 6.6), to further develop the draft amendments to SOLAS chapter II-1 and the associated Explanatory Notes. The Sub-Committee, having noted that the working group could not finalize the draft amendments to SOLAS chapter II-1 and the associated Explanatory Notes (SLF 54/WP.5/Rev.1, paragraphs 44.3 to 44.6), agreed to extend the target completion year for this output to 2013 and instructed the SDS Correspondence Group to finalize the draft amendments to SOLAS chapter II-1 and the related Explanatory Notes. (SLF 54/17, section 8)

SLF 55 considered the report of the SDS Correspondence Group (SLF 55/8/2 and Add.1) and, having approved it in general, noted that the group had progressed the work on the revision of SOLAS chapter II-1 subdivision and damage stability regulations and the associated Explanatory Notes considerably, but a vast amount of work still remained. The Sub-Committee instructed the SDS Working Group to further develop the draft amendments to SOLAS chapter II-1 and the associated Explanatory Notes. SLF 55 noted that the group could not finalize all the outstanding issues related to the revision of SOLAS chapter II-1 subdivision and damage stability regulations and, therefore, invited the Committee to extend the target completion year for this output to 2014. The Sub-Committee instructed the SDS Correspondence Group finalize the draft amendments to SOLAS chapter II-1 and the related Explanatory Notes and produce a clean text of the draft amendments to SOLAS chapter II-1, where all agreed changes, including those agreed at SLF 55, are shown as shaded and strike-through text, with the draft amendments separated from the Explanatory Notes. (SLF 55/17, section 8)

SDC 1 recalled that SLF 55 had re-established the SDS Correspondence Group and instructed it to submit a report to the first session of the SDC Sub-Committee. The Sub-Committee considered the report of the correspondence group (SDC 1/7 and Add.1) and, having approved it in general, noted that the group had progressed the work on the revision of SOLAS chapter II-1 subdivision and damage stability regulations and the associated Explanatory Notes considerably, but noted that a vast amount of work was still needed. SDC 1 instructed the Stability Working Group to finalize the draft amendments to SOLAS chapter II-1. Having considered the part of the report of the Stability Working Group (SDC 1/WP.5/Add.1) dealing with this item, the Sub-Committee agreed, in principle, to the proposed amendments to SOLAS chapter II-1 and endorsed the group's decision to continue working on them. SDC 1 agreed to establish the SDS Correspondence Group and instructed it to finalize the draft amendments to SOLAS chapter II-1, part B-4 and regulation 35-1. (SDC 1/26, section 7)

SDC 2 considered the first part of the report of the correspondence group (SDC 2/3/2) and, having approved it in general, instructed the SDS Working Group to finalize the draft amendments to SOLAS chapter II-1, taking into account documents SDC 2/3/1, SDC 2/3/4, SDC 2/3/8, SDC 2/3/9 and SDC 2/3/10. Having considered the part of the report of the SDS Working Group (SDC 2/WP.3) dealing with this item, the Sub-Committee agreed to the proposed amendments to SOLAS chapter II-1, with a view of approval at MSC 95 and subsequent adoption at MSC 96. (SDC 2/25, paragraphs 3.26 to 3.29).

MSC 95 considered the draft amendments to SOLAS chapter II-1 subdivision and damage stability regulations, prepared by the Sub-Committee (SDC 2/25, annex 1), together with documents MSC 95/10/1 (United States), proposing not to adopt the draft amendments at that time, since several additional amendments to SOLAS chapter II-1 were still under consideration by the Sub-Committee; and MSC 95/10/3 (United Kingdom), proposing editorial improvements to the draft amendments and expressing concern that the application date did not comply with the *Guidance on drafting of amendments to the 1974 SOLAS Convention and related mandatory instruments* (MSC.1/Circ.1500). Following discussion, MSC 95 decided to refer the draft amendments and documents MSC 95/10/1 and MSC 95/10/3 to SDC 3 for further consideration of the scope of application, with a view to approval at MSC 96.

SDC 3 considered the report of the correspondence group (SDC 3/3/2) and, having approved it in general, instructed the SDS Working Group to finalize the draft amendments to SOLAS chapter II-1, based on annex 1 to document SDC 2/25, taking into account documents SDC 3/3/1, SDC 3/3/3, SDC 3/3/4, SDC 3/3/7, SDC 3/3/8, SDC 3/3/9, SDC 3/3/10, SDC 3/3/11, SDC 3/INF.3, SDC 3/INF.4, SDC 2/INF.3, MSC 95/10/1 and MSC 95/10/3. Having considered the part of the report of the SDS Working Group (SDC 3/WP.4) dealing with this item, the Sub-Committee agreed to the proposed amendments to SOLAS chapter II-1, with a view of approval at MSC 96 and subsequent adoption at MSC 97 (SDC 3/21, paragraphs 3.22 to 3.30).

6 Impact on other instruments (e.g. codes, performance standards, guidance circulars, certificates/records format, etc.)

Explanatory Notes to the SOLAS chapter II-1 subdivision and damage stability regulations (MSC.281(85));

Guidelines on operational information for masters of passenger ships for safe return to port by own power or under tow (MSC.1/Circ.1400).

7 Technical background

7.1 Scope and objective (to cross check with items 4 and 5 in part II of the checklist)

Refinement of SOLAS chapter II-1.

The proposed amendments apply to new cargo and passenger ships.

7.2 Technical/operational background and rationale (summary of FSA study, etc., if available or, engineering challenge posed, etc.)

N/A

7.3 Source/derivation of requirement (non-mandatory instrument, industry standard, national/regional requirement)

In the process of developing Explanatory Notes for the new SOLAS chapter II-1 subdivision and damage stability regulations, various regulations have been identified as either needing or potential candidates for future improvement.

7.4	Short summary of requirement (what is the new requirement – in short and lay terms)
Refinement of the existing SOLAS regulations II-1/1, II-1/2, II-1/4, II-1/5, II-1/5-1, II-1/6, II-1/7, II-1/7-1, II-1/7-2, II-1/8, II-1/8-1, II-1/9, II-1/10, II-1/12, II-1/13, II-1/15, II-1/16, II-1/16-1, II-1/17, II-1/20, II-1/21, II-1/22, II-1/24 and II-1/35-1.	
7.5	**Points of discussions (controversial points and conclusion)**
.1	Having considered the need of amending SOLAS regulation II-1/8-1.3 (SDC 2/4), the group agreed that residual strength calculations need not to be included in the operational information and, therefore, no changes were made to the regulation. However, further consideration should be given to the development of guidance regarding residual strength, under agenda item 4, for inclusion in the *Guidelines on safe return to port for passenger ships* (MSC.1/Circ.1400).
.2	The group, keeping in mind that there are no mandatory requirements on damage stability for cargo ships less than 80 m in length, decided that no further changes to the proposed amendments to SOLAS regulation II-1/9 need to be made with regard to cargo ships of this size. However, the concern regarding consistent application of the alternative arrangements provision for such ships needs to be specifically addressed in the Explanatory Notes.
.3	The group considered the proposals in document SDC 2/3/10 (Denmark and Netherlands) regarding the requirements for watertightness of hatches which become immersed after damage. After extensive discussion, the proposed amendments were agreed to as set out in the annex. However, to address concerns that these amendments could potentially be misunderstood to require additional hatches to be watertight, it was decided to develop an associated explanatory note to indicate this is only setting a design standard for hatches that required to be watertight by other regulations. Also it should not override the requirements in the Load Lines Convention. There were also discussions regarding the inspection and maintenance of these watertight hatches, but it was decided not to include these elements in the amendments to SOLAS chapter II-1.
.4	The group considered the proposal in document SDC 2/3/9 (United States) regarding double hulls in way of main engine-rooms on passenger ships. In the extensive discussion that followed, various concerns were expressed regarding the specific aim of the proposed requirement with respect to the existing system redundancy requirement in SOLAS regulation 8-1.2, the definition of main engine-rooms, the option for redundant port and starboard engine-rooms in the context of excessive heel, ensuring this only regarded flooding and did not include structural or mechanical damage, the proposed B/20 double-side dimension, and the longitudinal separation distance for redundant main engine-rooms. There were also general concerns expressed that this was another deterministic requirement that was not in line with the probabilistic damage stability methodology, and that other options should be pursued to achieve the intended outcome. Therefore, this item could not be finalized, as instructed, and could be further considered at SDC 3.
.5	The group could also not agree on the additional proposal in document SDC 2/3/9 to add a stability requirement to close a gap in existing regulation 8-1.2 regarding essential system availability when subject to flooding of any single watertight compartment.

.6 The group briefly considered the proposal in document SDC 2/17/1 (United States) regarding damage control drills for passenger ships. However, the group concluded that further consideration was necessary regarding drill frequency, the alignment with other testing requirements (e.g. SOLAS regulation II-1/21), a definition for damage control station, etc. Therefore, this item will be included in the terms of reference for the correspondence group, if established.

.7 The issue of application dates for these amendments was raised. It was noted that this issue was initially considered at SLF 55 with the outcome that these amendments should apply to new ships only. This has been the premise that has been used in developing the amendments and is reflected in the proposed amendments to SOLAS regulations II-1/1.1.1 and II-1/1.1.3.2 in the annex. It was further noted by the group that this approach for the applicability may not be in line with the *Guidance on drafting of amendments to the 1974 SOLAS Convention and related mandatory instruments* (MSC.1/Circ.1500).

.8 At SDC 3, all the application issues were considered, as per instruction of MSC 95, and are currently in line with MSC.1/Circ.1500.

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ANNEX 2

DRAFT AMENDMENTS TO CHAPTER 2 OF THE 2008 SPS CODE*

Chapter 2
Stability and subdivision

1 The text of the existing paragraph 2.2 is amended to read as follows:

"2.2 The subdivision and damage stability of special purpose ships should in general be in accordance with SOLAS chapter II-1 where the ship is considered a passenger ship, and special personnel are considered passengers, with an *R*-value calculated ~~in accordance with SOLAS regulation II-1/6.2.3~~ as follows:

.1 where the ship is certified to carry 240 persons or more, the *R*-value is assigned as *R*;

.2 where the ship is certified to carry not more than 60 persons, the *R*-value is assigned as 0.8*R*; and

.3 for more than 60 (but not more than 240) persons, the *R*-value should be determined by linear interpolation between the *R*-values given in .1 and .2 above.

Where:

$$R = 1 - \frac{5{,}000}{L_s + 2.5N + 15{,}225}$$

$N = N_1 + 2N_2$

N_1 = number of persons for whom lifeboats are provided

N_2 = number of persons (including officers and crew) the ship is permitted to carry in excess of N_1

2 The following new paragraph 2.3 is added after the amended paragraph 2.2 and the existing paragraphs 2.3 to 2.5 are renumbered accordingly:

"2.3 Where the conditions of service are such that compliance with paragraph 2.2 above on the basis of $N = N_1 + 2N_2$ is impracticable and where the Administration considers that a suitably reduced degree of hazard exists, a lesser value of *N* may be taken but in no case less than $N = N_1 + N_2$."

***

* Tracked changes are created using "strikeout" for deleted text and "grey shading" to highlight all modifications and new insertions, including deleted text.

ANNEX 3

DRAFT MSC CIRCULAR

REVISED GUIDELINES ON OPERATIONAL INFORMATION FOR MASTERS OF PASSENGER SHIPS FOR SAFE RETURN TO PORT

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], having considered a proposal by the Sub-Committee on Ship Design and Construction, at its third session, approved the Revised Guidelines on operational information for masters of passenger ships for safe return to port, set out in the annex, to provide additional guidance for the uniform implementation of SOLAS regulation II-1/8-1.3.

2 Member Governments are invited to apply the annexed Revised Guidelines to passenger ships constructed on or after [*date of approval*] and to bring them to the attention of owners of passenger ships, operators and all other parties concerned.

ANNEX

REVISED GUIDELINES ON OPERATIONAL INFORMATION FOR MASTERS OF PASSENGER SHIPS FOR SAFE RETURN TO PORT

General

1 When an onboard stability computer is provided in accordance with regulation II-1/8-1.3.1, the system referred to in these guidelines should comprise an onboard stability computer capable of receiving and processing manual and electronic data to provide the master with regularly updated operational information on the residual damage stability of the ship after a flooding casualty. Two-way communication links to shore-based support should also be available to provide the master with post-damage residual structural strength information.

2 When shore-based support is provided in accordance with regulation II-1/8-1.3.2, the system referred to in these guidelines should comprise two-way communication links to the shore-based support with a stability computer capable of receiving and processing manual and electronic data to provide the master with regularly updated operational information on the residual damage stability of the ship after a flooding casualty. In addition, the shore-based support should also have the capability to provide the master with post-damage residual structural strength information.

3 The stability computers should utilize software with the following capabilities:

Using the pre-damage loading condition, software calculating the residual damage stability following any flooding casualty by processing data from both manual entry and from sensor readings to compute operational information required by the master using an accurate and detailed computer model of the entire hull, including superstructures and appendages, all internal compartments and tanks, etc. together with up-flooding/down-flooding points, cross-flooding arrangements, escape routes, ship profile and watertight door status (i.e. open or closed).

System overview

4 At least two independent stability computers should be available at all times (either two onboard, or two through shore-based support, or one each), which are capable of receiving and processing the data necessary to provide operational information to the master.

5 The on-board system should have an uninterruptible power supply (UPS) connected to both main and emergency switchboards.

Input

6 The system should be pre-loaded with a detailed computer model of the complete hull, including appendages, all compartments, tanks and the relevant parts of the superstructure considered in the damage stability calculation, wind profile, down-flooding and up-flooding openings, cross-flooding arrangements, internal compartment connections and escape routes. Each internal space should be assigned its standard regulation II-1/7-3 permeability, unless a more accurate permeability has been calculated.

7 The system should utilize the latest approved lightship weight and centre of gravity information.

8 Details of the damage location(s) and extent(s) or the damaged compartments should be input manually by the ship's staff and combined with data from electronic sensors such as draught gauges, tank level devices, watertight door indicators and flooding level sensors.

9 If it is considered at any time that a sensor or sensors are faulty, or have been damaged, the ship's staff should be able to over-ride the sensor data with manual data. The system should clearly indicate to the operator if a sensor that should be available is being manually over-ridden.

10 The system should always be updated to the current loading condition which will form the basis of any damage stability calculation.

Calculation methods

The system should:

11 Utilize software (see paragraph 3) capable of analysing the damage stability following any real flooding casualty including multi-compartment, non-linked breaches.

12 Use the actual pre-damage loading state obtained from the routine operations mode.

13 Be capable of accounting for applied moments such as wind, lifeboat launching, cargo shifts and passenger relocation.

14 Account for the effect of wind by using the method in regulation II-1/7-2.4.1.2 as the default, but allow for manual input of the wind speed/pressure if the on-scene pressure is significantly different ($P = 120\ N/m^2$ equates to Beaufort 6; approximately 13.8 m/s or 27 knots).

15 Be capable of assessing the impact of open main watertight doors on stability.

16 Have the capability of using the same detailed hull model for damage control drills or to assess potential damage and stability scenarios during a flooding casualty. This should not interfere with the ability of the onboard computer or shore-based support to monitor the actual situation and provide operational information to the master.

Output

17 The system should output the residual GZ curve both graphically and numerically. It should also provide the following information: draught (forward, midships and aft), trim, heel angle, GZ max, GZ range, vanishing angle of stability, down-flooding immersion angles and escape route immersion angles.

18 The output format and units of the information supplied by the ship's staff or shore-based support team should be consistent with the format and units of the approved stability booklet in order to facilitate easy comparison. The output should be within the tolerances specified in the *Guidelines for the approval of stability instruments* (MSC.1/Circ.1229).

19 The system should show a profile view, deck views and cross-sections of the ship indicating the flooded water-plane and the damaged compartments.

Other issues

20 An operation manual should be provided for the system software printed in a language in which the ship's staff are fully conversant. The manual should also indicate the limitations of the system.

21 At least two crew members should be competent in the operation of the system including the communication links to the shore-based support. They should be capable of interpreting the output of the system in order to provide the required operational information to the master.

22 When shore-based support is provided in accordance with regulation II-1/8-1.3.2, there should be a contract for the supply of shore-based support at all times during the validity of the ship's certificate.

23 When shore-based support is provided in accordance with regulation II-1/8-1.3.2, the shore-based support should be manned by adequately qualified persons with regard to stability and ship strength; no less than two qualified persons should be available to be on call at all times.

24 When shore-based support is provided in accordance with regulation II-1/8-1.3.2, the shore-based support should be operational within one hour (i.e. with the ability to input details of the condition of the ship, including structural damage, as instructed).

Strength

25 The system should have the capability of two-way communication with the shore-based team with an agreed method of specifying and transmitting details of structural loss and/or degradation.

26 The strength aspects of the shore-based computer should be in compliance with the requirements of a classification society which is recognized by the Administration.

Ro-ro passenger ships

27 There should be algorithms in the software for estimating the effect of water accumulation on deck (WOD).

Approval and testing

28 The stability aspects of the system should be initially approved and periodically checked against validated test conditions based on a number of loading/damage scenarios from the approved stability information book to ensure that it is operating correctly and that the stored data has not been subject to unauthorized alteration.

Limitations of the system

29 The system is not intended to compute transient asymmetrical flooding whereby the ship could capsize under the immediate inrush of floodwater before there is time for equalization measures to take effect.

30 The system is not intended to make any allowance for the motion of the ship in a seaway, including the effects of tide, current or wave action.

Equivalence

31 Equivalent arrangements for the provision of operational information to the master following a flooding casualty may be employed to the satisfaction of the Administration.

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ANNEX 4

DRAFT AMENDMENTS TO THE INTRODUCTION AND PART A OF THE 2008 IS CODE*

INTRODUCTION

1 Purpose

1 In paragraph 1.2, new subparagraphs .8 and .9 are inserted as follows:

".8 ships engaged in harbour, coastal or ocean-going towing operations and escort operations;

.9 ships engaged in lifting operations;"

and the remaining subparagraphs are renumbered accordingly.

2 Definitions

2 New paragraphs 2.28 to 2.31 are inserted after the existing paragraph 2.27 as follows:

"2.28 Ship engaged in harbour towing means a ship engaged in an operation intended for assisting ships or other floating structures within sheltered waters, normally while entering or leaving port and during berthing or unberthing operations.

2.29 Ship engaged in coastal or ocean-going towing means a ship engaged in an operation intended for assisting ships or other floating structures outside sheltered waters in which the forces associated with towing are often a function of the ship's bollard pull.*

2.30 Ship engaged in lifting operation means a ship engaged in an operation involving the raising or lowering of objects using vertical force by means of winches, cranes, a-frames or other lifting devices.**

2.31 Ship engaged in escort operation means a ship specifically engaged in steering, braking and otherwise controlling of the assisted ship during ordinary or emergency maneuvering, whereby the steering and braking forces are generated by the hydrodynamic forces acting on the hull and appendages and the thrust forces exerted by the propulsion units (see also figure 1).

* Refer to the *Guidelines for safe ocean towing* (MSC/Circ.884).

** Fishing vessels should not be included in the definition of lifting operations. Reference is made to part B, paragraphs 2.1.2.2 and 2.1.2.8. For anchor handling operations reference is made to section 2.7."

* Tracked changes are created using "strikeout" for deleted text and "grey shading" to highlight all modifications and new insertions, including deleted text.

PART A
MANDATORY CRITERIA

3 At the beginning of chapter 2, a footnote is added as follows:

"**Chapter 2 – General criteria**[*]

[*] Paragraphs 3.4.1.8, 3.4.1.9, 3.6.4 and 3.6.5 in part B should only be considered as recommendations.

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ANNEX 5

DRAFT AMENDMENTS TO PART B OF THE 2008 IS CODE*

Chapter 2 – Recommended design criteria for certain types of ships

1 Paragraph 2.4.3.4 is amended to read as follows:

"2.4.3.4 A vessel engaged in towing operations should be provided with means for quick release of the ~~towing hawser~~ towline.*

* Vessels provided with towing winch systems should also be provided with means of quick release."

2 New sections 2.8 and 2.9 are inserted as follows:

"2.8 Ships engaged in towing and escort operations

2.8.1 Application

The provisions given hereunder apply to ships the keel of which is laid or which is at a similar stage of construction* on or after [1 January 2017] engaged in harbour towing, coastal or ocean-going towing and escort operations and to ships converted to carry out towing operations after this date.

* A similar stage of construction means the stage at which:

.1 construction identifiable with a specific ship begins; and

.2 assembly of that ship has commenced, comprising at least 50 tonnes or 1% of the estimated mass of all structural material, whichever is less.

2.8.2 Heeling lever for towing operations

2.8.2.1 The self-tripping heeling lever is calculated as provided below:

.1 A transverse heeling moment is generated by the maximum transverse thrust exerted by the ship's propulsion and steering systems and the corresponding opposing towline pull.

.2 The heeling lever HL_φ, in (m), as a function of the heeling angle φ, should be calculated according to the following formula:

$$HL_\varphi = \frac{BP \cdot C_T \cdot (h \cdot \cos\varphi - r \cdot \sin\varphi)}{g \cdot \Delta}$$

* Tracked changes are created using "strikeout" for deleted text and "grey shading" to highlight all modifications and new insertions, including deleted text.

where:

BP = bollard pull, in (kN), which is the documented maximum continuous pull obtained from a static bollard pull test performed in accordance with relevant IMO guidelines* or a standard acceptable to the Administration;

* Refer to annex A to the *Guidelines for safe ocean towing* (MSC/Circ.884).

C_T =
- 0.5,
for ships with conventional, non-azimuth propulsion units;

- $0.90/(1 + l/L_{LL})$,
for ships with azimuth propulsion units installed at a single point along the length. However, C_T should not be less than 0.7 for ships with azimuth stern drive towing over the stern or tractor tugs towing over the bow, and not less than 0.5 for ships with azimuth stern drive towing over the bow or tractor tugs towing over the stern;

For tugs with other propulsion and/or towing arrangements, the value of C_T is to be established on a case by case basis to the satisfaction of the Administration.

Δ = displacement, in (t);

l = longitudinal distance, in (m), between the towing point and the vertical centreline of the propulsion unit(s) relevant to the towing situation considered;

h = vertical distance, in (m), between the towing point and the horizontal centreline of the propulsion unit(s) as relevant for the towing situation considered;

g = gravitational acceleration, in (m/s^2), to be taken as 9.81;

r = the transverse distance, in (m), between the centre line and the towing point, to be taken as zero when the towing point is at the centre line.

The towing point is the location where the towline force is applied to the ship. The towing point may be a towing hook, staple, fairlead or equivalent fitting serving that purpose.

2.8.2.2 The tow-tripping heeling lever $HL\varphi$, in (m), is calculated according to the following formula:

$$HL_{\varphi} = C_1 \cdot C_2 \cdot \gamma \cdot V^2 \cdot A_P \cdot (h \cdot \cos\varphi - r \cdot \sin\varphi + C_3 \cdot d)/(2 \cdot g \cdot \Delta)$$

where:

C_1 = lateral traction coefficient = $2.8(\frac{L_s}{L_{pp}} - 0.1)$ $0.10 <= C_1 <= 1.00$

C_2 = correction of C_1 for angle of heel = $\left(\frac{\varphi}{3 \cdot \varphi_D} + 0.5\right)$ $C_2 >= 1.00$

Angle to deck edge $\varphi_D = \arctan(\frac{2f}{B})$

C_3 = distance from the center of A_P to the waterline as fraction of the draught related to the heeling angle

$C_3 = \left(\frac{\varphi}{\varphi_D}\right) * 0.26 + 0.30$ $0.50 <= C_3 <= 0.83$

γ = specific gravity of water, in (t/m^3);

V = lateral velocity, in (m/s), to be taken as 2.57 (5 knots);

A_P = lateral projected area, in (m^2), of the underwater hull;

r = the transverse distance, in (m), between the centre line and the towing point, to be taken as zero when the towing point is at the centre line;

L_S = the longitudinal distance,in (m), from the aft perpendicular to the towing point;

L_{PP}= length between perpendiculars, in (m);

φ = angle of heel;

f = freeboard amidship, in (m);

B = moulded breadth, in (m);

h = vertical distance, in (m), from the waterline to the towing point;

d = actual mean draught, in (m).

The towing point is the location where the towline force is applied to the ship. The towing point may be a towing hook, staple, fairlead or equivalent fitting serving that purpose.

2.8.3 Heeling lever for escort operations

2.8.3.1 For the evaluation of the stability particulars during escort operations the ship is considered to be in an equilibrium position determined by the combined action of the hydrodynamic forces acting on hull and appendages, the thrust force and the towline force as shown in figure 1.

2.8.3.2 For each equilibrium position the corresponding steering force, braking force, heel angle and heeling lever are to be obtained from the results of full scale trials, model tests, or numerical simulations in accordance with a methodology acceptable to the Administration.

2.8.3.3 For each relevant loading condition the evaluation of the equilibrium positions is to be performed over the applicable escort speed range, whereby the speed of the assisted ship through the water is to be considered.*

* The typical escort speed range is 6 to 10 knots.

2.8.3.4 For each relevant combination of loading condition and escort speed, the maximum heeling lever is to be used for the evaluation of the stability particulars.

2.8.3.5 For the purpose of stability calculations the heeling lever is to be taken as constant.

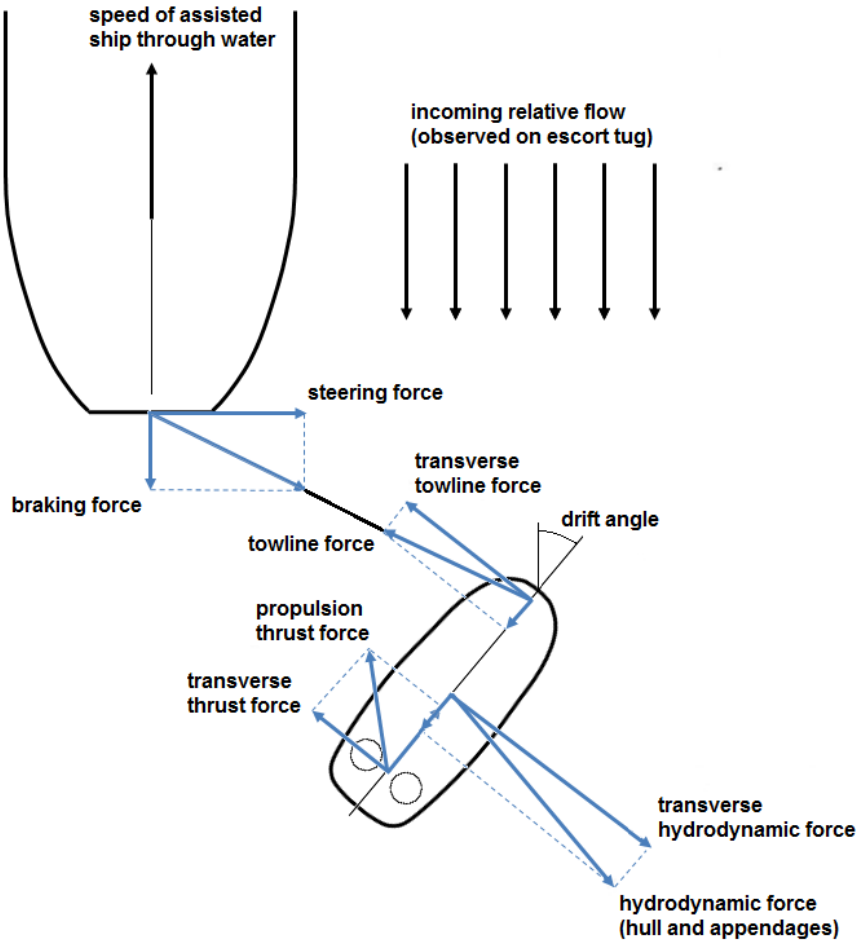


Figure 1: Escort tug equilibrium position

2.8.4 Stability criteria

2.8.4.1 In addition to the stability criteria given in part A, section 2.2, or the equivalent stability criteria given in chapter 4 of the explanatory notes to the 2008 IS Code where the ship's characteristics render compliance with part A, section 2.2 impracticable, the following stability criteria should be complied with:

2.8.4.2 For ships engaged in harbour, coastal or ocean-going towing operations the area A contained between the righting lever curve and the heeling lever curve calculated in accordance with paragraph 2.8.2.1 (self-tripping), measured from the heel angle, φ_e, to the angle of the second intersection, φ_c, or the angle of down-flooding, φ_f, whichever is less, should be greater than the area B contained between the heeling lever curve and the righting lever curve, measured from the heel angle φ = 0 to the heel angle, φ_e.

where:

φ_e = Angle of first intersection between the heeling lever and righting lever curves;

φ_f = Angle of down-flooding as defined in part A, paragraph 2.3.1.4 of this Code. Openings required to be fitted with weathertight closing devices under the ICLL but, for operational reasons, are required to be kept open should be considered as down-flooding points in stability calculation;

φ_c = Angle of second intersection between the heeling lever and righting lever curves.

2.8.4.3 For ships engaged in harbour, coastal or ocean-going towing operations the first intersection between the righting lever curve and the heeling lever curve calculated in accordance with paragraph 2.8.2.2 (tow-tripping) should occur at an angle of heel less than the angle of down-flooding, φf.

2.8.4.4 For ships engaged in escort operations the maximum heeling lever determined in accordance with paragraph 2.8.3 should comply with the following criteria:

.1 Area A ≥ 1.25 * Area B;

.2 Area C ≥ 1.40 * Area D; and

.3 φ_e ≤ 15 degrees.

where:

Area A = Righting lever curve area measured from the heel angle φ_e to a heel angle of 20 degrees (see figure 2a);

Area B = Heeling lever curve area measured from the heeling angle φe to a heel angle of 20 degrees (see figure 2a);

Area C = Righting lever curve area measured from the zero heel (φ = 0) to φ_d (see figure 2b);

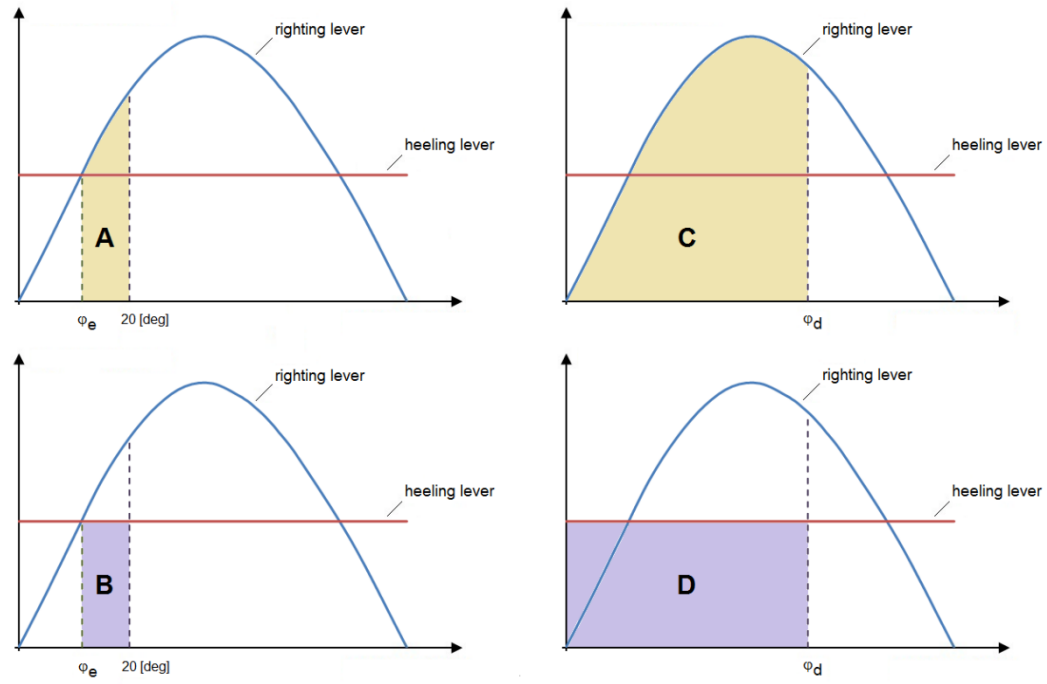
Area D = Heeling lever curve area measured from zero heel (φ = 0) to the heeling angle φ_d (see figure 2b);

φ_e = Equilibrium heel angle corresponding to the first intersection between heeling lever curve and the righting lever curve;

φ_d = the heel angle corresponding to the second intersection between heeling lever curve and the righting lever curve or the angle of down-flooding or 40 degrees, whichever is less.

Figure 2a: Areas A and B

Figure 2b: Areas C and D



2.8.5 Constructional precautions against capsizing

2.8.5.1 Access to the machinery space should, if possible, be arranged within the forecastle. Any access to the machinery space from the exposed cargo deck should be provided with two weathertight closures, if practicable. Access to spaces below the exposed cargo deck should preferably be from a position within or above the superstructure deck.

2.8.5.2 The area of freeing ports in the side bulwarks of the cargo deck should at least meet the requirements of regulation 24 of the International Convention on Load Lines, 1966 or the Protocol of 1988 relating thereto, as amended, as applicable. The disposition of the freeing ports should be carefully considered to ensure the most effective drainage of water trapped on the working deck and in recesses at the after end of the forecastle. In ships operating in areas where icing is likely to occur, no shutters should be fitted in the freeing ports.

2.8.5.3 A vessel engaged in towing operations should be provided with means for quick release of the towline.*

* Vessels provided with towing winch systems should also be provided with means of quick release.

2.8.6 Operational procedures against capsizing

2.8.6.1 The arrangement of cargo stowed on deck should be such as to avoid any obstruction of the freeing ports or sudden shift of cargo on deck. Cargo on deck, if any, should not interfere with the movement of the towline.

2.8.6.2 A minimum freeboard at stern of at least $0.005*L_{LL}$ should be maintained in all operating conditions.

2.9 Ships engaged in lifting operations

2.9.1 Application

2.9.1.1 The provisions given hereunder apply to ships the keel of which is laid or which is at a similar stage of construction* on or after [1 January 2017] engaged in lifting operations and to ships converted to carry out lifting operations after this date.

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* A similar stage of construction means the stage at which:

.1 construction identifiable with a specific ship begins; and

.2 assembly of that ship has commenced, comprising at least 50 tonnes or 1% of the estimated mass of all structural material, whichever is less.

2.9.1.2 The provisions of this section should be applied to operations involving the lifting of the ship's own structures or for lifts in which the maximum heeling moment due to the lift is greater than that given in the following:

$$M_L = 0.67 \cdot \Delta \cdot GM \cdot \left(\frac{f}{B}\right)_1$$

where:

M_L = Threshold value for the heeling moment, in (t.m), induced by the (lifting equipment and) load in the lifting equipment;

GM = The initial metacentric height, in (m), with free surface correction, including the effect of the (lifting equipment and) load in the lifting equipment;

f = the minimum freeboard, in (m), measured from the upper side of the weather deck to the waterline;

B = the moulded breadth of the ship, in (m); and

Δ = the displacement of the ship, including the lift load, in (t).

The provisions of this section also apply to ships which are engaged in lifting operations where no transverse heeling moment is induced and the increase of the ship's vertical centre of gravity (VCG) due to the lifted weight is greater than 1%.

The calculations should be completed at the most unfavourable loading conditions for which the lifting equipment shall be used.

2.9.1.3 For the purpose of this section, waters that are not exposed are those where the environmental impact on the lifting operation is negligible. Otherwise, waters are to be considered exposed.

2.9.2 Load and vertical centre of gravity for different types of lifting operations

2.9.2.1 In lifting operations involving a lifting appliance consisting of a crane, derrick, sheerlegs, or similar:

.1 the magnitude of the vertical load (P_L) should be the maximum allowed static load at a given outreach of the lifting appliance;

.2 the transverse distance (y) is the transverse distance between the point at which the vertical load is applied to the lifting appliance and the ship centreline in the upright position;

.3 the vertical height of the load (KG_{load}) is taken as the vertical distance from the point at which the vertical load is applied to the lifting appliance to the baseline in the upright position; and

.4 the change of centre of gravity of the lifting appliance(s) need to be taken into account.

2.9.2.2 In lifting operations not involving a lifting appliance consisting of a crane, derrick, sheerlegs or similar, which involve lifting of fully or partially submerged objects over rollers or strong points at or near a deck-level:

.1 the magnitude of the vertical load (P_L) should be the winch brake holding load;

.2 the transverse distance (y) is the transverse distance between the point at which the vertical load is applied to the ship and the ship centreline in the upright position; and

.3 the vertical height of the load (KG_{load}) is taken as the vertical distance from the point at which the vertical load is applied to the ship to the baseline in the upright position.

2.9.3 Stability criteria

2.9.3.1 The stability criteria shall be satisfied for all loading conditions intended for lifting with the lifting appliance and its load at the most unfavourable positions. For the purpose of this section, the lifting appliance and its load(s) and their centre of gravity (COG) should be included in the displacement and centre of gravity of the ship, in which case no external heeling moment/heeling lever is applied.

2.9.3.2 All loading conditions utilized during the lifting operations are to comply with the stability criteria given in sections 2.2 and 2.3 of part A. Where the ship's characteristics render compliance with section 2.2 of part A impracticable, the

equivalent stability criteria given in chapter 4 of the explanatory notes to the 2008 IS Code should apply. During the lifting operation, as determined by paragraphs 2.9.1, the following stability criteria should also apply:

.1 the equilibrium heel angle, φ_1, shall not be greater than the maximum static heeling angle for which the lifting device is designed and which has been considered in the approval of the loading gear;

.2 during lifting operations in non-exposed waters, the minimum distance between the water level and the highest continuous deck enclosing the watertight hull, taking into account trim and heel at any position along the length of the ship, shall not be less than 0.50 m; and

.3 during lifting operations in exposed waters, the residual freeboard shall not be less than 1.00 m or 75% of the highest significant wave height H_S, in (m), encountered during the operation, whichever is greater.

2.9.4 Lifting operations conducted under environmental and operational limitations

2.9.4.1 For lifting conditions carried out within clearly defined limitations set forth in paragraph 2.9.4.1.1, the intact criteria set forth in paragraph 2.9.4.1.2 may be applied instead of the criteria included in paragraph 2.9.3.

.1 The limits of the environmental conditions should specify at least the following:

- the maximum significant wave height, H_S; and
- the maximum wind speed (1 minute sustained at 10 m above sea level).

The limits of the operational conditions should specify at least the following:

- the maximum duration of the lift;
- limitations in ship speed; and
- limitations in traffic/traffic control.

.2 The following stability criteria should apply with the lifted load is at the most unfavourable position:

.1 the corner of the highest continuous deck enclosing the watertight hull shall not be submerged;

.2 $A_{RL} \geq 1.4 \cdot A_{HL}$

where:

A_{RL} = The area under the net righting lever curve, corrected for crane heeling moment and for the righting moment provided by the counter ballast if applicable, extending from the

equilibrium heeling angle, φ_1, to the angle of down flooding, φ_F, the angle of vanishing stability, φ_R, or the second intersection of the righting lever curve with the wind heeling lever curve, whichever is less, see figure 1;

A_{HL} = The area below the wind heeling lever curve due to the wind force applied to the ship and the lift at the maximum wind speed specified in paragraph 2.9.4.1.1, see figure 1.

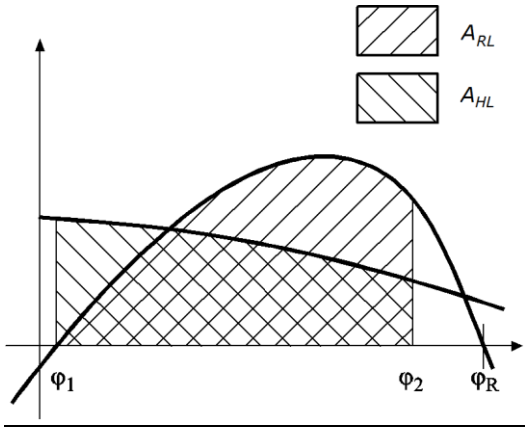

Figure 1 – Intact criteria under Environmental and Operational limitations

.3 The area under the net righting lever curve from the equilibrium heel angle, φ_1, to the down flooding angle φ_F, or 20°, whichever is less, shall be at least 0.03 m-rad.

2.9.5 Sudden loss of hook load

2.9.5.1 A ship engaged in a lifting operation and using counter ballasting should be able to withstand the sudden loss of the hook load, considering the most unfavourable point at which the hook load may be applied to the ship (i.e. largest heeling moment). For this purpose, the area on the side of the ship opposite to the lift (Area 2) should be greater than the residual area on the side of the lift (Area 1), as shown in Figure 2, by an amount given by the following:

Area 2 > 1.4 * Area 1, for lifting operations in waters that are exposed.

Area 2 > 1.0 * Area 1, for lifting operations in waters that are not exposed.

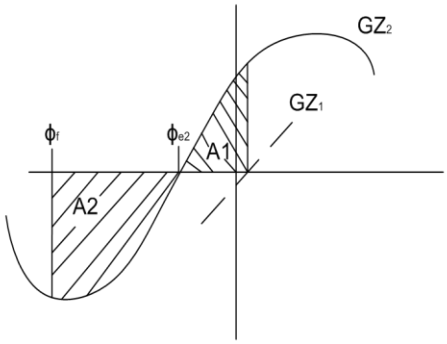

Figure 2

where:

GZ_1 = net righting lever (GZ) curve for the condition before loss of crane load, corrected for crane heeling moment and for the righting moment provided by the counter ballast if applicable;

GZ_2 = net righting lever (GZ) curve for the condition after loss of crane load, corrected for the transverse moment provided by the counter ballast if applicable;

φ_e = the angle of static equilibrium after loss of crane load;

φ_f = the angle of down-flooding or the heel angle corresponding to the second intersection between heeling and righting arm curves, whichever is less; and

The term "net righting lever" means that the calculation of the GZ curve includes the ship's true transverse centre of gravity as function of the angle of heel.

2.9.6 Alternative method

2.9.6.1 The criteria in paragraph 2.9.6 may be applied to a ship engaged in a lifting operation, as determined by paragraph 2.9.1, as an alternative to the criteria in paragraph 2.9.3 through paragraph 2.9.5, as applicable. For the purpose of this section and the stability criteria set out in paragraph 2.9.7, the lifted load which causes the ship to heel is translated for the purpose of stability calculation to a heeling moment/heeling lever which is applied on the righting lever curve of the ship.

2.9.6.2 The heeling moment applied to the ship due to a lift and the associated heeling lever should be calculated using the following formulae:

$$HM_{\varphi} = P_L \cdot y \cdot \cos\varphi$$

$$HL_{\varphi} = HM_{\varphi} \div \Delta$$

where:

$HM\varphi$ = the heeling moment, in (t·m), due to the lift at φ;

P_L = the vertical load, in (t), of the lift, as defined in 2.9.2.1.1;

y = the transverse distance, in (m), of the lift, metres, as defined in 2.9.2.1.2;

φ = the angle of heel;

$HL\varphi$ = the heeling lever, in (m) due to the lift at φ; and

Δ = the displacement, in (t) of the ship with the load of the lift.

2.9.6.3 For application of the criteria contained in paragraph 2.9.7 involving the sudden loss of load of the lift in which counter-ballast is used, the heeling levers that include the counter-ballast should be calculated using the following formulae:

$$CHL_1 = \frac{\left(P_L \cdot y - CBM\right) \cdot \cos\varphi}{\Delta}$$

$$CBHL_2 = \frac{CBM \cdot \cos\varphi}{\left(\Delta - P_L\right)}$$

Where:

CBM = the heeling moment, in (t·m), due to the counter-ballast;

CHL_1 = combined heeling lever, in (m), due to the load of the lift and the counter-ballast heeling moment at the displacement corresponding to the ship with the load of the lift; and

$CBHL_2$ = heeling lever, in (m), due to the counter-ballast heeling moment at the displacement corresponding to the ship without the load of the lift.

2.9.6.4 The equilibrium heel angle φ_e referred to in 2.9.7 means the angle of first intersection between the righting lever curve and the heeling lever curve.

2.9.7 Alternative stability criteria

2.9.7.1 For the loading conditions intended for lifting, but before commencing the operation, the stability criteria given in sections 2.2 and 2.3 of part A should be applied. Where a ship's characteristics render compliance with section 2.2 of part A impracticable, the equivalent stability criteria given in chapter 4 of the explanatory notes to the 2008 IS Code should apply. During the lifting operation, as determined by paragraph 2.9.1, the following stability criteria should apply:

.1 the residual righting area below the righting lever and above the heeling lever curve between φ_e and the lesser of 40° or the angle of the maximum residual righting lever should not be less than:
0.080 m·rad, if lifting operations are performed in waters that are exposed; or

0.053 m·rad, if lifting operations are performed in waters that are not exposed;

.2 in addition, the equilibrium angle is to be limited to the lesser of the following:

.1 10 degrees;

.2 the angle of immersion of the highest continuous deck enclosing the watertight hull; or

.3 the lifting appliance allowable value of trim/heel (data to be derived from sidelead and offlead allowable values obtained from manufacturer).

2.9.7.2 A ship engaged in a lifting operation and using counter ballasting should be able to withstand the sudden loss of the hook load, considering the most unfavourable point at which the hook load may be applied to the ship (i.e. largest heeling moment). For this purpose, the area on the side of the ship opposite from the lift (Area 2) in figure 3 should be greater than the residual area on the side of the lift (Area 1) in figure 3 by an amount given by the following:

$$Area2 - Area1 > K \ ,$$

where:

K = 0.037 m·rad, for a lifting operation in waters that are exposed; and
K = 0.0 m.rad, for a lifting operation in waters that are not exposed.

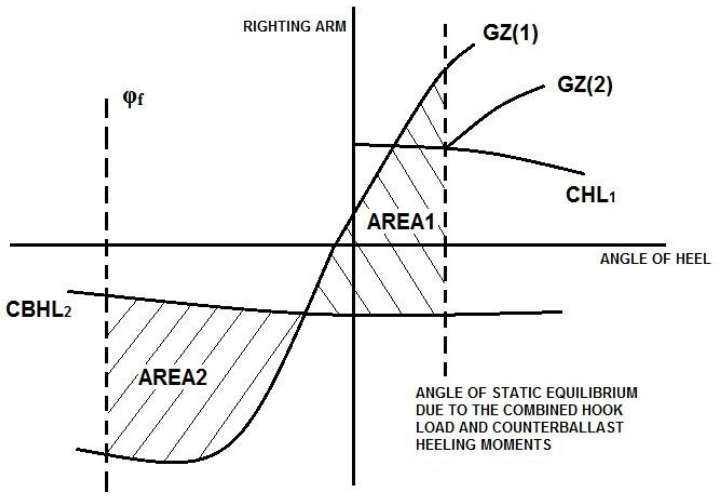

Figure 3

GZ(1) = The righting arm curve at the displacement corresponding to the ship without hook load;

GZ(2) = The righting arm curve at the displacement corresponding to the ship with hook load;

Area2 = residual area between GZ(1) and $CBHL_2$ up to the lesser of the down-flooding angle or the second intersection of GZ(2) and $CBHL_2$;

Area1 = residual area below GZ(1) and above $CBHL_2$ up to φ_e.

2.9.8 Model tests or direct calculations

2.9.8.1 Model tests or direct calculations, performed in accordance with a methodology acceptable to the Administration, that demonstrate the survivability of the ship after sudden loss of hook load, may be allowed as an alternative to complying with the requirements of paragraph 2.9.5 or 2.9.7.2, provided that:

.1 the effects of wind and waves are taken into account; and

.2 the maximum dynamic roll amplitude of the ship after loss of load will not cause immersion of unprotected openings.

2.9.9 Operational procedures against capsizing

2.9.9.1 Ships should avoid resonant roll conditions when engaged in lifting operations."

Chapter 3 – Guidance in preparing stability information

3.4 Standard conditions of loading to be examined

3.4.1 Loading conditions

3 New paragraphs 3.4.1.8 to 3.4.1.10 are inserted as follows:

"3.4.1.8 For a ship engaged in a harbour, coastal or ocean going towing operation and/or escort operation, the following loading conditions should be included in addition to the standard loading conditions for a cargo ship in paragraph 3.4.1.2:

.1 maximum operational draught at which towing or escorting operations are carried out, considering full stores and fuel;

.2 minimum operational draught at which towing or escorting operations are carried out, considering 10% stores and fuel; and

.3 intermediate condition with 50% stores and fuel.

3.4.1.9 For ships engaged in lifting, loading conditions reflecting the operational limitations of the ship, while engaged in lifting shall be included in the stability booklet. Use of counter ballast, if applicable, shall be clearly documented, and the adequacy of the ships stability in the event of the sudden loss of the hook load shall be demonstrated

3.4.1.10 The criteria stated in paragraphs 2.9.3, 2.9.4, 2.9.5 or 2.9.7, as applicable, shall be satisfied for all loading conditions intended for lifting and with the hook load at the most unfavourable positions. For each loading condition, the weight and centre of gravity of the load being lifted, the lifting appliance, and counter ballast, if any, should be included. The most unfavourable position may be obtained from the load chart and is chosen at the position where the total of the transverse and vertical moment is the greatest. Additional loading conditions corresponding to various boom positions and counter ballast with different filling level (if applicable) may need to be checked."

3.6 Stability booklet

4 New paragraphs 3.6.4 and 3.6.5 are added as follows:

"3.6.4 The stability booklet for ships engaged in harbour, coastal or ocean going towing operations and/or escort operations should contain additional information on:

.1 maximum bollard pull;

.2 details on the towing arrangement, including location and type of the towing point(s), such as towing hook, staple, fairlead or any other point serving that purpose;

.3 identification of critical down-flooding openings;

.4 recommendations on the use of roll reduction systems;

.5 if any wire, etc. is included as part of the lightship weight, clear guidance on the quantity and size should be given;

.6 maximum and minimum draught for towing and escort operations;

.7 instructions on the use of the quick-release device; and

.8 for ships engaged in escort operations, the following additional operating information should be included:

.1 a table with permissible limits of the heel angle in accordance with the criteria included in paragraph 2.7.3.4 as function of loading condition and escort speed; and

.2 instructions on the available means to limit the heel angle within the permissible limits.

3.6.5 For ships engaged in lifting operations, for which section 2.9 applies, additional documentation should be included in the stability booklet:

.1 maximum heeling moment for each direction of lift/inclination as a function of the counter-ballast heeling moment, if used, the draught, and vertical centre of gravity;

.2 where fixed counter ballast is used, the following information should be included:

.1 weight of the fixed counter ballast; and

.2 centre of gravity (LCG, TCG, VCG) of the fixed counter ballast;

.3 loading conditions over the range of draughts for which lifting operations may be conducted with the maximum vertical load of the lift. Where applicable, righting lever curves for both before and after load drop should be presented for each loading condition;

.4 limitations on crane operation, including permissible heeling angles, if provided;

.5 operational limitations, such as:

.1 Maximum Safe Working Load (SWL);

.2 maximum radius of operation of all derricks and lifting appliances;

.3 maximum load moment; and

.4 environmental condition affecting the stability of the ship;

.6 instructions related to normal crane operation, including those for use of counter ballast;

.7 instructions such as ballasting/de-ballasting procedures to righting the ship following an accidental load drop;

.8 identification of critical down-flooding openings;

.9 recommendations on the use of roll reduction systems;

.10 drawing of the crane showing the weight and center of gravity, including heel / trim limitations established by the crane manufacturer;

.11 a crane load chart, with appropriate de-ratings for wave height;

.12 load chart for lifting operations covering the range of operational draughts related to lifting and including a summary of the stability results;

.13 a crane specification manual provided by the manufacturer shall be submitted separately for information;

.14 the lifting appliance load, radius, boom angle limit table, including identification of offlead and sidelead angle limits and slewing angle range limits and reference to the ship's centreline;

.15 a table that relates the ship trim and heel to the load, radius, slewing angle and limits, and the offlead and sidelead limits;

.16 procedures for calculating the offlead and sidelead angles and the ship VCG with the load applied;

.17 if installed, data associated with a Load Moment Indicator system and metrics included in the system;

.18 if lifting appliance (crane) offlead and sidelead determine the maximum ship equilibrium angle, the stability booklet should include a note identifying the lifting appliance as the stability limiting factor during lifting operations; and

.19 information regarding the deployment of (stability) pontoons to assist a lifting operation, if fitted.

The information in subparagraphs .2 to .19 above may be included in other ship specific documentation on board the ship. In that case, a reference to these documents shall be included in the stability booklet."

and the subsequent paragraphs are renumbered accordingly.

5 A new paragraphs 3.8 is added as follows:

"3.8 Operational and planning booklets for ships engaged in lifting for which section 2.9 applies

3.8.1 An operation plan should be agreed to by the Master of the ship and a copy archived on a remote location before the operation commences. To assist the master an operational and planning booklet containing guidelines for planning and performing specific operations should be provided on board.

3.8.2 The guidelines should contain sufficient information to enable the Master to plan and operate the ship in compliance with the applicable requirements contained in this Code. The following information should be included as appropriate:

.1 lifting arrangements, capabilities and procedures to operate the lifting systems; and

.2 detailed data concerning the ship's lifting capability, operational limitations, limitations of cargo capacities, stability limiting curves and recommendations for calculating ship's loading conditions including sample calculations.

3.8.3 Guidelines and procedures to define a step-wise operational plan for a specific operation should contain instructions for:

.1 identifying and calculating loading conditions for all relevant stages of operation, taking into account the alterations on deck load, effects of deployment or recovering of the line on the winches (in particular for deep water lifting);

.2 planning ballast or counter ballast operations;

.3 identifying the possibility to use the roll reduction systems in all operational stages;

.4 collecting latest weather forecasts in order to define the environmental conditions for the intended lifting operation;

.5 using limiting stability curves, if applicable;

.6 defining the stop work limits:

.1 heeling angles in compliance with the stability criteria; and

.2 environmental conditions; and

.7 defining and implementing corrective and emergency procedures."

and the existing paragraph 3.8 is renumbered as paragraph 3.9, accordingly.

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ANNEX 6

DRAFT MSC CIRCULAR

REVISED GUIDELINES ON EVACUATION ANALYSIS FOR NEW AND EXISTING PASSENGER SHIPS

1 The Maritime Safety Committee, at its seventy-first session (19 to 28 May 1999), having approved the *Interim Guidelines for a simplified evacuation analysis of ro-ro passenger ships* (MSC/Circ.909) as a guide for the implementation of SOLAS regulation II-2/28-1.3, and requested the Sub-Committee on Fire Protection (FP) to also develop guidelines on evacuation analysis for passenger ships in general and high-speed passenger craft.

2 The Committee, at its seventy-fourth session (30 May to 8 June 2001), following a recommendation of the forty-fifth session of the FP Sub-Committee (8 to 12 January 2001), approved the *Interim Guidelines for a simplified evacuation analysis of high-speed passenger craft* (MSC/Circ.1001). The Committee, at its eightieth session (11 to 20 May 2005), after having considered a proposal by the forty-ninth session of the Sub-Committee on Fire Protection (24 to 28 January 2005) made in light of the experience gained in the application of the aforementioned interim guidelines, approved the *Guidelines for a simplified evacuation analysis of high-speed passenger craft* (MSC/Circ.1166), which superseded MSC/Circ.1001, together with the worked example appended thereto.

3 The Committee, at its seventy-fifth session (15 to 24 May 2002), further approved the *Interim guidelines on evacuation analys*es *for new and existing passenger ships* (MSC/Circ.1033) and invited Member Governments to collect and submit to the Sub-Committee on Fire Protection for further consideration, any information and data resulting from research and development activities, full-scale tests and findings on human behaviour which may be relevant for the necessary future upgrading of the interim guidelines.

4 The Committee, at its eighty-third session (3 to 12 October 2007), approved the *Guidelines on evacuation analys*es *for new and existing passenger ships* (MSC.1/Circ.1238), including ro-ro passenger ships.

5 The Committee, at its [ninety-sixth session (11 to 20 May 2016)], approved the *Revised Guidelines on evacuation analys*es *for new and existing passenger ships*, as set out in the annexes, as a guide for the implementation of amendments to SOLAS regulation II-2/13.3.2.7[1], making evacuation analysis mandatory not only for ro-ro passenger ships but also for other passenger ships constructed on or after [1 January 2020].

6 The annexed revised guidelines offer the possibility of using two distinct methods:

.1 a simplified evacuation analysis (annex 2); and/or

.2 an advanced evacuation analysis (annex 3).

7 The assumptions inherent within the simplified method are by their nature limiting. As the complexity of the ships increases (through the mix of passenger types, accommodation types, number of decks and number of stairways) these assumptions become less representative of reality. In such cases, the use of the advanced method would be preferred.

[1] The amendments to SOLAS regulation II-2/13.3.2.7 were adopted by the Committee, at [its ninety-sixth session (11 to 20 May 2016)] and are expected to enter into force on [1 January 2020].

However, in early design iterations of the ship, the simplified method has merit due to its relative ease of use and its ability to provide an approximation to expected evacuation performance.

8 It is also to be noted that the acceptable evacuation durations in these guidelines are based on an analysis of fire risk.

9 Member Governments are invited to bring the annexed guidelines (annexes 1, 2 and 3) to the attention of all those concerned and, in particular, to:

.1 recommend them to use these guidelines when conducting evacuation analyses, early in the design process, on new ro-ro passenger ships in compliance with SOLAS regulation II-2/13.7.4 (which entered into force on 1 July 2002) and SOLAS regulation II-2/13.3.2.7 (which is expected to enter into force on 1 January 2020);

.2 recommend them to use these guidelines when conducting evacuation analyses, early in the design process, on new passenger ships other than ro-ro passenger ships constructed on or after [1 January 2020] carrying more than 36 passengers in compliance with SOLAS regulation II-2/13.3.2.7 (which is expected to enter into force on 1 January 2020); and

.3 encourage them to conduct evacuation analyses on existing passenger ships using these guidelines.

10 Member Governments are also encouraged to:

.1 collect and submit to the Sub-Committee on Ship Systems and Equipment for further consideration, any information and data resulting from research and development activities, full-scale tests and findings on human behaviour, which may be relevant for the necessary future upgrading of the present guidelines;

.2 submit to the Sub-Committee on Ship Systems and Equipment information on experience gained in the implementation of the guidelines; and

.3 use the Guidance on validation/verification of evacuation simulation tools provided in annex 3 to the present circular when assessing the ability of evacuation simulation tools to perform an advanced evacuation analysis.

11 This circular supersedes MSC.1/Circ.1238.

ANNEX 1

REVISED GUIDELINES ON EVACUATION ANALYSIS FOR NEW AND EXISTING PASSENGER SHIPS

Preamble

1 The following information is provided for consideration by, and guidance to, the users of these guidelines:

.1 To ensure uniformity of application, typical benchmark scenarios and relevant data are specified in the guidelines. Therefore, the aim of the analysis is to assess the performance of the ship with regard to the benchmark scenarios rather than simulating an actual emergency.

.2 Although the approach is, from a theoretical and mathematical point of view, sufficiently developed to deal with realistic simulations of evacuation on board ships, there is still a shortfall in the amount of verification data and practical experience on its application. When suitable information is provided by Member Governments, the Organization should reappraise the figures, parameters, benchmark scenarios and performance standards defined in the interim guidelines.

.3 Almost all the data and parameters given in the guidelines are based on well-documented data coming from civil building experience. The data and results from ongoing research and development show the importance of such data for improving the interim guidelines. Nevertheless, the simulation of these benchmark scenarios are expected to improve ship design by identifying inadequate escape arrangements, congestion points and optimizing evacuation arrangements, thereby significantly enhancing safety.

2 For the above considerations, it is recommended that:

.1 the evacuation analysis be carried out as indicated in the guidelines, in particular using the scenarios and parameters provided;

.2 the objective should be to assess the evacuation process through benchmark cases rather than trying to model the evacuation in real emergency conditions;

.3 application of the guidelines to analyse actual events to the greatest extent possible, where passengers were called to assembly stations during a drill or where a passenger ship was actually evacuated under emergency conditions, would be beneficial in validating the guidelines;

.4 the aim of the evacuation analysis for existing passenger ships should be to identify congestion points and/or critical areas and to provide recommendations as to where these points and critical areas are located on board; and

.5 keeping in mind that it is the company's responsibility to ensure passenger and crew safety by means of operational measures, if the result of an analysis, conducted on an existing passenger ship shows that the maximum allowable evacuation duration has been exceeded, then the company should ensure that suitable operational measures (e.g. updates of the onboard emergency procedures, improved signage, emergency preparedness of the crew, etc.) are implemented.

1 General

1.1 The purpose of this part of the guidelines is to present the methodology for conducting an evacuation analysis and, in particular, to:

.1 confirm that the performance standards set out in these guidelines can be met;

.2 identify and eliminate, as far as practicable, congestion which may develop during an abandonment, due to normal movement of passengers and crew along escape routes, taking into account the possibility that crew may need to move along these routes in a direction opposite the movement of passengers;

.3 demonstrate that escape arrangements are sufficiently flexible to provide for the possibility that certain escape routes, assembly stations, embarkation stations or survival craft may be unavailable as a result of a casualty;

.4 identify areas of intense counter and cross flows; and

.5 provide information gained by the evacuation analysis to the operators.

2 Definitions

2.1 Persons load is the number of persons considered in the means of escape calculations contained in chapter 13 of the *Fire Safety Systems (FSS) Code* (resolution MSC.98(73)).

2.2 Response duration (R) is the duration it takes for people to react to the situation. This duration begins upon initial notification (e.g. alarm) of an emergency and ends when the passenger has accepted the situation and begins to move towards an assembly station.

2.3 Individual travel duration is the duration incurred by an individual in moving from its starting location to reach the assembly station.

2.4 Individual assembly duration is the sum of the individual response and the individual travel duration.

2.5 Total assembly duration (t_A) is the maximum individual assembly duration.

2.6 Total travel duration (T) is defined as the duration it takes for all persons on board to move from where they are upon notification to the assembly stations.

2.7 Embarkation and launching duration (E+L), is defined as the duration required to provide for abandonment by the total number of persons on board, starting from the time the abandon ship signal is given after all persons have been assembled, with lifejackets donned.

3 Method of evaluation

The steps in the evacuation analysis specified as below.

3.1 Description of the system:

.1 Identification of passenger and crew assembly stations.

.2 Identification of escape routes.

3.2 Common Assumptions

This method of estimating the evacuation duration is based on several idealized benchmark scenarios and the following assumptions are made:

.1 passengers and crew will evacuate via the main escape route towards their assigned assembly station, as referred to in SOLAS regulation II-2/13;

.2 passenger load and initial distribution are based on chapter 13 of the FSS Code;

.3 full availability of escape arrangements is considered, unless otherwise stated;

.4 assisting crew will immediately be at the evacuation duty locations ready to assist the passengers;

.5 smoke, heat and toxic fire products are not considered to impact passenger/crew performance;

.6 family group behaviour is not considered; and

.7 ship motion, heel, and trim are not considered.

4 Scenarios to be considered

4.1 As a minimum, four scenarios (cases 1, 2, 3 and 4) should be considered for the analysis as follows. If more detailed data considering the crew distribution is available, it may be used.

.1 case 1 (primary evacuation case, night) and case 2 (primary evacuation case, day) in accordance with chapter 13 of the FSS Code.

.2 case 3 (secondary evacuation cases, night) and case 4 (secondary evacuation cases, day). In these cases only the main vertical zone, which generates the longest individual assembly duration, is further investigated. These cases utilize the same population demographics as the primary evacuation cases. The following are two alternatives that should be considered for both case 3 and case 4. For ro-ro passenger ships, alternative 1 should be the preferred option:

.1 alternative 1: one complete run of the stairways having largest capacity previously used within the identified main vertical zone is considered unavailable for the simulation; or

.2 alternative 2: 50% of the persons in one of the main vertical zones neighbouring the identified main vertical zone are forced to move into the zone and to proceed to the relevant assembly station. The neighbouring zone with the largest population should be selected.

4.2 The following additional scenarios may be considered as appropriate.

.1 case 5 (Open Deck): If an open deck is outfitted for use by passengers and if its gross surface area is larger than 400 m² or accommodates more than 200 persons the following, additional day case should be analysed: All persons are to be distributed as defined in the primary day case (case 2) and the open deck should be considered as an additional public space with an initial density of 0.5 persons/m², calculated using the gross deck surface area.

.2 case 6 (Embarkation): If separate embarkation and assembly stations are employed, an analysis of travel duration from assembly station to the entry point of LSA should be taken into account in the process of determining embarkation and launching duration (E+L). All persons which the ship is certified to carry are initially distributed according to the designated capacities of the assembly stations. The persons will move to the entry point of LSA according to the operator's procedures and designated routes. The time for boarding the LSA is determined during LSA prototype test and thus need not be addressed in detail in the simulation. However, congestion directly in front of the LSA should be considered as part of the simulation. These congestions need to be considered as blockage or obstacle for passenger and crew passing, i.e. generated with a LSA entry flow rate equal to the one observed during the LSA test.

4.3 If the total number of persons on board calculated, as indicated in the above cases, exceeds the maximum number of persons the ship will be certified to carry, the initial distribution of people should be scaled down so that the total number of persons is equal to what the ship will be certified to carry.

5 Performance standards

5.1 The following performance standards, as illustrated in figure 5.1, should be complied with:

Calculated total evacuation duration:

$$1.25\ (R+T) + 2/3\ (E+L) \leq n \qquad (1)$$

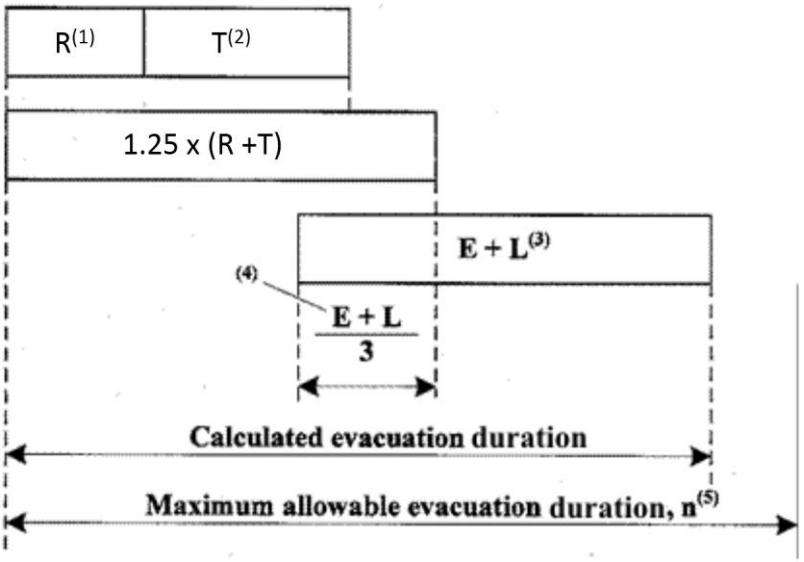
$$(E+L) \leq 30 \text{ min} \qquad (2)$$

5.2 In performance standard (1):

.1 for ro-ro passenger ships, n = 60; and

.2 for passenger ships other than ro-ro passenger ships, n = 60 if the ship has no more than three main vertical zones; and 80, if the ship has more than three main vertical zones.

5.3 Performance standard (2) complies with SOLAS regulation III/21.1.3.



(1) according to detailed specification of analysis method
(2) calculated as in the annexes to these guidelines
(3) maximum 30 min in compliance with SOLAS regulation III/21.1.3
(4) overlap duration = 1/3 (E+L)
(5) values of n (min) provided in 5.2

Figure 5.1

5.4 E + L should be calculated separately based upon:

.1 results of full scale trials on similar ships and evacuation systems,

.2 results of a simulation based embarkation analysis; or

.3 data provided by the manufacturers. However, in this case, the method of calculation should be documented, including the value of correction factor used.

The embarkation and launching duration (E+L) should be clearly documented to be available in case of change of LSA.

5.5 For cases where neither of the three above methods can be used, (E+L) should be assumed equal to 30 min.

6 Documentation

The documentation of the analysis should report on the following items:

.1 basic assumptions for the analysis;

.2 schematic representation of the layout of the zones subjected to the analysis;

.3 initial distribution of persons for each considered scenario;

.4 methodology used for the analysis if different from these guidelines;

.5 details of the calculations;

.6 total evacuation duration;

.7 identified congestion points; and

.8 identified areas of counter and crossing flows;

7 Corrective Actions

7.1 For new ships, if the total evacuation duration calculated is in excess of the allowed total evacuation duration, corrective actions should be considered at the design stage by suitably modifying the arrangements affecting the evacuation system in order to reach an acceptable total evacuation duration.

7.2 For existing ships, if the total evacuation duration calculated is in excess of the allowed total evacuation duration, onboard evacuation procedures should be reviewed with a view toward taking appropriate actions which would reduce congestion which may be experienced in locations as indicated by the analysis.

ANNEX 2

GUIDELINES FOR A SIMPLIFIED EVACUATION ANALYSIS FOR NEW AND EXISTING PASSENGER SHIPS

1 Specific Assumptions

1.1 This method of estimating evacuation duration is basic in nature and, therefore, common evacuation analysis assumptions should be made as follows:

.1 all passengers and crew will begin evacuation at the same time and will not hinder each other;

.2 initial walking speed depends on the density of persons, assuming that the flow is only in the direction of the escape route, and that there is no overtaking;

.3 people can move unhindered;

.4 counterflow is accounted for by a counterflow correction factor; and

.5 simplifications are accounted for in a correction factor and a safety factor. The safety factor has a value of 1.25.

2 Calculation of the evacuation duration

2.1 The following components should be considered:

.1 response duration (R) should be 10 min for the night time scenarios and 5 min for the day time scenarios;

.2 method to calculate the travel duration (T) is given in appendix 1; and

.3 embarkation and launching duration (E+L).

3 Identification of congestion

3.1 Congestion is identified by the following criteria:

.1 initial density equal to, or greater than, 3.5 persons/m^2; and

.2 the difference between inlet and outlet of calculated flows (F_C) is larger than 1.5 persons per second.

APPENDIX 1

METHOD TO CALCULATE THE TRAVEL DURATION (T)

1 PARAMETERS TO BE CONSIDERED

1.1 Clear width (W_c)

Clear width is measured off the handrail(s) for corridors and stairways and the actual passage width of a door in its fully open position.

1.2 Initial density of persons (D)

The initial density of persons in an escape route is the number of persons (p) divided by the available escape route area pertinent to the space where the persons are originally located and expressed in (p/m^2).

1.3 Speed of persons (S)

The speed (m/s) of persons along the escape route depends on the specific flow of persons (as defined in 1.4) and on the type of escape facility. People speed values are given in tables 1.1 (initial speed) and 1.3 below (speed after transition point as a function of specific flow).

1.4 Specific flow of persons (F_s)

Specific flow (p/m/s) is the number of escaping persons past a point in the escape route per unit time per unit of clear width W_c of the route involved. Values of F_S are given, in table 1.1 (initial F_s as a function of initial density) and in table 1.2 (maximum value) below.

Table 1.1[2] – Values of initial specific flow and initial speed as a function of density

Type of facility	Initial density D (p/m^2)	Initial specific flow Fs (p/m/s)	Initial speed of persons S (m/s)
Corridors	0	0	1.2
	0.5	0.65	1.2
	1,9	1.3	0.67
	3.2	0.65	0.20
	≥ 3.5	0.32	0.10

Table 1.2[2] – Value of maximum specific flow

Type of facility	Maximum specific flow Fs (p/m/s)
Stairs (down)	1.1
Stairs (up)	0.88
Corridors	1.3
Doorways	1.3

[2] Data derived from land-based stairs, corridors and doors in civil building and extracted from the publication "SFPE Fire Protection Engineering Handbook, 2nd edition, NFPA 1995".

Table 1.3[2] – Values of specific flow and speed

Type of facility	Specific flow Fs (p/m/s)	Speed of persons S (m/s)
Stairs (down)	0	1.0
	0.54	1.0
	1.1	0.55
Stairs (up)	0	0.8
	0.43	0.8
	0.88	0.44
Corridors	0	1.2
	0.65	1.2
	1.3	0.67

1.5 Calculated flow of persons (F_c)

The calculated flow of persons (p/s) is the predicted number of persons passing a particular point in an escape route per unit time. It is obtained from:

$$F_c = F_s W_c \quad (1.5)$$

1.6 Flow duration (t_F)

Flow duration (s) is the total duration needed for N persons to move past a point in the egress system, and is calculated as:

$$t_F = N / F_c \quad (1.6)$$

1.7 Transitions

Transitions are those points in the egress system where the type (e.g. from a corridor to a stairway) or dimension of a route changes or where routes merge or ramify. In a transition, the sum of all the outlet-calculated flow is equal to the sum of all the inlet-calculated flow:

$$\Sigma F_c(in)_i = \Sigma F_c(out)_j \quad (1.7)$$

where:

$F_c(in)_i$ = calculated flow of route (i) arriving at transition point
$F_c(out)_j$ = calculated flow of route (j) departing from transition point

1.8 Travel duration T, correction factor and counterflow correction factor

Travel duration T expressed in seconds as given by:

$$T = (\gamma+\delta)\, t_l \quad (1.8)$$

where:

γ = is the correction factor to be taken equal to 2 for cases 1 and 2 and 1.3 for cases 3 and 4;
δ = is the counterflow correction factor to be taken equal to 0.3; and

[2] Data derived from land-based stairs, corridors and doors in civil building and extracted from the publication "SFPE Fire Protection Engineering Handbook, 2nd edition, NFPA 1995".

t_I = is the highest travel duration expressed in seconds in ideal conditions resulting from application of the calculation procedure outlined in paragraph 2 of this appendix.

2 Procedure for calculating the travel duration in ideal conditions

2.1 Symbols

To illustrate the procedure, the following notation is used:

t_{stair} = stairway travel duration (s) of the escape route to the assembly station

t_{deck} = travel duration (s) to move from the farthest point of the escape route of a deck to the stairway

$t_{assembly}$ = travel duration (s) to move from the end of the stairway to the entrance of the assigned assembly station

2.2 Quantification of flow duration

The basic steps of the calculation are the following:

.1 Schematization of the escape routes as a hydraulic network, where the pipes are the corridors and stairways, the valves are the doors and restrictions in general, and the tanks are the public spaces.

.2 Calculation of the density D in the main escape routes of each deck. In the case of cabin rows facing a corridor, it is assumed that the people in the cabins simultaneously move into the corridor; the corridor density is therefore the number of cabin occupants per corridor unit area calculated considering the clear width. For public spaces, it is assumed that all persons simultaneously begin the evacuation at the exit door (the specific flow to be used in the calculations is the door's maximum specific flow); the number of evacuees using each door may be assumed proportional to the door clear width.

.3 Calculation of the initial specific flows Fs, by linear interpolation from table 1.1, as a function of the densities.

.4 Calculation of the flow Fc for corridors and doors, in the direction of the correspondent assigned escape stairway.

.5 Once a transition point is reached; formula (1.7) is used to obtain the outlet calculated flow(s) Fc. In cases where two or more routes leave the transition point, it is assumed that the flow Fc of each route is proportional to its clear width. The outlet specific flow(s), Fs, is obtained as the outlet calculated flow(s) divided by the clear width(s); two possibilities exist:

.1 Fs does not exceed the maximum value of table 1.2; the corresponding outlet speed (S) is then taken by linear interpolation from table 1.3, as a function of the specific flow; or

.2 Fs exceeds the maximum value of table 1.2 above; in this case, a queue will form at the transition point, Fs is the maximum of table 1.2 and the corresponding outlet speed (S) is taken from table 1.3.

.6 The above procedure is repeated for each deck, resulting in a set of values of calculated flows Fc and speed S, each entering the assigned escape stairway.

.7 Calculation, from N (number of persons entering a flight or corridor) and from the relevant Fc, of the flow duration t_F of each stairway and corridor. The flow duration t_F of each escape route is the longest among those corresponding to each portion of the escape route.

.8 Calculation of the travel duration t_{deck} from the farthest point of each escape route to the stairway, is defined as the ratio of length/speed. For the various portions of the escape route, the travel durations should be summed up if the portions are used in series, otherwise the largest among them should be adopted. This calculation should be performed for each deck; as the people are assumed to move in parallel on each deck to the assigned stairway, the dominant value t_{deck} should be taken as the largest among them. No t_{deck} is calculated for public spaces.

.9 Calculation, for each stair flight, of its travel duration as the ratio of inclined stair flight length and speed. For each deck, the total stair travel duration, t_{stair}, is the sum of the travel durations of all stairs flights connecting the deck with the assembly station.

.10 Calculation of the travel duration t assembly from the end of the stairway (at the assembly station deck) to the entrance of the assembly station.

.11 The overall duration to travel along an escape route to the assigned assembly station is:

$$t_I = t_F + t_{deck} + t_{stair} + t_{assembly} \qquad (2.2.11)$$

.12 The procedure should be repeated for both the day and night cases. This will result in two values (one for each case) of t_I for each main escape route leading to the assigned assembly station.

.13 Congestion points are identified as follows:

.1 in those spaces where the initial density is equal, or greater than, 3.5 persons/m^2; and

.2 in those locations where the difference between inlet and outlet calculated flows (F_C) is in more than 1.5 persons per second.

.14 Once the calculation is performed for all the escape routes, the highest t_I should be selected for calculating the travel duration T using formula (1.8).

APPENDIX 2

EXAMPLE OF APPLICATION

1 General

1.1 This example provides an illustration on the application of the interim guidelines regarding cases 1 and 2. Therefore, it should not be viewed as a comprehensive and complete analysis nor as an indication of the data to be used.

1.2 The present example refers to an early design analysis of arrangements of a hypothetical new cruise ship. Moreover, the performance standard is assumed to be 60 min, as for ro-ro passenger ships. It should be noted that, at the time this example was developed, no such requirement is applicable for passenger ships other than ro-ro passenger ships. This example is therefore to be considered purely illustrative.

2 Ship characteristics

2.1 The example is limited to two main vertical zones (MVZ 1 and MVZ 2) of a hypothetical cruise ship. For MVZ 1, a night scenario is considered, hereinafter called case 1 (see figure 1) while a day scenario (case 2, see figure 2) is considered for MVZ 2.

2.2 In case 1, the initial distribution corresponds to a total of 449 persons located in the crew and passengers cabins as follows: 42 in deck 5; 65 in deck 6 (42 in the fore part and 23 in the aft part); 26 in deck 7; 110 in deck 9; 96 in deck 10; and 110 in deck 11. Deck 8 (assembly station) is empty.

2.3 In case 2, the initial distribution corresponds to a total of 1138 persons located in the public spaces as follows: 469 in deck 6; 469 in deck 7; and 200 in deck 9. Deck 8 (assembly station) is empty.

3 Description of the system

3.1 Identification of assembly stations

For both MVZ 1 and MVZ 2, the assembly stations are located at deck 8, which is also the embarkation deck.

3.2 Identification of escape routes

3.2.1 In MVZ 1, the escape routes are as follows (see figure 3):

.1 Deck 5 is connected with deck 6 (and then deck 8 where assembly stations are located) through one stair (stair A) in the fore part of the zone. Four corridors (corridors 1, 2, 3 and 4) and two doors (respectively door 1 and 2) connect the cabins with stair A. The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Area [m^2]	Notes
MVZ1 – deck 5 – corridor 1	0.9	13	11.7	To door 1
MVZ1 – deck 5 – corridor 2	0.9	20	18	To door 1
MVZ1 – deck 5 – corridor 3	0.9	9.5	8.55	To door 2
MVZ1 – deck 5 – corridor 4	0.9	20	18	To door 1
MVZ1 – deck 5 – door 1	0.9	N.A.	N.A.	To stair A
MVZ1 – deck 5 – door 2	0.9	N.A.	N.A.	To stair A
MVZ1 – deck 5 – stair A	1.35	4.67	N.A.	Up to deck 6

.2 Deck 6 is connected with deck 7 (and then deck 8) through two stairs (stairs A and B respectively in the fore and aft part of the zone). Four corridors (corridors 1, 2, 3 and 4) and two doors (doors 1 and 2) connect the fore cabins with stair A; and two corridors (corridors 5 and 6) and two doors (doors 3 and 4) connect the aft cabins with stair B. The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Area [m^2]	Notes
MVZ1 – deck 6 – corridor 1	0.9	13	11.7	To door 1
MVZ1 – deck 6 – corridor 2	0.9	20	18	To door 1
MVZ1 – deck 6 – corridor 3	0.9	9.5	8.55	To door 2
MVZ1 – deck 6 – corridor 4	0.9	20	18	To door 1
MVZ1 – deck 6 – door 1	0.9	N.A.	N.A.	To stair A
MVZ1 – deck 6 – door 2	0.9	N.A.	N.A.	To stair A
MVZ1 – deck 6 – stair A	1.35	4.67	N.A.	Up to deck 7
MVZ1 – deck 6 – corridor 5	0.9	13	11.7	To door 3
MVZ1 – deck 6 – corridor 6	0.9	20	18	To door 4
MVZ1 – deck 6 – door 3	0.9	N.A.	N.A.	To stair B
MVZ1 – deck 6 – door 4	0.9	N.A.	N.A.	To stair B
MVZ1 – deck 6 – stair B	1.35	4.67	N.A.	Up to deck 7

.3 Deck 7 is connected with deck 8 through stair C (stairs A and B coming from below stop at deck 7). Arrival of stairs A and B and deck 7 cabins are connected to stair C through 8 corridors, doors are neglected here in view of simplifying this example. The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Area [m^2]	Notes
MVZ1 – deck 7 – corridor 1	0.9	6	5.4	To stair C
MVZ1 – deck 7 – corridor 2	0.9	9	8.1	To corridor 7
MVZ1 – deck 7 – corridor 3	0.9	15	13.5	To corridor 8
MVZ1 – deck 7 – corridor 4	0.9	6	5.4	To stairway C
MVZ1 – deck 7 – corridor 5	0.9	14	12.6	To corridor 7
MVZ1 – deck 7 – corridor 6	0.9	15	13.5	To corridor 8
MVZ1 – deck 7 – corridor 7	2.4	11	26.4	From stair B
MVZ1 – deck 7 – corridor 8	2.4	9	21.6	From stair A to stair C
MVZ1 – deck 7 – stair C	1.40	4.67	N.A.	Up to deck 8

.4 Deck 11 is connected with deck 10 through a double stair (stair C) in the aft part of the zone. Two corridors (corridor 1 and 2) connect the cabins with stair C through two doors (respectively doors 1 and 2). The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Area [m^2]	Notes
MVZ1 – deck 11 – corridor 1	0.9	36	32.4	To door 1
MVZ1 – deck 11 – corridor 2	0.9	36	32.4	To door 2
MVZ1 – deck 11 – door 1	0.9	N.A.	N.A.	To stair C
MVZ1 – deck 11 – door 2	0.9	N.A.	N.A.	To stair C
MVZ1 – deck 11 – stair C	2.8	4.67	N.A.	down to deck 10

.5 Deck 10 has a similar arrangement as deck 11. The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Area [m^2]	Notes
MVZ1 – deck 10 – corridor 1	0.9	36	32.4	To door 1
MVZ1 – deck 10 – corridor 2	0.9	36	32.4	To door 2
MVZ1 – deck 10 – door 1	0.9	N.A.	N.A.	To stair C
MVZ1 – deck 10 – door 2	0.9	N.A.	N.A.	To stair C
MVZ1 – deck 10 – stair C	2.8	4.67	N.A.	down to deck 9

.6 Deck 9 has a similar arrangement as deck 11. The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Area [m^2]	Notes
MVZ1 – deck 9 – corridor 1	0.9	36	32.4	To door 1
MVZ1 – deck 9 – corridor 2	0.9	36	32.4	To door 2
MVZ1 – deck 9 – door 1	0.9	N.A.	N.A.	To stair C
MVZ1 – deck 9 – door 2	0.9	N.A.	N.A.	To stair C
MVZ1 – deck 9 – stair C	2.8	4.67	N.A.	down to deck 8

.7 Deck 8, people coming from decks 5, 6 and 7 (stair C) and from decks 11, 10 and 9 (stair C) enters the assembly station through paths 1 and 2. The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Notes
MVZ1 – deck 8 – path 1	2.00	9.50	to assembly station
MVZ1 – deck 8 – path 2	2.50	7.50	to assembly station

3.2.2 In MVZ 2, the escape routes are as follows (see figure 4):

.1 Deck 6 is connected with deck 7 (and then deck 8 where assembly stations are located) through two stairs (stair A and B respectively) in the fore part of the zone and through a double stair (stair C) in the aft part of the zone. Two doors (respectively door A and B) connect the public space with stairs A and B; and two doors (respectively door port side (PS) and door starboard side (SB)) connect the public space with stair C. The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Notes
MVZ2 – deck 6 – door A	1	N.A.	
MVZ2 – deck 6 – door B	1	N.A.	
MVZ2 – deck 6 – door C PS	1.35	N.A.	
MVZ2 – deck 6 – door C SB	1.35	N.A.	
MVZ2 – deck 6 – stair A	1.4	4.67	up to deck 7
MVZ2 – deck 6 – stair B	1.4	4.67	up to deck 7
MVZ2 – deck 6 – stair C	3.2	4.67	up to deck 7

.2 deck 7 is connected with deck 8 through the same arrangements as deck 6 to deck 7. The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Notes
MVZ2 – deck 7 – door A	1.7	N.A.	
MVZ2 – deck 7 – door B	1.7	N.A.	
MVZ2 – deck 7 – door C PS	0.9	N.A.	
MVZ2 – deck 7 – door C SB	0.9	N.A.	
MVZ2 – deck 7 – stair A	2.05	4.67	up to deck 8
MVZ2 – deck 7 – stair B	2.05	4.67	up to deck 8
MVZ2 – deck 7 – stair C	3.2	4.67	up to deck 8

.3 Deck 9 is connected with deck 8 through a double stair (stair C) in the aft part of the zone. Two doors (respectively door PS and door SB) connect the public space with stair C. The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Notes
MVZ2 – deck 9 – door C PS	1	N.A.	
MVZ2 – deck 9 – door C SB	1	N.A.	
MVZ2 – deck 9 – stair C	3.2	4.67	down to deck 7

.4 Deck 8, people coming from decks 6 and 7 (stairs A and B) enter directly the embarkation station (open deck) through doors A and B, while people coming from deck 9 (stair C) enter the assembly (muster) station through paths 1 and 2. The clear widths and lengths are:

Item	Wc (clear width)[m]	Length [m]	Notes
MVZ2 – deck 8 – door A	2.05	N.A.	to embarkation station
MVZ2 – deck 8 – door B	2.05	N.A.	to embarkation station
MVZ2 – deck 8 – path 1	2	9.5	to assembly station
MVZ2 – deck 8 – path 2	2.5	7.5	to assembly station

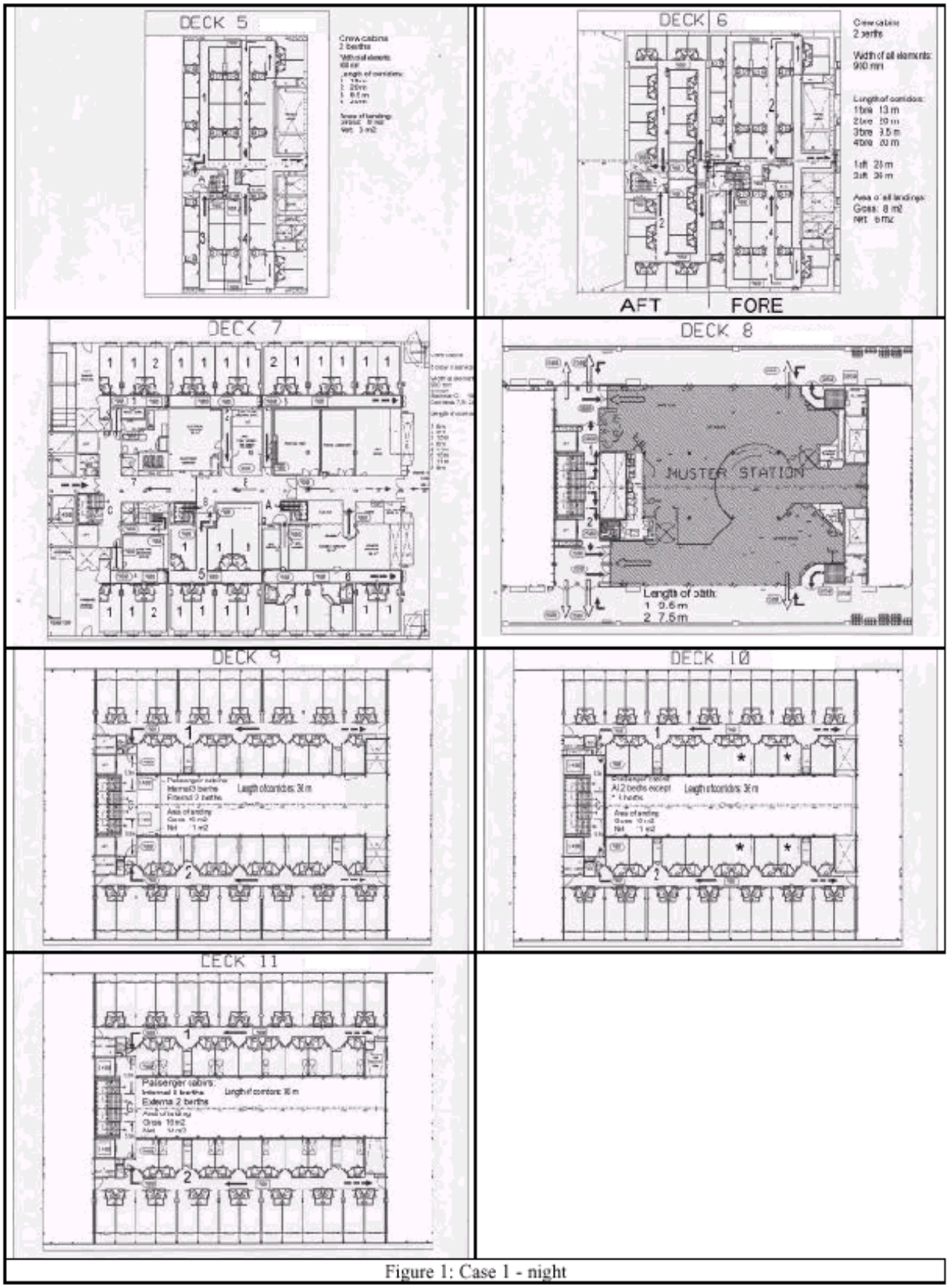


Figure 1: Case 1 - night

NOTE: "Muster Station" has the same meaning as "Assembly Station". Refer to *Indication of the assembly station in passenger ships* (MSC/Circ.777).

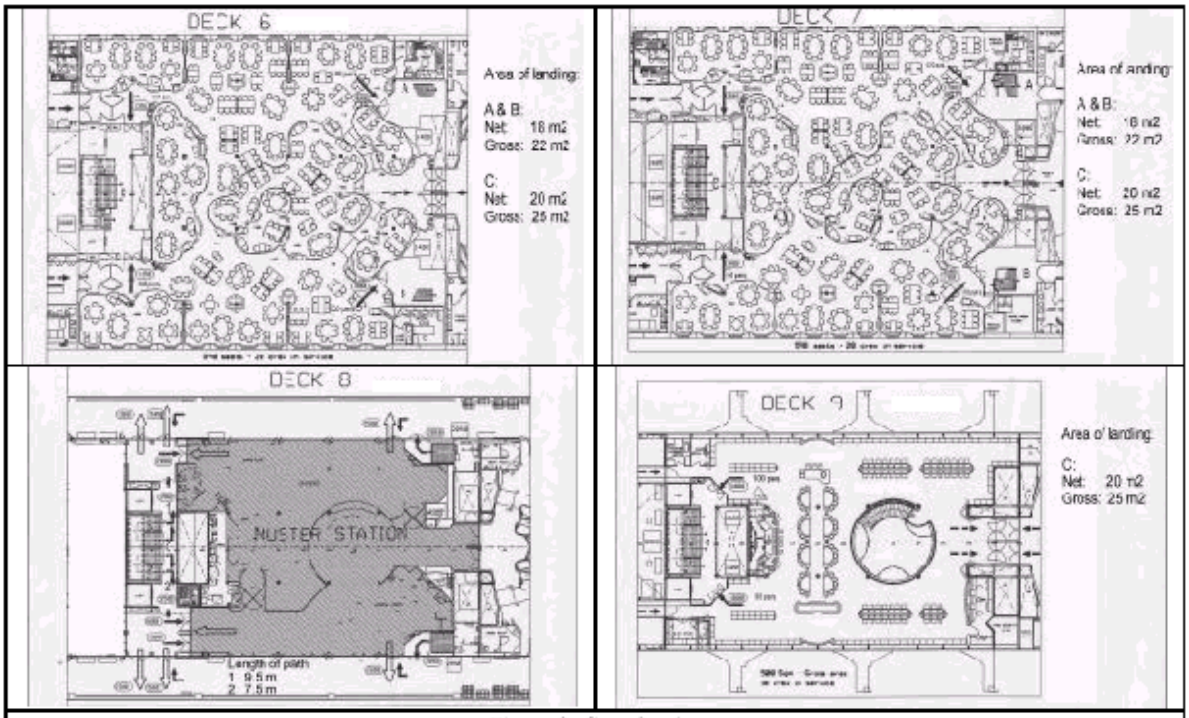


Figure 2: Case 2 - day

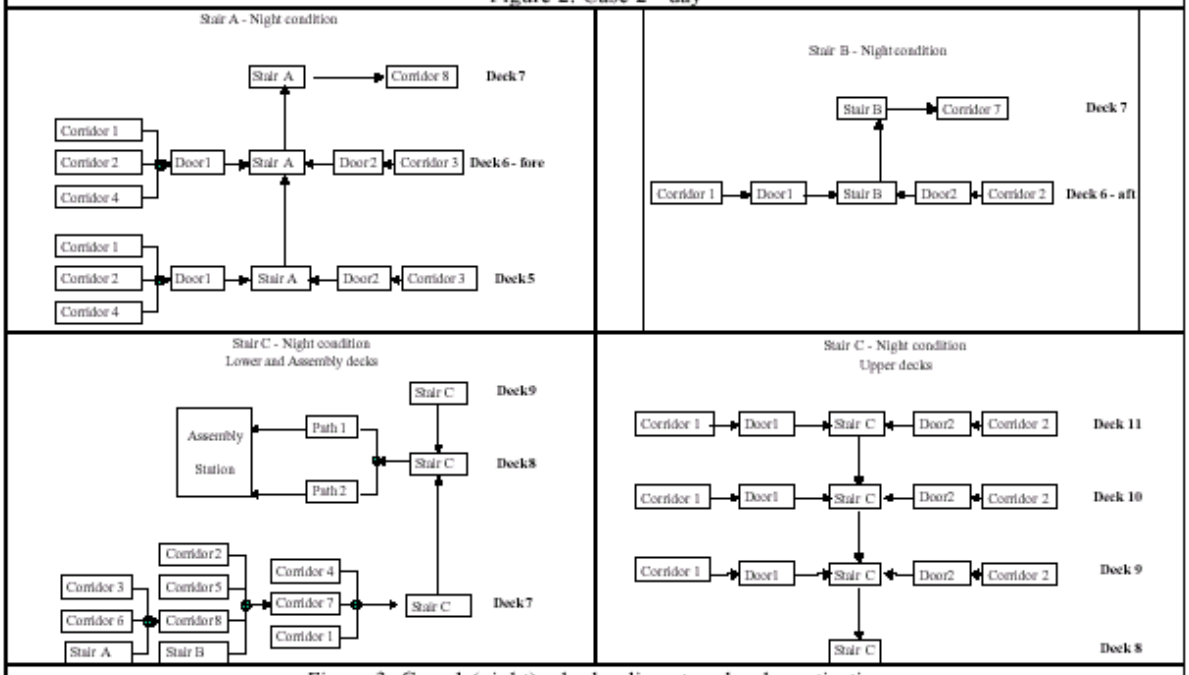


Figure 3: Case 1 (night) – hydraulic network schematisation

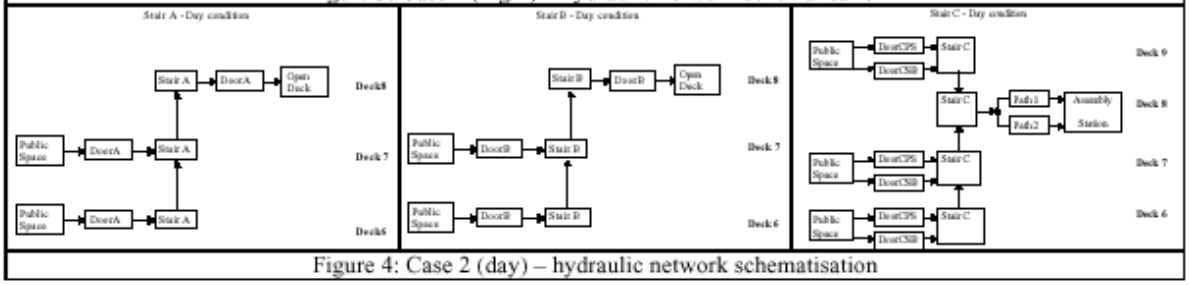


Figure 4: Case 2 (day) – hydraulic network schematisation

NOTE: "Muster Station" has the same meaning as "Assembly Station". Refer to *Indication of the assembly station in passenger ships* (MSC/Circ.777).

4 Scenarios considered

4.1 Case 1 refers to a day scenario in MVZ 1, according to chapter 13 of the FSS Code, the 449 persons are initially distributed as follows: 42 in deck 5; 65 in deck 6 (42 in the fore part and 23 in the aft part); 26 in deck 7; 110 in deck 9; 96 in deck 10; and 110 in deck 11. Deck 8 (assembly station) is empty. In accordance with paragraph 2.2 of appendix 1 to the guidelines, all persons in the cabins are assumed to simultaneously move into the corridors. The corresponding initial conditions are:

MVZ 1 – Corridors	Persons	Initial density D (p/m^2)	Initial specific flow Fs (p/m/s)	Calculated flow Fc (p/s)	Initial speed of persons S (m/s)
Deck 5 – corridor 1	11	0.94	0.85	0.77	1.03
Deck 5 – corridor 2	12	0.67	0.73	0.65	1.14
Deck 5 – corridor 3	8	0.94	0.85	0.77	1.04
Deck 5 – corridor 4	11	0.61	0.7	0.63	1.16
Deck 6 – corridor 1	11	0.94	0.85	0.77	1.03
Deck 6 – corridor 2	12	0.67	0.73	0.65	1.14
Deck 6 – corridor 3	8	0.94	0.85	0.77	1.04
Deck 6 – corridor 4	11	0.61	0.7	0.63	1.16
Deck 6 – corridor 5	11	0.94	0.85	0.77	1.03
Deck 6 – corridor 6	12	0.67	0.73	0.65	1.14
Deck 7 – corridor 1	4	0.74	0.76	0.69	1.11
Deck 7 – corridor 2	4	0.49	0.64	0.58	1.2
Deck 7 – corridor 3	6	0.44	0.58	0.52	1.2
Deck 7 – corridor 4	4	0.74	0.76	0.69	1.11
Deck 7 – corridor 5	6	0.48	0.62	0.56	1.2
Deck 7 – corridor 6	2	0.15	0.19	0.17	1.2
Deck 7 – corridor 7	0	0	N.A.	N.A.	N.A.
Deck 7 – corridor 8	0	0	N.A.	N.A.	N.A.
Deck 11 – corridor 1	55	1.7	1.21	1.09	0.75
Deck 11 – corridor 2	55	1.7	1.21	1.09	0.75
Deck 10 – corridor 1	48	1.48	1.11	1	0.83
Deck 10 – corridor 2	48	1.48	1.11	1	0.83
Deck 9 – corridor 1	55	1.7	1.21	1.09	0.74
Deck 9 – corridor 2	55	1.7	1.21	1.09	0.74

MVZ 1 – Stairs, doors & corridors	Persons (N)		Specific flow Fs in (p/m/s)	Max. specific flow Fs (p/m/s)	Specific flow Fs (p/m/s)	Cal-culated flow Fc (p/s)	Speed of persons S (m/s)	Queue	Comments	Notes
	From current route	Total including those from other routes								
Deck 5 – door 1	34	34	2.28	1.3	1.3	1.17	N.A.	Yes	From corridors 1, 2 and 4	1
Deck 5 – door 2	8	8	1.85	1.3	0.85	0.77	N.A.		From corridor 3	1
Deck 5 – stair A	42	42	1.43	0.88	0.88	1.188	0.44	Yes	From doors 1 and 2	1, 2
Deck 6 – door 1	34	34	2.58	1.30	1.3	1.17	N.A.	Yes	From corridors 1, 2, and 4;	1
Deck 6 – door 2	8	8	0.85	1.30	0.85	0.77	N.A.		From corridor 3	1
Deck 6 – stair A	42	84	2.32	0.88	0.88	1.188	0.44	Yes	From doors 1 and 2, from deck 5	1, 2
Deck 6 – door 3	11	11	0.85	1.30	0.85	0.77	N.A.		From corridor 5	1
Deck 6 – door 4	12	12	0.73	1.30	0.81	0.73	N.A.		From corridor 4	1
Deck 6 – stair B	23	23	1.05	0.88	0.88	1.188	0.44	Yes	From doors 3 and 4	1, 2
Deck 7 – corridor 8	8	92	0.78	1.3	0.78	1.88	1.09		From corridors 3 and 6, from deck 6, stair A	1, 3
Deck 7 – corridor 7	18	125	1.75	1.3	1.3	3.12	0.67	Yes	From corridors 2, 5 and 8, from deck 6, stair B	1, 4
Deck 7 – stair C	8	133	3.21	0.88	0.88	1.232	0.44	Yes	From corridors 1, 4 and 7; up to deck 8	1, 2, 5
Deck 11 – door 1	55	55	1.21	1.3	1.21	1.09	N.A.		To stair C	1
Deck 11 – door 2	55	55	1.21	1.3	1.21	1.09	N.A.		To stair C	1
Deck 11 – stair C	110	110	0.78	1.1	0.78	2.17	0.81		Down to deck 10	1, 2
Deck 10 – door 1	48	48	1.11	1.3	1.11	1	N.A.		To stair C	1
Deck 10 – door 2	48	48	1.11	1.3	1.11	1	N.A.		To stair C	1
Deck 10 – stair C	96	206	1.49	1.1	1.10	3.08	0.55	Yes	Down to deck 9	1, 2
Deck 9 – door 1	55	55	1.21	1.3	1.21	1.09	N.A.		To stair C	1
Deck 9 – door 2	55	55	1.21	1.3	1.21	1.09	N.A.		To stair C	1
Deck 9 – stair C	110	316	1.88	1.1	1.10	3.08	0.55	Yes	Down to deck 8	1, 2
Deck 8 – path 1	0	200	0.96	1.3	0.96	1.92	0.95		To assembly stat	1, 6
Deck 8 – path 2	0	249	0.96	1.3	0.96	2.4	0.95		To assembly stat	1, 6

Notes:

1 The specific flow "Fs in" is the specific flow entering the element of the escape route; the maximum specific flow is the maximum allowable flow given in table 1.3 of appendix 1 of the guidelines; the specific flow is the one applicable for the calculations i.e. the minimum between "Fs in" and the maximum allowable; when "Fs in" is greater than the maximum allowable, a queue is formed.

2 Some stairs are used by both persons coming from below (or above) and persons coming from the current deck considered; in making the calculation for a stair connecting deck N to deck N+1 (or deck N-1), the persons to be considered are those entering the stairs at deck N plus those coming from all decks below (or above) deck N.

3 At deck 7, 8 persons initially move from the cabins into corridor 8 and 84 persons arrive to corridor 8 from deck 6, stair A; the total is therefore 92 persons.

4 At deck 7, 18 persons initially move from the cabins into corridor 7, 23 persons arrive to corridor 7 from deck 6 stair B and 84 persons arrive to corridor 8 from deck 7, corridor 7; the total is therefore 125 persons.

5 At deck 7, 8 persons initially move from the cabins directly to the stair C and 125 persons arrive to stair C from corridor 8; the total is therefore 133 persons.

6 At deck 8 (assembly station), no persons are initially present; therefore, the escape routes on this deck are then used by the total number of persons arriving from above and/or below.

4.2 Case 2 refers to a day scenario in MVZ 2, according to chapter 13 of the FSS Code, the 1,138 persons are initially distributed as follows: 469 in deck 6; 469 in deck 7; and 200 in deck 9. Deck 8 (assembly station) is initially empty. In accordance with paragraph 2.2 of appendix 1 to the guidelines, all persons are assumed to simultaneously begin the evacuation and use the exit doors at their maximum specific flow. The corresponding initial conditions are:

MVZ 2 – Doors	Persons	Initial density D (p/m^2)	Initial Specific flow Fs (p/m/s)	Calculated flow Fc (p/s)	Initial speed of persons S (m/s)
Deck 6 – door A	100	N.A.	1.3	1.3	N.A.
Deck 6 – door B	100	N.A.	1.3	1.3	N.A.
Deck 6 – door C PS	134	N.A.	1.3	1.76	N.A.
Deck 6 – door C SB	135	N.A.	1.3	1.76	N.A.
Deck 7 – door A	170	N.A.	1.3	2.21	N.A.
Deck 7 – door B	170	N.A.	1.3	2.21	N.A.
Deck 7 – door C PS	65	N.A.	1.3	1.17	N.A.
Deck 7 – door C SB	64	N.A.	1.3	1.17	N.A.
Deck 9 – door C SB	100	N.A.	1.3	1.3	N.A.
Deck 9 – door C PS	100	N.A.	1.3	1.3	N.A.

MVZ 2 – Stairs	Persons (N)		Specific flow Fs in (p/m/s)	Max. specific flow Fs (p/m/s)	Specific flow Fs (p/m/s)	Calcu-lated flow Fc (p/s)	Speed of persons S (m/s)	Queue	Comments	Notes
	From current route	Total including those from other routes								
Deck 6 – stair A	100	100	0.93	0.88	0.88	1.23	0.44	Yes	up to deck 7	1
Deck 6 – stair B	100	100	0.93	0.88	0.88	1.23	0.44	Yes	up to deck 7	1
Deck 6 – stair C	269	269	1.1	0.88	0.88	2.82	0.44	Yes	up to deck 7	1
Deck 7 – stair A	170	270	1.68	0.88	0.88	1.8	0.44	Yes	up to deck 8	1, 2
Deck 7 – stair B	170	270	1.68	0.88	0.88	1.8	0.44	Yes	up to deck 8	1, 2
Deck 7 – stair C	129	398	1.61	0.88	0.88	2.82	0.44	Yes	up to deck 8	1, 2
Deck 9 – stair C	200	200	0.81	1.1	0.81	2.60	0.78		down to deck 8	
Deck 8 – path 1	0	266	1.2	1.3	1.2	2.41	0.75		from decks 7 and 9	1, 3
Deck 8 – path 2	0	332	1.2	1.3	1.2	3.01	0.75		from decks 7 and 9	1, 3
Deck 8 – door A	0	270	0.88	1.3	0.88	1.8	N.A.		from deck 7	1, 3
Deck 8 – door B	0	270	0.88	1.3	0.88	1.8	N.A.		from deck 7	1, 3

Notes:

1 The specific flow "Fs in" is the specific flow entering the element of the escape route; the maximum specific flow is the maximum allowable flow given in table 1.3 of appendix 1 of the guidelines; the specific flow is the one applicable for the calculations i.e. the minimum between "Fs in" and the maximum allowable; when "Fs in" is greater than the maximum allowable, a queue is formed.

2 Some stairs are used by both persons coming from below (or above) and persons coming from the current deck considered; in making the calculation for a stair connecting deck N to deck N+1 (or deck N-1), the persons to be considered are those entering the stairs at deck N plus those coming from all decks below (or above) deck N.

3 At deck 8 (assembly station), no persons are initially present; therefore, the escape routes on this deck are then used by the total number of persons arriving from above and/or below.

5 Calculation of t_F, t_{deck} and t_{stair}

5.1 For case 1:

Item	Persons N	Length L (m)	Calculated flow Fc (p/s)	Speed S (m/s)	Flow dur. t_F (s) t_F = N/ Fc	Deck or stairs dur., t_{deck}, t_{stairs} T = L/S	Entering
Deck 5 – corridor 1	11	13	0.77	1.03	14.3	12.6	Door 1
Deck 5 – corridor 2	12	20	0.65	1.14	18.3	17.6	Door 1
Deck 5 – corridor 3	8	9.5	0.77	1.04	10.4	9.2	Door 2
Deck 5 – corridor 4	11	20	0.63	1.16	17.4	17.3	Door 1
Deck 5 – door 1	34	N.A.	1.17	N.A.	29.1	N.A.	Stair A
Deck 5 – door 2	8	N.A.	0.77	N.A.	10.4	N.A.	Stair A
Deck 5 – stair A	42	4.67	1.188	0.44	35.4	10.6	Deck 6
Deck 6 – corridor 1	11	13	0.77	1.03	14.3	12.6	Door 1
Deck 6 – corridor 2	12	20	0.65	1.14	18.3	17.6	Door 1
Deck 6 – corridor 3	8	9.5	0.77	1.04	10.4	9.2	Door 2
Deck 6 – corridor 4	11	20	0.63	1.16	17.4	17.3	Door 1
Deck 6 – door 1	34	N.A.	1.17	N.A.	29.1	N.A.	Stair A
Deck 6 – door 2	8	N.A.	0.77	N.A.	10.4	N.A.	Stair A
Deck 6 – stair A	84	4.67	1.188	0.44	70.7	10.6	Deck 7
Deck 6 – corridor 5	11	13	0.77	1.03	14.3	12.6	Door 3
Deck 6 – corridor 6	12	20	0.65	1.14	18.3	17.6	Door 4
Deck 6 – door 3	11	N.A.	0.77	N.A.	14.3	N.A.	Stair B
Deck 6 – door 4	12	N.A.	0.65	N.A.	18.3	N.A.	Stair B
Deck 6 – stair B	23	4.67	1.188	0.44	19.4	10.6	Deck 7
Deck 7 – corridor 1	4	6	0.69	1.11	5.8	5.4	Stair C
Deck 7 – corridor 2	4	9	0.58	1.2	6.9	7.5	Corridor 7
Deck 7 – corridor 3	6	15	0.52	1.2	11.5	12.5	Corridor 8
Deck 7 – corridor 4	4	6	0.69	1.11	5.8	5.4	Stair C
Deck 7 – corridor 5	6	14	0.56	1.2	10.8	11.7	Corridor 7
Deck 7 – corridor 6	2	15	0.17	1.2	11.5	12.5	Corridor 8
Deck 7 – corridor 8	92	9	1.88	1.09	48.9	8.2	Corridor 7
Deck 7 – corridor 7	125	11	3.12	0.67	40.1	16.4	Stair C
Deck 7 – stair C	133	4.67	1.232	0.44	108	10.6	Deck 8
Deck 11– corridor 1	55	36	1.09	0.75	50.7	48.2	Door 1
Deck 11– corridor 2	55	36	1.09	0.75	50.7	48.2	Door 2
Deck 11 – door 1	55	N.A.	1.09	N.A.	50.7	N.A.	Stair C
Deck 11 – door 2	55	N.A.	1.09	N.A.	50.7	N.A.	Stair C
Deck 11 – stair C	110	4.67	2.17	0.81	50.7	5.8	Deck 10
Deck 10– corridor 1	48	36	1	0.83	48.2	43.5	Door 1
Deck 10– corridor 2	48	36	1	0.83	48.2	43.5	Door 2
Deck 10 – door 1	48	N.A.	1	N.A.	48.2	N.A.	Stair C
Deck 10 – door 2	48	N.A.	1	N.A.	48.2	N.A.	Stair C
Deck 10 – stair C	206	4.67	3.08	0.55	66.9	8.5	Deck 9
Deck 9 – corridor 1	55	36	1.09	0.74	50.7	48.4	Door 1
Deck 9 – corridor 2	55	36	1.09	0.74	50.7	48.4	Door 2
Deck 9 – door 1	55	N.A.	1.09	N.A.	50.7	N.A.	Stair C
Deck 9 – door 2	55	N.A.	1.09	N.A.	50.7	N.A.	Stair C
Deck 9 – stair C	316	4.67	3.08	0.55	102.6	8.5	Deck 8

5.2 For case 2: since in this particular arrangement there are no corridors, the deck duration is zero.

Item	Persons N	Length L (m)	Calculated flow Fc (p/s)	Speed S (m/s)	Flow dur. t_F (s) $t_F = N/ Fc$	Deck or stairs dur., t_{deck}, t_{stairs} t = L/S	Entering
Deck 6 – door A	100	N.A.	1.3	N.A	76.9	N.A.	Stair A
Deck 6 – door B	100	N.A.	1.3	N.A.	76.9	N.A.	Stair B
Deck 6 – door C PS	134	N.A.	1.76	N.A.	76.4	N.A.	Stair C
Deck 6 – door C SB	135	N.A.	1.76	N.A.	76.9	N.A.	Stair C
Deck 6 – stair A	100	4.67	1.23	0.44	81.2	10.6	Deck 7
Deck 6 – stair B	100	4.67	1.23	0.44	81.2	10.6	Deck 7
Deck 6 – stair C	269	4.67	2.82	0.44	95.5	10.6	Deck 7
Deck 7 – door A	170	N.A.	2.21	N.A	76.9	N.A.	Stair A
Deck 7 – door B	170	N.A.	2.21	N.A.	76.9	N.A.	Stair B
Deck 7 – door C PS	65	N.A.	1.17	N.A.	55.6	N.A.	Stair C
Deck 7 – door C SB	64	N.A.	1.17	N.A.	54.7	N.A.	Stair C
Deck 7 – stair A	270	4.67	1.8	0.44	149.7	10.6	Deck 8
Deck 7 – stair B	270	4.67	1.8	0.44	149.7	10.6	Deck 8
Deck 7 – stair C	398	4.67	2.82	0.44	141.3	10.6	Deck 8
Deck 8 – door A	270	N.A.	1.8	N.A.	149.7	N.A.	Embarkation
Deck 8 – door B	270	N.A.	1.8	N.A.	149.7	N.A.	Embarkation
Deck 9 – door PS	100	N.A.	1.3	N.A.	76.9	N.A.	Stair C
Deck 9 – door SB	100	N.A.	1.3	N.A.	76.9	N.A.	Stair C
Deck 9 – stair C	200	4.67	2.6	0.78	76.9	6	Deck 8

6 Calculation of $t_{assembly}$

6.1 Case 1: In this case, all the 429 persons use stair C (316 coming from above deck 8 and 133 from below) and, once arrived at deck 8, need to travel on deck 8 to reach the assembly station using either path 1 or path 2. The corresponding duration is as follows:

Item	Persons N	Length L (m)	Calculated flow Fc (p/s)	Speed S (m/s)	Flow dur. t_F (s) $t_F = N/ Fc$	$t_{assembly}$ t = L/S	Entering
Deck 8 – path 1	200	9.5	1.92	0.95	104.4	10	Assembly station
Deck 8 – path 2	249	7.5	2.4	0.95	103.9	7.9	Assembly station

6.2 Case 2: In this case, all the persons using stair C (totalling 598), once arrived at deck 8, need to travel through on deck 8 to reach the assembly station using either path 1 or path 2. The corresponding duration is as follows:

Item	Persons N	Length L (m)	Calculated flow Fc (p/s)	Speed S (m/s)	Flow dur. t_F (s) t_F = N/ Fc	$t_{assembly}$ t = L/S	Entering
Deck 8 – path 1	266	9.5	2.41	0.75	110.5	12.7	Assembly station
Deck 8 – path 2	332	7.5	3.01	0.75	110.3	10	Assembly station

7 Calculation of T

7.1 Case 1: The travel duration T, according to appendix 1 to the interim guidelines, is the maximum t_l (equation 2.2.11) multiplied by 2.3 (sum of correction factor and counterflow correction factor). The maximum values of t_l for each escape route are given in the following:

Escape route on	T_{deck}	t_f	t_{stair}	$t_{assembly}$	t_l	T	Notes
Deck 11	48.2	104.4	22.7	10	185.3	426.2	1
Deck 10	43.5	104.4	17	10	174.8	402	1, 2
Deck 9	48.4	104.4	8.5	10	171.3	394	1, 2
Deck 8	0	104.4	0	10	114.4	286.1	
Deck 7	37.1	108	10.6	10	163.9	377	1
Deck 6 – stair A (fore)	42.4	108	21.2	10	179.6	413.1	1, 3
Deck 6 – stair B (aft)	34	108	21.2	10	170.2	391.5	1, 3
Deck 5	42.2	108	31.8	10	190.2	437.5	1, 3

Notes:

1 The flow duration, t_f, is the maximum flow duration recorded on the whole escape route from the deck where persons started evacuating up to the assembly station.

2 The travel duration on the stairways (t_{stair}) is the total duration necessary to travel along all the stairs from the deck where persons originally started evacuating up to the deck where the assembly station is located; in the present case, t_{stair} for persons moving down from deck 11 is therefore the sum of t_{stair} from deck 11 to 10 (5.7 s), from deck 10 to 9 (8.5 s) and from deck 9 to 8 (8.5 s), in total 22.7 s; similarly for the other cases.

3 The travel duration on the stairways (t_{stair}) is the total duration necessary to travel along all the stairs from the deck where persons originally started evacuating up to the deck where the assembly station is located; in the present case, t_{stair} for persons moving up from deck 5 is therefore the sum of t_{stair} from deck 5 to 6 (10.6 s.), from deck 6 to 7 (10.6 s) and from deck 7 to 8 (10.6 s), in total 31.8 s; similarly for the other cases.

Accordingly, the corresponding value of T is 437.5 s.

7.2 Case 2: The travel duration T, according to appendix 1 to the guidelines, is the maximum t_I equation 2.2.11) multiplied by 2.3 (sum of correction factor and counterflow correction factor). The maximum values of t_I for each escape route are given in the following:

Escape route on	T_{deck}	t_f	t_{stair}	$t_{assembly}$	t_I	T	Notes
Deck 9	0	110.4	6	12.7	168.3	387.2	1, 2
Deck 8	0	110.4	0	12.7	162.4	373.4	
Deck 7 – stair A	0	149.7	10.6	0	160.3	368.6	
Deck 7 – stair B	0	149.7	10.6	0	160.3	368.6	
Deck 7 – stair C	0	141.3	10.6	12.7	164.6	378.7	2
Deck 6 – stair A	0	149.7	21.2	0	170.9	393	1, 3
Deck 6 – stair B	0	149.7	21.2	0	170.9	393	1, 3
Deck 6 – stair C	0	141.3	21.2	12.7	175.2	403.1	1, 2, 3

Notes:

1 The flow duration, t_f, is the maximum flow duration recorded on the whole escape route from the deck where persons started evacuating up to the assembly station.

2 In this example, stairs A and B are already leading to the embarkation station; therefore, only those escape routes passing through stair C need additional duration, $t_{assembly}$, to reach the assembly station.

3 The travel duration on the stairways (t_{stair}) is the total duration necessary to travel along all the stairs from the deck where persons originally started evacuating up to the deck where the assembly station is located; in the present case, t_{stair} for persons moving from deck 6 is therefore the sum of t_{stair} from deck 6 to 7 (10.6 s) and from deck 7 to 8 (10.6 s).

Accordingly, the corresponding value of T is 403.1 s.

8 Identification of congestion

8.1 Case 1: Congestion takes place on deck 5 (door 1 and stair A), deck 6 (door 1, stairs A and B), deck 7 (corridor 7 and stair C), deck 10 (stair C) and deck 9 (stair C). However, since the total duration is below the limit (see paragraph 9.1 of this example) and no design modifications are needed.

8.2 Case 2: Congestion takes place on deck 6 (stairs A, B and C) and deck 7 (stairs A, B and C). However, since the total duration is below the limit (see paragraph 9.2 of this example) no design modifications are needed.

9 Performance standard

9.1 Case 1: The total evacuation duration, according to paragraph 5.1 of the revised guidelines is as follows:

$$1.25\ (R+T) + 2/3\ (E+L) = 1.25\text{-}x\ (10' + 7'18'') + 20 = 41'\ 38'' \qquad (9.1)$$

where:

(E+L) is assumed to be 30'
R = 10' (night case)
T = 7' 18"

9.2 Case 2: The total evacuation duration, according to paragraph 5.1 of the revised guidelines is as follows:

$$1.25\ (R+T) + 2/3\ (E+L) = 1.25\text{-}x\ (5' + 6'\ 43") + 20 = 34'\ 39" \qquad (9.2)$$

where:

(E+L) is assumed to be 30'
R = 5' (day case)
T = 6' 43".

ANNEX 3

GUIDELINES FOR AN ADVANCED EVACUATION ANALYSIS OF NEW AND EXISTING PASSENGER SHIPS[3]

1 Specific Assumptions

1.1 This method of estimating the evacuation duration is based on several idealized benchmark scenarios and the following assumptions are made:

.1 the passengers and crew are represented as unique individuals with specified individual abilities and response durations;

.2 a safety factor having a value of 1.25 is introduced in the calculation to take account of model omissions, assumptions, and the limited number and nature of the benchmark scenarios considered.

2 Calculation of the evacuation duration

2.1 The following components should be included in the calculation of the evacuation duration as specified in the appendix:

.1 The response duration (R) distribution to be used in the calculations.

.2 The method to determine the travel duration (T).

.3 Embarkation and launching duration (E+L).

3 Identification of congestion

3.1 Congestion within regions is identified by local population densities exceeding 4 p/m^2 for significant duration. These levels of congestion may or may not be significant to the overall assembly process.

3.2 If any identified congestion region is found to persist for longer than 10% of the simulated total assembly duration (t_A), it is considered to be significant.

[3] **Note:** Advanced evacuation analysis is taken to mean a computer-based simulation that represents each occupant as an individual that has a detailed representation of the layout of a ship and represents the interaction between the occupants and the layout.

APPENDIX 1

METHOD TO DETERMINE THE TRAVEL DURATION (T) BY SIMULATION TOOLS FOR THE ADVANCED EVACUATION ANALYSIS

1 Characteristics of the models

1.1 Each person (p) is represented in the model individually.

1.2 The abilities of each person are determined by a set of parameters, some of which are probabilistic.

1.3 The movement of each person is recorded.

1.4 The parameters should vary among the individuals of the population.

1.5 The basic rules for personal decisions and movements are the same for everyone, described by a universal algorithm.

1.6 The time difference between the actions of any two persons in the simulation should be not more than one second of simulated time, e.g. all persons proceed with their action in one second (a parallel update is necessary).

2 Parameters to be used

2.1 In order to facilitate their use, the parameters are grouped into the same 4 categories as used in other industrial fields, namely: GEOMETRICAL, POPULATION, ENVIRONMENTAL and PROCEDURAL.

2.2 Category GEOMETRICAL: layout of escape routes, their obstruction and partial unavailability, initial passenger and crew distribution conditions.

2.3 Category POPULATION: ranges of parameters of persons and population demographics.

2.4 Category ENVIRONMENTAL: static and dynamic conditions of the ship.

2.5 Category PROCEDURAL: crew members available to assist in emergency.

3 Recommended values of the parameters

3.1 Category GEOMETRICAL

3.1.1 General. The evacuation analysis specified in this annex is aimed at measuring the performance of the ship in reproducing benchmark scenarios rather than simulating an actual emergency situation. Four benchmark cases should be considered, namely cases 1, 2, 3 and 4 (refer to paragraph 4 for detailed specifications) corresponding to primary evacuation cases (cases1 and 2, where all the escape routes should be assumed to be in operation) and secondary evacuation cases (cases 3 and 4, where some of the escape route should be assumed to be unavailable).

3.1.2 Layout of escape routes – primary evacuation cases (case 1 and case 2): Passengers and crew should be assumed to proceed along the primary escape routes and to know their ways up to the assembly stations; to this effect, signage, low-location lighting, crew training and other relevant aspects connected with the evacuation system design and operation should be assumed to be in compliance with the requirements set out in IMO instruments.

3.1.3 Layout of escape routes – secondary evacuation cases (case 3 and case 4): Those passengers and crew who were previously assigned to the now unavailable primary escape route should be assumed to proceed along the escape routes determined by the ship designer.

3.1.4 Initial passenger and crew distribution condition. The occupant distribution should be based upon the cases defined in chapter 13 of the FSS Code, as outlined in 4.

3.2 Category population

3.2.1 This describes the make-up of the population in terms of age, gender, physical attributes and response durations. The population is identical for all scenarios with the exception of the response duration and passenger initial locations. The population is made of the following mix:

Table 3.1 – Population's composition (age and gender)

Population groups – passengers	Percentage of passengers (%)
Females younger than 30 years	7
Females 30-50 years old	7
Females older than 50 years	16
Females older than 50, mobility impaired (1)	10
Females older than 50, mobility impaired (2)	10
Males younger than 30 years	7
Males 30-50 years old	7
Males older than 50 years	16
Males older than 50, mobility impaired (1)	10
Males older than 50, mobility impaired (2)	10
Population groups – crew	**Percentage of crew (%)**
Crew females	50
Crew males	50

All of the attributes associated with this population distribution should consist of a statistical distribution within a fixed range of values. The range is specified between a minimum and maximum value with a uniform random distribution.

3.2.2 Response Duration

The response duration distributions for the benchmark scenarios should be truncated logarithmic normal distributions[4] as follows:

[4] "Recommendations on the Nature of the Passenger Response Time Distribution to be used in the MSC.1033 Assembly Time Analysis Based on Data Derived from Sea Trials", Galea, E. R., Deere, S., Sharp, G., Fillips, L., Lawrence, P., and Gwunne, S., The Transaction of The Royal Institution of Naval Architects, Part A – International Journal of Maritime Engineering ISSN 14798751.2007.

For Case 1 and Case 3 (Night Cases):

$$y = \frac{1.01875}{\sqrt{2\pi}\,0.84(x-400)} \exp\left[-\frac{(\ln(x-400)-3.95)^2}{2\times 0.84^2}\right] \qquad (3.2.2.1)$$

$400 < x < 700$

For Case 2 and Case 4 (Day Cases):

$$y = \frac{1.00808}{\sqrt{2\pi}\,0.94x} \exp\left[-\frac{(\ln(x)-3.44)^2}{2\times 0.94^2}\right] \qquad (3.2.2.2)$$

$0 < x < 300$

where, x is the response duration in seconds and y is the probability density at response duration x.

3.2.3 Unhindered travel speeds on flat terrain (e.g. corridors)

The maximum unhindered travel speeds to be used are those derived from data published by Ando[5] which provides male and female walk rates as a function of age. These are distributed according to figure 3.1 and represented by approximate piecewise functions shown in table 3.3.

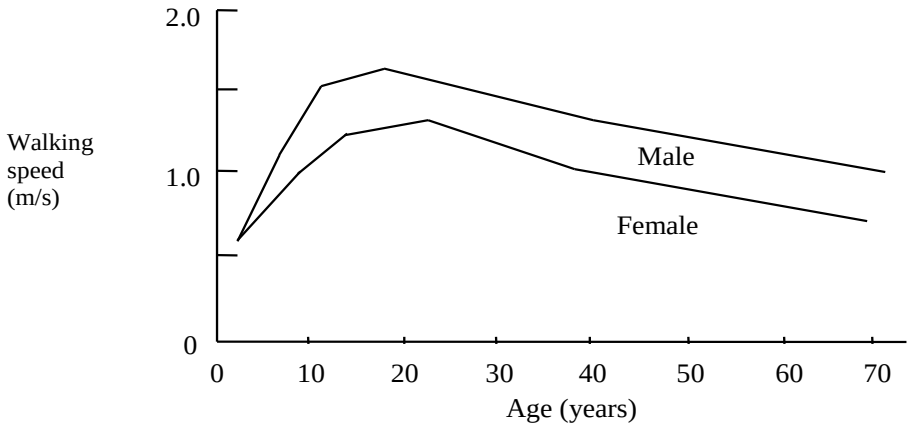


Figure 3.1 – Walking speeds as a function of age and gender

5 Ando K, Ota H, and Oki T, Forecasting The Flow Of People, Railway Research Review, (45), pp 8-14, 1988.

Table 3.3 – Regression formulation for mean travel speed values[6]

Gender	Age (years)	Speed (m/s)
Female	2 - 8.3	0.06 * age + 0.5
	8.3 - 13.3	0.04 * age + 0.67
	13.3 - 22.25	0.02 * age + 0.94
	22.25 - 37.5	-0.018 * age + 1.78
	37.5 - 70	-0.01 * age + 1.45
Male	2 - 5	0.16 * age + 0.3
	5 - 12.5	0.06 * age + 0.8
	12.5 - 18.8	0.008 * age + 1.45
	18.8 - 39.2	-0.01 * age + 1.78
	39.2 - 70	-0.009 * age + 1.75

For each and gender group specified in table 3.1, the walking speed should be modelled as a statistical uniform distribution having minimum and maximum values as follows:

Table 3.4 – Walking speed on flat terrain (e.g. corridors)

Population groups – passengers	**Walking speed on flat terrain (e.g. corridors)**	
	Minimum (m/s)	**Maximum (m/s)**
Females younger than 30 years	0.93	1.55
Females 30-50 years old	0.71	1.19
Females older than 50 years	0.56	0.94
Females older than 50, mobility impaired (1)	0.43	0.71
Females older than 50, mobility impaired (2)	0.37	0.61
Males younger than 30 years	1.11	1.85
Males 30-50 years old	0.97	1.62
Males older than 50 years	0.84	1.4
Males older than 50, mobility impaired (1)	0.64	1.06
Males older than 50, mobility impaired (2)	0.55	0.91
Population groups – crew	**Walking speed on flat terrain (e.g. corridors)**	
	Minimum (m/s)	**Maximum (m/s)**
Crew females	0.93	1.55
Crew males	1.11	1.85

6 Maritime EXODUS V4.0, USER GUIDE AND TECHNICAL MANUAL, Authors: E R Galea, S Gwynne, P. J. Lawrence, L. Filippidis, D. Blackshields and D. Cooney, CMS Press, May 2003 Revision 1.0, ISBN: 1 904521 38 X.

3.2.4 Unhindered stair speeds[7]

Speeds are given on the base of gender, age and travel direction (up and down). The speeds in table 3.5 are those along the inclined stairs. It is expected that all the data above will be updated when more appropriate data and results become available.

Table 3.5 – Walking speed on stairs

Population groups – passengers	**Walking speed on stairs (m/s)**			
	Stairs down		**Stairs up**	
	Min.	**Max.**	**Min.**	**Max.**
Females younger than 30 years	0.56	0.94	0.47	0.79
Females 30-50 years old	0.49	0.81	0.44	0.74
Females older than 50 years	0.45	0.75	0.37	0.61
Females older than 50, mobility impaired (1)	0.34	0.56	0.28	0.46
Females older than 50, mobility impaired (2)	0.29	0.49	0.23	0.39
Males younger than 30 years	0.76	1.26	0.5	0.84
Males 30-50 years old	0.64	1.07	0.47	0.79
Males older than 50 years	0.5	0.84	0.38	0.64
Males older than 50, mobility impaired (1)	0.38	0.64	0.29	0.49
Males older than 50, mobility impaired (2)	0.33	0.55	0.25	0.41
Population groups – Crew	**Walking speed on stairs (m/s)**			
	Stairs down		**Stairs up**	
	Min.	**Max.**	**Min.**	**Max.**
Crew females	0.56	0.94	0.47	0.79
Crew males	0.76	1.26	0.5	0.84

3.2.5 Consistency of travel speed

The unhindered travel speeds of each evacuee on flat terrain and on stairs (down and up) are consistent within the respective ranges specified in tables 3.4 and 3.5.

3.2.6 Exit flow rate (doors)

The specific unit flow rate is the number of escaping persons past a point in the escape route per unit time per unit width of the route involved, and is measured in number of persons (p). The specific unit flow rate[8] for any exit should not exceed 1.33 p/m/s.

3.3 **Category ENVIRONMENTAL**

Static and dynamic conditions of the ship. These parameters will influence the moving speed of persons. Presently no reliable figures are available to assess this effect; therefore, these parameters could not yet be considered. This effect will not be accounted for in the scenarios (cases 1, 2, 3 and 4) until more data has been gathered.

[7] The maximum unhindered stair speeds are derived from data generated by J. Fruin. Pedestrian planning and design, Metropolitan Association of Urban Designers and Environmental Planners, New York, 1971. The study comprises two staircase configurations.

[8] Value based on data accepted in civil building applications in Japan, the United Kingdom and the United States; this value is also consistent with the simplified evacuation analysis method.

3.4 **Category PROCEDURAL**

For the purposes of the four benchmark cases, it is not required to model any special crew procedures. However, the distribution of the crew for the benchmark cases should be in accordance with 4.

3.5 It is expected that all data provided in paragraphs 3.2 and 3.3 will be updated when more appropriate data and results become available.

4 Detailed specifications (scenarios) for the 4 cases to be considered

For the purpose of conducting the evacuation analysis, the following initial distributions of passengers and crew should be considered as derived from chapter 13 of the FSS Code, with the additional indications only relevant for the advanced evacuation analysis. If more detailed data considering the distribution of crew is available, the distribution may deviate from the following specifications:

4.1 **Case 1 and 3 (night)**

Passengers in cabins with maximum berthing capacity fully occupied; 2/3 of crew members in their cabins; of the remaining 1/3 of crew members:

.1 50% should be initially located in service spaces;

.2 25% should be located at their emergency stations and should not be explicitly modelled; and

.3 25% should be initially located at the assembly stations and should proceed towards the most distant passenger cabin assigned to that assembly station in counterflow with evacuees; once this passenger cabin is reached, these crew are no longer considered in the simulation. The ratio between the passenger and counterflow crew should be the same in each main vertical zone.

4.2 **Case 2 and 4 (day)**

Public spaces, as defined by SOLAS regulation II-2/3.39, will be occupied to 75% of maximum capacity of the spaces by passengers. Crew will be distributed as follows:

.1 1/3 of the crew will be initially distributed in the crew accommodation spaces (cabins and crew day spaces);

.2 1/3 of the crew will be initially distributed in the public spaces;

.3 the remaining 1/3 should be distributed as follows:

.1 50% should be located in service spaces;

.2 25% should be located at their emergency duty locations and should not be explicitly modelled; and

.3 25% should be initially located at the assembly stations and should proceed towards to the most distant passenger cabin assigned to that assembly station in counterflow with evacuees; once this passenger cabin is reached, these crew are no longer considered in the simulation. The ratio between the passenger and counterflow crew should be the same in each main vertical zone.

5 Procedure for calculating the travel duration T

5.1 The travel duration, both that predicted by models and as measured in reality, is a random quantity due to the probabilistic nature of the evacuation process.

5.2 In total, a minimum of 500 different simulations should be carried out for each of the benchmark cases. This will yield, for each case, a total of at least 500 values of t_A.

5.3 These simulations should be made up of at least 100 different randomly generated populations (within the range of population demographics specified in paragraph 3). Simulations based on each of these different populations should be repeated at least 5 times. If these 5 repetitions produce insignificant variations in the results, the total number of populations analysed should be 500 rather than 100, with only a single simulation performed for each population.

5.4 The minimum number of 500 different simulations can be reduced when a convergence is determined by an appropriate method, such as the one shown in appendix 3. The total number of different simulations should be in this case not less than 50.

5.5 The value of the travel duration for each of cases 1 to 4: the value t_l is taken which is higher than 95% of all the calculated values (i.e. for each of cases 1 to 4, the durations t_A are ranked from lowest to highest and t_l is selected for which 95% of the ranked values are lower).

5.6 The value of the travel duration to comply with the performance standard T is the highest of the four calculated travel durations t_l (one for each of cases 1 to 4).

5.7 The procedure for the calculating the travel duration for cases 5 and 6 should be based on the same principles as for cases 1 to 4.

6 Documentation of the simulation model used

6.1 The assumptions made for the simulation should be stated. Assumptions that contain simplifications above those in paragraph 3.2 of the *Guidelines for the advanced evacuation analysis of new and existing passenger ships*, should not be made.

6.2 The documentation of the algorithms should contain:

.1 the variables used in the model to describe the dynamics, e.g. walking speed and direction of each person;

.2 the functional relation between the parameters and the variables;

.3 the type of update, e.g. the order in which the persons move during the simulation (parallel, random sequential, ordered sequential or other);

.4 the representation of stairs, doors, assembly stations, embarkation stations, and other special geometrical elements and their influence on the variables during the simulation (if there is any) and the respective parameters quantifying this influence; and

.5 a detailed user guide/manual specifying the nature of the model and its assumptions and guidelines for the correct use of the model and interpretations of results should be readily available.

APPENDIX 2

GUIDANCE ON VALIDATION/VERIFICATION OF EVACUATION SIMULATION TOOLS

1 Software verification is an ongoing activity. For any complex simulation software, verification is an ongoing activity and is an integral part of its life cycle. There are at least four forms of verification that evacuation models should undergo. These are[9]:

.1 component testing;

.2 functional verification;

.3 qualitative verification; and

.4 quantitative verification.

Component testing

2 Component testing involves checking that the various components of the software perform as intended. This involves running the software through a battery of elementary test scenarios to ensure that the major sub-components of the model are functioning as intended. The following is a non-exhaustive list of suggested component tests that should be included in the verification process.

Test 1: Maintaining set walking speed in corridor

3 One person in a corridor 2 m wide and 40 m long with a walking speed of 1 m/s should be demonstrated to cover this distance in 40 s.

Test 2: Maintaining set walking speed up staircase

4 One person on a stair 2 m wide and a length of 10 m measured along the incline with a walking speed of 1 m/s should be demonstrated to cover this distance in 10 s.

Test 3: Maintaining set walking speed down staircase

5 One person on a stair 2 m wide and a length of 10 m measured along the incline with a walking speed of 1 m/s should be demonstrated to cover this distance in 10 s.

Test 4: Exit flow rate

6 100 persons (p) in a room of size 8 m by 5 m with a 1 m exit located centrally on the 5 m wall. The flow rate over the entire period should not exceed 1.33 p/s.

Test 5: Response Duration

7 Ten persons in a room of size 8 m by 5 m with a 1 m exit located centrally on the 5 m wall. Impose response durations as follows uniformly distributed in the range between 10 s and 100 s. Verify that each occupant starts moving at the appropriate time.

[9] Note: This procedure has been highlighted in ISO document ISO/TR 13387-8:1999.

Test 6: Rounding corners

8 Twenty persons approaching a left-hand corner (see figure 1) will successfully navigate around the corner without penetrating the boundaries.

Test 7: Assignment of population demographics parameters

9 Choose a panel consisting of males 30-50 years old from table 3.4 in the appendix to the Guidelines for the advanced evacuation analysis of new and existing ships and distribute the walking speeds over a population of 50 people. Show that the distributed walking speeds are consistent with the distribution specified in the table.

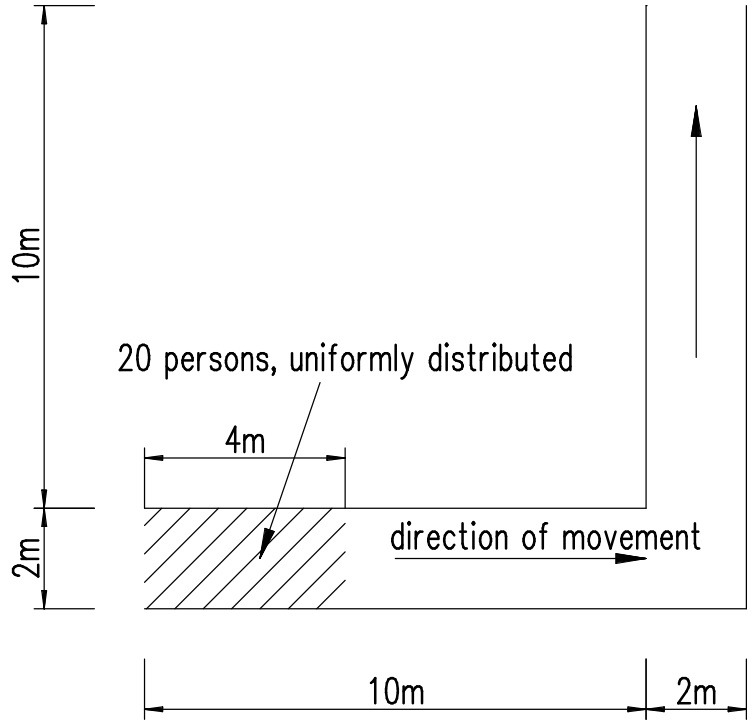


Figure 1: Transverse corridor

Functional verification

10 Functional verification involves checking that the model possesses the ability to exhibit the range of capabilities required to perform the intended simulations. This requirement is task specific. To satisfy functional verification the model developers must set out in a comprehensible manner the complete range of model capabilities and inherent assumptions and give a guide to the correct use of these capabilities. This information should be readily available in technical documentation that accompanies the software.

Qualitative verification

11 The third form of model validation concerns the nature of predicted human behaviour with informed expectations. While this is only a qualitative form of verification, it is nevertheless important, as it demonstrates that the behavioural capabilities built into the model are able to produce realistic behaviours.

Test 8: Counterflow – two rooms connected via a corridor

12 Two rooms 10 m wide and long connected via a corridor 10 m long and 2 m wide starting and ending at the centre of one side of each room. Choose a panel consisting of males 30-50 years old from table 3.4 in the appendix to the Guidelines for the advanced evacuation analysis of new and existing ships with instant response time and distribute the walking speeds over a population of 100 persons.

13 Step 1: One hundred persons move from room 1 to room 2, where the initial distribution is such that the space of room 1 is filled from the left with maximum possible density (see figure 2). The time the last person enters room 2 is recorded.

14 Step 2: Step one is repeated with an additional ten, fifty, and one hundred persons in room 2. These persons should have identical characteristics to those in room 1. Both rooms move off simultaneously and the duration for the last persons in room 1 to enter room 2 is recorded. The expected result is that the recorded duration increases with the number of persons in counterflow increases.

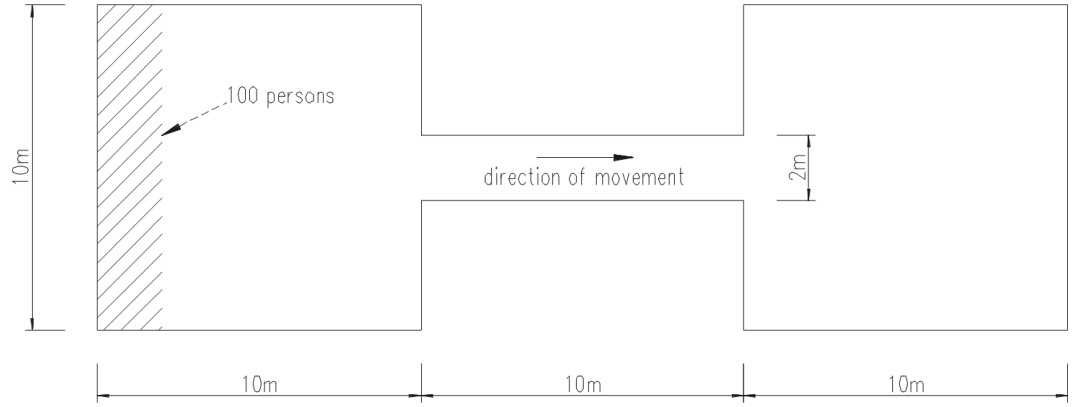


Figure 2: Two rooms connected via a corridor

Test 9: Exit flow: crowd dissipation from a large public room

15 Public room with four exits and 1,000 persons (see figure 3) uniformly distributed in the room. Persons leave via the nearest exits. Choose a panel consisting of males 30-50 years old from table 3.4 in the appendix to the *Guidelines for the advanced evacuation analysis of new and existing ships* with instant response time and distribute the walking speeds over a population of 1,000 persons.

Step 1: Record the amount of time the last person needs to leave the room.

Step 2: Close doors 1 and 2 and repeat step 1.

The expected result is an approximate doubling of the duration to empty the room.

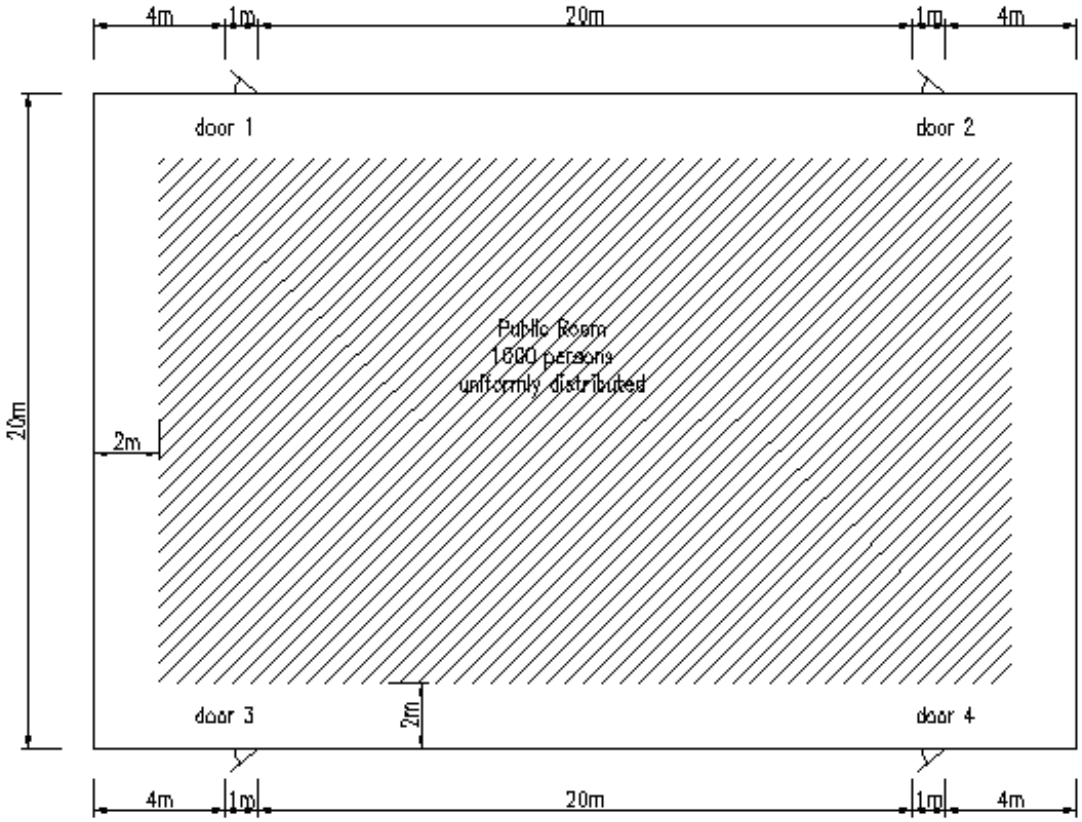


Figure 3: Exit flow from a large public room

Test 10: Exit route allocation

16 Construct a cabin corridor section as shown in figure 4 populated as indicated with a panel consisting of males 30-50 years old from table 3.4 in the appendix to the *Guidelines for the advanced evacuation analysis of new and existing ships* with instant response time and distribute the walking speeds over a population of 23 persons. The people in cabins 1, 2, 3, 4, 7, 8, 9, and 10 are allocated the main exit. All the remaining passengers are allocated the secondary exit. The expected result is that the allocated passengers move to the appropriate exits.

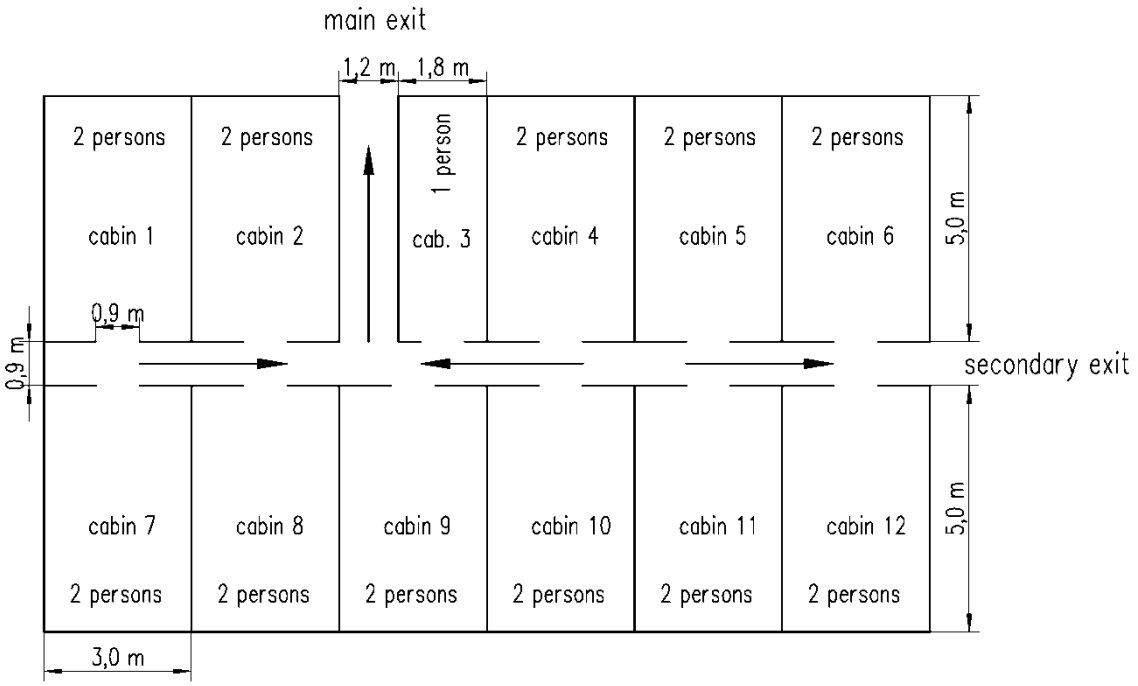


Figure 4: Cabin area

Test 11: Staircase

17 Construct a room connected to a stair via a corridor as shown in figure 5 populated as indicated with a panel consisting of males 30-50 years old from table 3.4 in the appendix to the *Guidelines for the advanced evacuation analysis of new and existing ships* with instant response time and distribute the walking speeds over a population of 150 persons. The expected result is that congestion appears at the exit from the room, which produces a steady flow in the corridor with the formation of congestion at the base of the stairs.

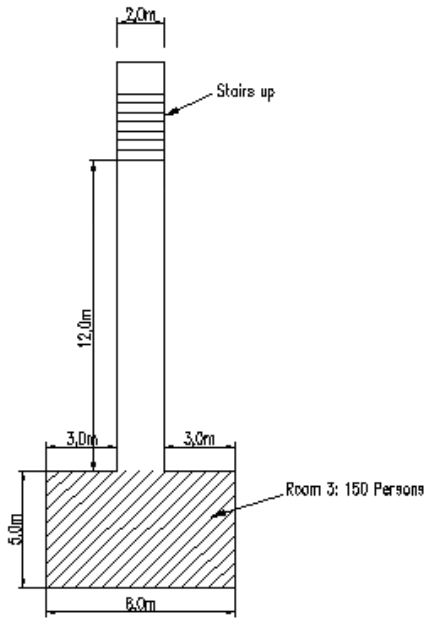


Figure 5: Escape route via stairs

Test 12: Flow density relation

18 The software should be tested for a corridor without any obstructions, It should be demonstrated that the flow of persons in the corridor is generally smaller at very high population densities compared with that at moderate densities.

Quantitative verification

19 Quantitative verification involves comparing model predictions with reliable data generated from evacuation demonstrations. At this stage of development there is insufficient reliable experimental data to allow a thorough quantitative verification of egress models. Until such data becomes available the first three components of the verification process are considered sufficient.

APPENDIX 3

The following process is given as an example of a convergence criterion mentioned in paragraph 5.4 of appendix 1.

1 In total, a minimum of 50 different simulations should be carried out for each of the benchmark cases. This will yield, for each case, a total of at least 50 values of t_A. More than 50 simulations may be required according to the outcome of the convergence test (3 and 4 below), which requires to increment the number of simulations one by one (see 3) and to test the criterion every batch of 50 simulation runs (see 4).

2 These simulations should be made up of at least 10 different randomly generated populations (within the range of population demographics specified in paragraph 3 of appendix 1). Simulations based on each of these different populations should be repeated at least 5 times. If these 5 repetitions produce insignificant variations in the results, the total number of populations analysed should be 50 rather than 10, with only a single simulation performed for each population.

3 Observed 95th centile of t_A:

3.1 For each case, the evaluation of the 95th centile is an incremental evaluation which is performed every simulation run using all available t_A previously calculated from the first to the last simulation run of the case studied.

3.2 The value of the 95th centile of all calculated total assembly times (noted $T_{0.95}$) is taken which is higher than 95% of all the previous calculated values (i.e. for each of the four cases, for each simulation run increment, indexed on letter "i" below, all available values of assembly times t_A of the case are ranked from lowest to highest and $T_{0.95}^{i}$ is selected for which 95% of the ranked values are lower. Consequently, at the simulation number i, there is a series of i values of $T_{0.95}^{i}$.

4 Convergence criterion:

4.1 For each case, the convergence test is an evaluation of the following criterion which is performed every batch of 50 simulation runs. N denotes the number of simulations that have been run every time the criterion is tested (i.e. N=50 for the first batch, N=100 for the second batch etc.)

4.2 The distance between the maximum to the minimum of $T_{0.95}^{i}$ obtained over the 50 last simulation increments should not exceed the distance (in absolute value) of the mean of $T_{0.95}^{i}$ over the 50 last simulation increments, to the maximum allowable assembly time (T_{lim}):

$$\left|T_{lim} - T_{0.95}^{mean50}\right| \geq T_{0.95}^{max50} - T_{0.95}^{min50}$$

Where:

$T_{lim} = \frac{n - \frac{2}{3}(E+L)}{1.25}$ with n, E, and L, as defined in Annex1, §5.1 (1),

$T_{0.95}^{mean50} = \text{mean}\left(T_{0.95}^{i}\right)$, with i between $(N-49)$ and N,

$T_{0.95}^{max50} = \text{maximum}\left(T_{0.95}^{i}\right)$, with i between $(N-49)$ and N, and

$T_{0.95}^{min50} = \text{minimu m}\left(T_{0.95}^{i}\right)$, with i between $(N-49)$and N.

4.3 For each of the four cases, the following iterative method should be followed to determine the travel Time T_{case}:

- If the criterion is not met, another batch of 50 simulations should be run;

- If the criterion is met, sufficient number of simulations has been run for the case. $T_{0.95}^{mean50}$ (for the first N which satisfies the criterion) is selected as the travel time T_{case}; and

- If a total of 500 simulations have been run for the case, the process should be stopped and $T_{0.95}^{mean50}$ is selected as the travel time T_{case}.

5 The value of the travel time to comply with the performance standard T is the highest of the four calculated travel times T_{case} (one for each of the four cases).

6 The same procedure for a convergence criterion for case 5 and the travel duration in case 6 (travel duration from assembly stations to the LSA entry points) can be based on the same principle (paragraph -1 to -5). For case 6, the procedure requires to adapt the notations (t_A) and to take into account (E+L) ≤ 30' (see annex 1, paragraph 5.1 (2) for the definition of T_{lim}.

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ANNEX 7

DRAFT AMENDMENTS TO PARAGRAPH 2.1.2.2.2.1 OF CHAPTER 13 OF THE FSS CODE

CHAPTER 13
ARRANGEMENT OF MEANS OF ESCAPE

In paragraph 2.1.2.2.2.1, under case 2, the words "members of the crew in public spaces occupied to one third of the maximum capacity" are replaced with the words "one third of the crew distributed in public spaces"

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ANNEX 8

DRAFT AMENDMENTS TO SOLAS CHAPTER III

PART A
GENERAL

Regulation 1 – Application

3 The following new paragraph 4.3 is added after the existing paragraph 4.2:

".3 ensure that the requirements of regulations 30.3 and 37.3.9 are complied with."

PART B
REQUIREMENTS FOR SHIPS AND LIFE-SAVING APPLIANCES

Regulation 30 – Drills

4 The following new paragraph 3 is added after the existing paragraph 2:

"3 Damage control drills shall be conducted as required in regulation II-1/19-1."

Regulation 37 – Muster list and emergency instructions

5 The following new paragraph 3.9 is added after the existing paragraph 3.8:

".9 damage control for flooding emergencies."

***

ANNEX 9

DRAFT AMENDMENTS TO THE 2011 ESP CODE*

THE INTERNATIONAL CODE ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF BULK CARRIERS AND OIL TANKERS, 2011 (2011 ESP CODE)

ANNEX A

CODE ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF BULK CARRIERS

Part A

CODE ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF BULK CARRIERS HAVING SINGLE-SIDE SKIN CONSTRUCTION

1 Paragraph 1.5 is amended as follows:

"1.5 In any kind of survey, i.e. renewal, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by annex 2, of structures in areas where close-up surveys are required should be carried out simultaneously with close-up surveys."

2 Paragraph 2.4.4 is amended as follows:

"2.4.4 Close up survey and thickness measurement[3] ~~Thickness measurement~~ of the hatch cover and coaming plating and stiffeners should be carried out as given in annexes 1 and ~~annex~~ 2.

[3] Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures."

ANNEX 1

REQUIREMENTS FOR CLOSE-UP SURVEY AT RENEWAL SURVEYS

3 Note (D) is amended as follows:

"(D) Cargo hold hatch covers and coamings. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures."

* Tracked changes are created using "strikeout" for deleted text and "grey shading" to highlight all modifications and new insertions, including deleted text.

Part B

CODE ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF BULK CARRIERS HAVING DOUBLE-SIDE SKIN CONSTRUCTION

4 Paragraph 1.5 is amended as follows:

"1.5 In any kind of survey, i.e. renewal, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by annex 2, of structures in areas where close-up surveys are required should be carried out simultaneously with close-up surveys."

5 Paragraph 2.4.4 is amended as follows:

"2.4.4 Close up survey and thickness measurement[3] ~~Thickness measurement~~ of the hatch cover and coaming plating and stiffeners should be carried out as given in annexes 1 and ~~annex~~ 2.

[3] Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures."

ANNEX 1

REQUIREMENTS FOR CLOSE-UP SURVEY AT RENEWAL SURVEYS

Appendix 1 – Minimum requirements for close-up survey at renewal survey of double-side skin bulk carriers excluding ore carriers

5 < Age ≤ 10 years – Renewal Survey No.2

6 The third paragraph in the column is amended as follows:

"25% of ordinary transverse ~~web~~ frames for transverse framing system or 25% of longitudinals for longitudinal framing system on side shell and inner side plating at forward, middle and aft parts in the foremost double-side tanks. (B)"

10 < Age ≤ 15 years – Renewal Survey No.3

7 The third paragraph in the column is amended as follows:

"25% of ordinary transverse ~~web~~ frames for transverse framing system or 25% of longitudinals for longitudinal framing system on side shell and inner side plating at forward, middle and aft parts in all double-side tanks. (B)"

Age > 15 years – Renewal Survey No.4 and Subsequent

8 The third paragraph in the column is amended as follows:

"All ordinary transverse frames for transverse framing system or all of longitudinals for longitudinal framing system on side shell and inner side plating at forward, middle and aft parts in all double-side tanks. (B)"

9 Note (D) is amended as follows:

"(D) Cargo hold hatch covers and coamings. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures."

Appendix 2 – Minimum requirements for close-up survey at renewal survey for ore carriers

10 Note (D) is amended as follows:

"(D) Cargo hold hatch covers and coamings. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures."

ANNEX 2

REQUIREMENTS FOR THICKNESS MEASUREMENTS AT RENEWAL SURVEYS

5 < Age ≤ 10 years – Renewal Survey No.2

11 Paragraph 3 is amended as follows:

"3 Measurement, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to annex 1/appendix1 or annex1/ appendix 2 as applicable."

10 < Age ≤ 15 years – Renewal Survey No.3

12 Paragraph 3 is amended as follows:

"3 Measurement, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to annex 1/appendix1 or annex1/appendix 2 as applicable."

ANNEX B

CODE ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF OIL TANKERS

Part A

CODE ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF DOUBLE-HULL OIL TANKERS

13 Paragraph 1.5 is amended as follows:

"1.5 In any kind of survey, i.e. renewal, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by annex 2, of structures in areas where close-up surveys are required should be carried out simultaneously with close-up surveys."

14 Paragraph 2.5.6 is amended as follows:

"2.5.6 In cases where two or three sections are to be measured, at least one should include a ballast tank within 0.5*L* amidships. In case of oil tankers of 130 m in length and upwards (as defined in the International Convention on Load Lines in force) and more than 10 years of age, for the evaluation of the ship's longitudinal strength as required in 8.1.2, the sampling method of thickness measurements is given in annex 12."

15 Paragraph 2.6.1.1 is amended as follows:

"1. tank testing procedure, specifying fill heights, tanks being filled and bulkheads being tested, has been submitted by the owner and reviewed by the Administration or recognized organization prior to the testing being carried out;"

ANNEX 1

MINIMUM REQUIREMENTS FOR CLOSE-UP SURVEY AT RENEWAL SURVEY OF DOUBLE-HULL OIL TANKERS

16 Note (7) is amended as follows:

"(7) Web frame in a cargo oil tank means deck transverse, longitudinal bulkhead ~~vertical girder~~ structural elements and cross ties, where fitted, including adjacent structural members."

Part B

CODE ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF OIL TANKERS OTHER THAN DOUBLE-HULL OIL TANKERS

17 Paragraph 1.5 is amended as follows:

"1.5 In any kind of survey, i.e. renewal, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by annex 2, of structures in areas where close-up surveys are required should be carried out simultaneously with close-up surveys."

18 Paragraph 2.6.1.1 is amended as follows:

"1. tank testing procedure, specifying fill heights, tanks being filled and bulkheads being tested, has been submitted by the owner and reviewed by the Administration or recognized organization prior to the testing being carried out;"

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ANNEX 10

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATIONS RELATING TO THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], in order to facilitate global and consistent implementation of the requirements of the 1966 Load Lines Convention, approved Unified interpretations relating to the International Convention on Load Lines, 1966, prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex.

2 Member Governments are invited to apply the annexed Unified interpretations and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATIONS RELATING TO THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966

Regulation 13 – Position of hatchways, doorways and ventilators

1 For the purpose of these regulations, two positions of hatchways, doorways and ventilators are defined as follows:

Position 1 – Upon freeboard decks and raised quarterdecks, or other exposed decks* lower than one standard height of superstructure above the freeboard deck, and upon exposed decks* situated forward of a point located a quarter of the ship's length from the forward perpendicular that are located lower than two standard heights of superstructure above the freeboard deck.

Position 2 – Upon exposed decks* situated abaft a quarter of the ship's length from the forward perpendicular and located at least one standard height of superstructure above the freeboard deck and lower than two standard heights of superstructure above the freeboard deck.

Upon exposed decks* situated forward of a point located a quarter of the ship's length from the forward perpendicular and located at least two standard heights of superstructure above the freeboard deck and lower than three standard heights of superstructure above the freeboard deck.

Regulation 20 – Air pipes

2 Where air pipes to ballast and other tanks extend above:

.1 the freeboard deck; or

.2 other exposed decks* lower than two standard heights of superstructure above the freeboard deck,

the exposed parts of the pipes shall be of substantial construction, and the height from the deck to the point where water may have access below shall be at least:

.1 760 mm on the freeboard deck or other exposed decks* lower than one standard height of superstructure above the freeboard deck; and

.2 450 mm on other exposed decks* lower than two standard heights of superstructure above freeboard deck.

Note: Flush bolted access covers, which are of substantial construction and are secured by gaskets and closely spaced bolts to maintain water tightness, are not subject to the minimum sill height requirements.

* "Exposed decks" include top decks of superstructures, deckhouses, companionways and other similar deck structures.

Regulation 27 – Types of ships

Regulation 27(13)(e)

3 Unprotected openings include ventilators (complying with regulation 19(4)of the International Convention on Load Lines, 1966) that for operational reasons have to remain open to supply air to the engine room or emergency generator room (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship.

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ANNEX 11

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATIONS RELATING TO THE PROTOCOL OF 1988 RELATING TO THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], in order to facilitate global and consistent implementation of requirements concerning sill and coaming heights for openings on top of deckhouses and companionways of the 1988 Load Lines Protocol, approved Unified interpretations relating to the Protocol of 1988 relating to the International Convention on Load Lines, 1966, prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex.

2 Member Governments are invited to apply the annexed Unified interpretations and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATIONS RELATING TO THE PROTOCOL OF 1988 RELATING TO THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966

Regulation 13 – Position of hatchways, doorways and ventilators

1 For the purpose of these regulations, two positions of hatchways, doorways and ventilators are defined as follows:

Position 1 – Upon freeboard decks and raised quarterdecks, or other exposed decks* lower than one standard height of superstructure above the freeboard deck, and upon exposed decks* situated forward of a point located a quarter of the ship's length from the forward perpendicular that are located lower than two standard heights of superstructure above the freeboard deck.

Position 2 – Upon exposed decks* situated abaft a quarter of the ship's length from the forward perpendicular and located at least one standard height of superstructure above the freeboard deck and lower than two standard heights of superstructure above the freeboard deck.

Upon exposed decks* situated forward of a point located a quarter of the ship's length from the forward perpendicular and located at least two standard heights of superstructure above the freeboard deck and lower than three standard heights of superstructure above the freeboard deck.

Regulation 20 – Air pipes

2 Where air pipes to ballast and other tanks extend above:

.1 the freeboard deck; or

.2 other exposed decks* lower than two standard heights of superstructure above the freeboard deck,

the exposed parts of the pipes shall be of substantial construction, and the height from the deck to the point where water may have access below shall be at least:

.1 760 mm on the freeboard deck or other exposed decks* lower than one standard height of superstructure above the freeboard deck; and

.2 450 mm on other exposed decks* lower than two standard heights of superstructure above freeboard deck.

Note: Flush bolted access covers, which are of substantial construction and are secured by gaskets and closely spaced bolts to maintain water tightness, are not subject to the minimum sill height requirements.

***

* "Exposed decks" include top decks of superstructures, deckhouses, companionways and other similar deck structures.

ANNEX 12

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATION OF SOLAS REGULATIONS II-1/29.3 AND 29.4

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], with a view to providing more specific guidance on the application of the provisions of SOLAS regulations II-1/29.3 and 29.4 concerning the steering gear test, approved the Unified interpretation of SOLAS regulations II-1/29.3 and 29.4, prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex.

2 Member Governments are invited to apply the annexed interpretation from [*date of approval]* when applying the relevant provisions of SOLAS regulations II-1/29.3 and 29.4 and to bring it to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATION OF SOLAS REGULATIONS II-1/29.3 AND 29.4

Regulation II-1/29 – Steering gear

1 In order for ships to comply with the performance requirements stated in regulations II-1/29.3.2 and 29.4.2 they are to have steering gear capable of meeting these performance requirements when at their deepest seagoing draught.

2 In order to demonstrate this ability, the trials may be conducted in accordance with section 6.1.5.1 of the standard ISO 19019:2005 (Sea-going vessels and marine technology – Instructions for planning, carrying out and reporting sea trials).

3 On all occasions when trials are conducted with the vessel not at the deepest seagoing draught, the loading condition can be accepted on the conditions that either:

.1 The rudder is fully submerged (at zero speed waterline) and the vessel is in an acceptable trim condition.

.2 The rudder torque at the trial loading condition have been reliably predicted (based on the system pressure measurement) and extrapolated to the maximum seagoing draught condition using the following method to predict the equivalent torque and actuator pressure at the deepest seagoing draught:

$$Q_F = Q_T \alpha$$

$$\alpha = 1.25(\frac{A_F}{A_T})(\frac{V_F}{V_T})^2$$

where:

α is the Extrapolation factor.

Q_F is the rudder stock moment (torque in the rudder stock) for the deepest service draught and maximum service speed condition.

Q_T is the rudder stock moment (torque in the rudder stock) for the trial condition.

A_F is the total immersed projected area of the movable part of the rudder in the deepest seagoing condition.

A_T is the total immersed projected area of the movable part of the rudder in the trial condition.

V_F is the contractual design speed of the vessel corresponding to the maximum continuous revolutions of the main engine at the deepest seagoing draught.

V_T is the measured speed of the vessel (considering current) in the trial condition.

Where the rudder actuator system pressure is shown to have a linear relationship to the rudder stock torque the above equation can be taken as:

$$P_F = P_T \alpha$$

where:

P_F is the estimated steering actuator hydraulic pressure in the deepest seagoing draught condition.

P_T is the maximum measured actuator hydraulic pressure in the trial condition.

Where constant volume fixed displacement pumps are utilized then the regulations can be deemed satisfied if the estimated steering actuator hydraulic pressure at the deepest draught is less than the specified maximum working pressure of the rudder actuator. Where a variable delivery pump is utilized pump data should be supplied and interpreted to estimate the delivered flow rate corresponds to the deepest seagoing draught in order to calculate the steering time and allow it to be compared to the required time.

Where A_T is greater than $0.95A_F$ there is no need for extrapolation methods to be applied.

3. Alternatively, the designer or builder may use computational fluid dynamic (CFD) studies or experimental investigations to predict the rudder stock moment at the full seagoing draught condition and service speed. These calculations or experimental investigations are to be to the satisfaction of the Administration.

4 In any case for the main steering gear trial, the speed of the ship corresponding to the number of maximum continuous revolution of main engine and maximum design pitch applies.

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ANNEX 13

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATIONS OF THE 2008 IS CODE

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], in order to facilitate global and consistent implementation of requirements of the 2008 IS Code, approved Unified interpretations of the 2008 IS Code, prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex.

2 Member Governments are invited to apply the annexed Unified interpretations and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATIONS OF THE 2008 IS CODE

Introduction

2.23 Definition of the term "lightship"

1 The weight of mediums on board for the fixed firefighting systems (e.g. freshwater, CO_2, dry chemical powder, foam concentrate etc.) should be included in the lightweight and lightship condition.

Part A – Mandatory criteria

2.3 Severe wind and rolling criterion (weather criterion)

2 In applying Φ_f, openings which cannot be or are incapable of being closed weathertight include ventilators (complying with regulation 19(4) of the International Convention on Load Lines, 1966) that for operational reasons have to remain open to supply air to the engine room or emergency generator room (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship.

Part B – Recommendations for certain types of ships and additional guidelines

3.4.2 Assumptions for calculating loading conditions

3 For tankers assigned with a tropical load line, the ship should be assumed to be loaded to its tropical load line.

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ANNEX 14

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATION RELATING TO THE INTERNATIONAL GRAIN CODE

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], in order to facilitate global and consistent implementation of requirements concerning the angle of down-flooding of the International Code for the Safe Carriage of Grain in Bulk (International Grain Code), approved Unified interpretation relating to the International Grain Code, prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex.

2 Member Governments are invited to apply the annexed Unified interpretation and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATION RELATING TO THE INTERNATIONAL GRAIN CODE

Part A – Specific requirements

In applying Φ_1, openings which cannot be or are incapable of being closed weathertight include ventilators (complying with regulation 19(4) of the International Convention on Load Lines, 1966) that for operational reasons have to remain open to supply air to the engine room or emergency generator room (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship.

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ANNEX 15

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-1

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], in order to facilitate global and consistent implementation of the requirements of SOLAS chapter II-1, approved Unified interpretations of SOLAS chapter II-1, prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex.

2 Member Governments are invited to apply the annexed Unified interpretations and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-1

Regulation 2.21 – Definition of the term "Lightweight"

1 The weight of mediums on board for the fixed firefighting systems (e.g. freshwater, CO_2, dry chemical powder, foam concentrate etc.) should be included in the lightweight and lightship condition.

Regulation 3-2 – Protective coatings of dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers

2 The following tanks should not be considered to be dedicated seawater ballast tanks and should, therefore, be exempted from the application and requirements of the *Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers* (resolution MSC.215(82)), provided the coatings applied in the tanks described in subparagraphs .2 and .3 below are confirmed by the coating manufacturer to be resistant to the media stored in these tanks and provided such coatings are applied and maintained according to the coating manufacturer's procedures.

.1 ballast tanks identified as "Spaces included in Net Tonnage" in the International Tonnage Certificate (1969);

.2 seawater ballast tanks in passenger ships also designated for the carriage of grey water or black water; and

.3 seawater ballast tanks in livestock carriers also designated for the carriage of livestock dung.

Regulation 7-2 – Calculation of the factor s_i

3 In applying θ_v, openings which cannot be or are incapable of being closed weathertight include ventilators (complying with regulation 19(4) of the International Convention on Load Lines, 1966) *that* for operational reasons have to remain open to supply air to the engine room or emergency generator room (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship.

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ANNEX 16

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATION RELATING TO THE IBC CODE

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], in order to facilitate global and consistent implementation of survival requirements of the IBC Code, approved Unified interpretation relating to the IBC Code, prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex.

2 Member Governments are invited to apply the annexed Unified interpretation and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATION RELATING TO THE IBC CODE

2.9 Survival requirements

Other openings capable of being closed weathertight do not include ventilators (complying with regulation 19(4) of the International Convention on Load Lines, 1966) that for operational reasons have to remain open to supply air to the engine room or emergency generator room (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship.

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ANNEX 17

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATION RELATING TO THE IGC CODE

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], in order to facilitate global and consistent implementation of flooding assumptions requirements of the IGC Code, approved Unified interpretation relating to the IGC Code, prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex.

2 Member Governments are invited to apply the annexed Unified interpretation and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATION RELATING TO THE IGC CODE

2.7 Survival requirements

Other openings capable of being closed weathertight do not include ventilators (complying with regulation 19(4) of the International Convention on Load Lines, 1966) that for operational reasons have to remain open to supply air to the engine room or emergency generator room (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship.

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ANNEX 18

DRAFT MEPC CIRCULAR

UNIFIED INTERPRETATIONS RELATING TO MARPOL ANNEX I

1 The Marine Environment Protection Committee, at its [sixty-ninth session (18 to 22 April 2016)], in order to facilitate global and consistent implementation of the requirements of MARPOL Annex I, approved Unified interpretations relating to MARPOL Annex I, prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex.

2 Member Governments are invited to apply the annexed Unified interpretations, as appropriate, and bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATIONS RELATING TO MARPOL ANNEX I

Regulation 27 – Intact stability stability

1 For proving compliance with regulation I/27, either subparagraph .1 or .2, below, should be applied:

.1 The vessel should be loaded with all cargo tanks filled to a level corresponding to the maximum combined total of vertical moment of volume plus free surface inertia moment at 0° heel, for each individual tank. Cargo density should correspond to the available cargo deadweight at the displacement at which transverse KM reaches a minimum value, assuming full departure consumables and 1% of the total water ballast capacity. The maximum free surface moment should be assumed in all ballast conditions. For the purpose of calculating GMo, liquid free surface corrections should be based on the appropriate upright free surface inertia moment. The righting lever curve may be corrected on the basis of liquid transfer moments.

.2 An extensive analysis covering all possible combinations of cargo and ballast tank loading should be carried out. For such extensive analysis conditions, it is considered that:

.1 weight, centre of gravity coordinates and free surface moment for all tanks should be according to the actual content considered in the calculations; and

.2 the extensive calculations should be carried out in accordance with the following:

.1 the draughts should be varied between light ballast and scantling draught;

.2 consumables including, but not restricted to, fuel oil, diesel oil and fresh water corresponding to 97%, 50% and 10% content should be considered;

.3 for each draught and variation of consumables, the available deadweight should comprise ballast water and cargo, such that combinations between maximum ballast and minimum cargo and vice versa, are covered. In all cases the number of ballast and cargo tanks loaded is to be chosen to reflect the worst combination of VCG and free surface effects. Operational limits on the number of tanks considered to be simultaneously slack and exclusion of specific tanks should not be permitted. All ballast tanks should have at least 1% content;

.4 cargo densities between the lowest and highest intended to be carried should be considered; and

.5 sufficient steps between all limits should be examined to ensure that the worst conditions are identified. A minimum of 20 steps for the range of cargo and ballast content, between 1% and 99% of total capacity, should be examined. More closely spaced steps near critical parts of the range may be necessary.

At every stage, the criteria described in MARPOL regulation I/27, paragraphs 1.1 and 1.2 are to be met.

2 In applying θ_f, openings which "cannot be closed weathertight" include ventilators (complying with regulation 19(4) of the International Convention on Load Lines, 1966) that for operational reasons have to remain open to supply air to the engine room or emergency generator room (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship.

Regulation 28 – Subdivision and damage stability

3 Other openings capable of being closed weathertight do not include ventilators (complying with regulation 19(4) of the International Convention on Load Lines, 1966) that for operational reasons have to remain open to supply air to the engine room or emergency generator room (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship.

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ANNEX 19

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATIONS FOR THE APPLICATION OF THE 2009 MODU CODE, CHAPTER 2, PARAGRAPHS 2.1 TO 2.4 AND THE REVISED TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS (RESOLUTION MSC.158(78))

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], approved the Unified interpretations for the application of the 2009 MODU Code, chapter 2, paragraphs 2.1 to 2.4 and the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78)), prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex, with a view to ensuring a uniform approach towards the application of the provisions of the 2009 MODU Code.

2 Member Governments are invited to apply the annexed Unified interpretations and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATIONS FOR THE APPLICATION OF THE 2009 MODU CODE, CHAPTER 2, PARAGRAPHS 2.1 TO 2.4 AND THE REVISED TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS (RESOLUTION MSC.158(78))

2009 MODU Code

2.2.1 Means of access

Paragraph 2.2.1.2

1 Some possible alternative means of access are listed under paragraph 3.9 of the MODU Technical Provisions for means of access for inspection (MODU TP). Always subject to acceptance as equivalent by the Administration, alternative means such as an unmanned robot arm, ROV's with necessary equipment of the permanent means of access for overall and close-up inspections and thickness measurements of the deck head structure, such as deck transverses and deck longitudinals of ballast tanks and other tanks, holds and other spaces where gas hazardous atmosphere may be present, should be capable of:

.1 safe operation in ullage space in gas-free environment; and

.2 introduction into the place directly from a deck access.

2 When considering use of alternative means of access as addressed by paragraph 3.9 of the MODU TP, refer to IACS Recommendation No.91 "Guidelines for Approval/Acceptance of Alternative Means of Access".

Paragraph 2.2.1.3

3 This interpretation is to be contained in a section of the Means of Access (MA) Manual, as specified in the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78)).

2.2.2 Safe access to holds, tanks, ballast tanks and other spaces

4 This regulation is only applicable to integral tanks. Independent tanks can be excluded. Additionally, spud cans and jack cases of self-elevating units can be excluded.

5 The wording "not intended for the carriage of oil or hazardous materials" applies only to "similar compartments", i.e. safe access can be through a pump-room, deep cofferdam, pipe tunnel, cargo hold or double hull space.

Paragraph 2.2.2.2

6 A tank of less than 35 m length without a swash bulkhead requires only one access hatch.

7 Where rafting is indicated in the access manual as the means to gain ready access to the under deck structure, the term "*similar obstructions*" referred to in the regulation includes internal structures (e.g. webs > 1.5 m deep) which restrict the ability to raft (at the maximum water level needed for rafting of under deck structure) directly to the nearest access ladder and hatchway to deck. When rafts or boats alone, as an alternative means of access are allowed, permanent means of access should be provided to allow safe entry and exit. This means:

.1 access direct from the deck via a vertical ladder and small platform fitted approximately 2 m below the deck in each bay; or

.2 access to deck from a longitudinal permanent platform having ladders to deck in each end of the tank. The platform should, for the full length of the tank, be arranged in level with, or above, the maximum water level needed for rafting of under deck structure. For this purpose, the ullage corresponding to the maximum water level should be assumed not more than 3 m from the deck plate measured at the midspan of deck transverses and in the middle length of the tank. A permanent means of access from the longitudinal permanent platform to the water level indicated above should be fitted in each bay (e.g. permanent rungs on one of the deck webs inboard of the longitudinal permanent platform).

2.2.3 Access manual

8 The access manual* is to address spaces listed in section 2.2.2 of the Code. As a minimum the English version should be provided.

9 The access manual should contain at least the following two parts:

Part 1: Plans, instructions and inventory required by paragraphs .1.1 to .1.7 of section 2.2.3.1. This part is to be approved by the Administration or the organization recognized by the Administration.

Part 2: Form of record of inspections and maintenance, and change of inventory of portable equipment due to additions or replacement after construction. This part is to be approved for its form only at new building.

10 The following matters should be addressed in the access manual:

.1 the access manual should clearly cover scope as specified in the regulations for use by crews, surveyors and port State control officers;

.2 approval / re-approval procedure for the manual, i.e. any changes of the permanent, portable, movable or alternative means of access within the scope of the regulation and the Technical provisions are subject to review and approval by the Administration or by the organization recognized by the Administration;

.3 verification of MA should be part of safety construction survey for continued effectiveness of the MA in that space which is subject to the statutory survey;

.4 inspection of MA by the crew and/or a competent inspector of the company as a part of regular inspection and maintenance (see interpretation for paragraph 2.2.1.3);

.5 actions to be taken if MA is found unsafe to use; and

.6 in case of use of portable equipment, plans showing the means of access within each space indicating from where and how each area in the space can be inspected.

* Refer to IACS Recommendation No.90 "Ship Structural Access Manual".

Paragraph 2.2.3.2

11 Critical structural areas should be identified by advanced calculation techniques for structural strength and fatigue performance, if available, and feedback from the service history and design development of similar or sister units.

2.2.4 General technical specifications

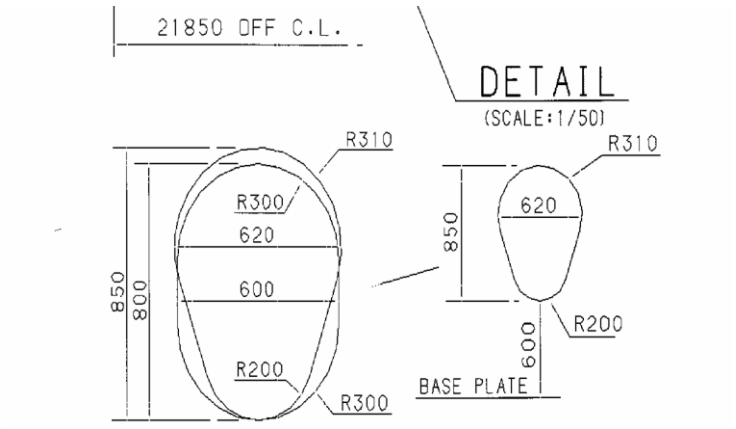
Paragraph 2.2.4.1

12 The minimum clear opening of 600 mm x 600 mm may have corner radii up to 100 mm maximum. The clear opening is specified in the *Guidelines on the means of access to structures for inspection and maintenance of oil tankers and bulk carriers* (MSC/Circ.686) to keep the opening fit for passage of personnel wearing a breathing apparatus. In such a case where as a consequence of structural analysis of a given design the stress should 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 100mm maximum fits.

Paragraph 2.2.4.2

13 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 opening in the structural strength aspects, i.e. girders and floors in double bottom tanks.

14 Subject to verification of easy evacuation of injured person on a stretcher the vertical opening 850 mm x 620 mm with wider upper half 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.



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

Revised technical provisions for means of access for inspections (resolution MSC.158(78))

1 Preamble

16 In the context of the above requirement, the deviation should be applied only to distances between integrated PMA that are the subject of paragraph 2.1.2 of table 1.

17 Deviations should not be applied to the distances governing the installation of underdeck longitudinal walkways and dimensions that determine whether permanent access are required or not, such as height of the spaces and height to elements of the structure (e.g. cross-ties).

3 Technical provisions

Paragraph 3.1

18 The permanent means of access to a space can be credited for the permanent means of access for inspection.

Paragraphs 3.2 and 3.3

19 Sloping structures are structures that are sloped by 5 or more degrees from horizontal plane when a unit is in upright position at even-keel.

20 Guard rails should be fitted on the open side. For stand-alone passageways guard rails should be fitted on both sides of these structures.

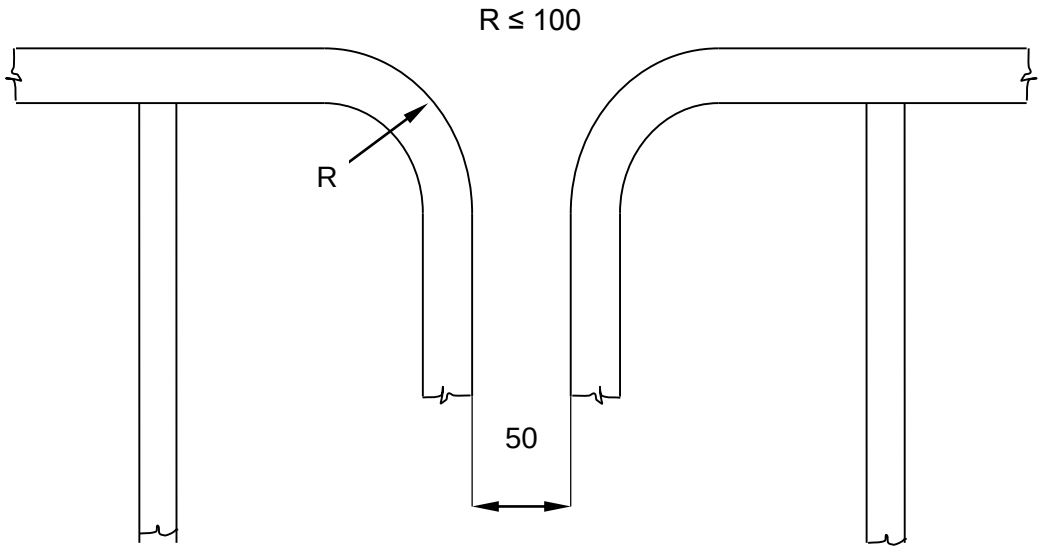
21 Discontinuous top handrails are allowed, provided the gap does not exceed 50 mm.

22 The same maximum gap is to be considered between the top handrail and other structural members (i.e. bulkhead, web frame, etc.).

23 The maximum distance between the adjacent stanchions across the handrail gaps should be 350 mm where the top and mid handrails are not connected together and 550 mm when they are connected together.

24 The maximum distance between the stanchion and other structural members should not exceed 200 mm where the top and mid handrails are not connected together and 300 mm when they are connected together.

25 When the top and mid handrails are connected by a bent rail, the outside radius of the bent part should not exceed 100 mm (see figure below).



26 Non-skid construction is such that the surface on which personnel walks provides sufficient friction to the sole of boots even if the surface is wet and covered with thin sediment.

27 "Substantial construction" is taken to refer to the designed strength as well as the residual strength during the service life of the unit. Durability of passageways together with guard rails should be ensured by the initial corrosion protection and inspection and maintenance during services.

28 For guard rails, use of alternative materials such as GRP should be subject to compatibility with the liquid carried in the tank. Non-fire resistant materials should not be used for means of access to a space with a view to securing an escape route at a high temperature.

29 Requirements for resting platforms placed between ladders are equivalent to those applicable to elevated passageways.

Paragraph 3.4

30 Where the vertical manhole is at a height of more than 600 mm above the walking level, it should be demonstrated that an injured person can be easily evacuated.

Paragraph 3.6

31 Vertical height of handrails should not be less than 890 mm from the centre of the step and two course handrails are to be provided.

32 The requirement of two square bars for treads specified in MODU TP, paragraph 3.6, is based upon the specification of construction of ladders in paragraph 3(e) of annex 1 to resolution A.272(VIII), which addresses inclined ladders. MODU TP, paragraph 3.4, allows for single rungs fitted to vertical surfaces, which is considered for a safe grip. For vertical ladders, when steel is used, the rungs are to be formed of single square bars of not less than 22 mm by 22 mm for the sake of safe grip.

33 The width of inclined ladders for access to a hold should be at least 450 mm to comply with the Australian AMSA Marine Orders Part 32, Appendix 17.

34 The width of inclined ladders other than an access to a hold should not be less than 400 mm.

35 The minimum width of vertical ladders should be 350 mm and the vertical distance between the rungs is to be equal and should be between 250 mm and 350 mm.

36 A minimum climbing clearance in width should be 600 mm other than the ladders placed between the hold frames.

37 The vertical ladders should be secured at intervals not exceeding 2.5 m apart to prevent vibration.

Paragraphs 3.7 to 3.9

38 A mechanical device such as hooks for securing at the upper end of a ladder should be considered as an appropriate securing device if a movement fore/aft and sideways can be prevented at the upper end of the ladder.

Paragraphs 3.10 and 3.11

39 See interpretation for paragraphs 2.2.4.1and 2.2.4.2 of 2009 MODU Code (paragraphs 12 to 15 above).

Paragraphs 3.12 and 3.13

40 Either a vertical or an inclined ladder or a combination of them may be used for access to a large hold where the vertical distance is 6 m or less from the deck to the bottom of the hold.

41 Adjacent sections of vertical ladder need to be installed so that the following provisions are complied with (refer to figures A and B):

- The minimum "lateral offset" between two adjacent sections of vertical ladder, is the distance between the sections, upper and lower, so that the adjacent stringers are spaced of at least 200 mm, measured from half thickness of each stringer.

- Adjacent sections of vertical ladder should be installed so that the upper end of the lower section is vertically overlapped, in respect to the lower end of the upper section, to a height of 1500 mm in order to permit a safe transfer between ladders.

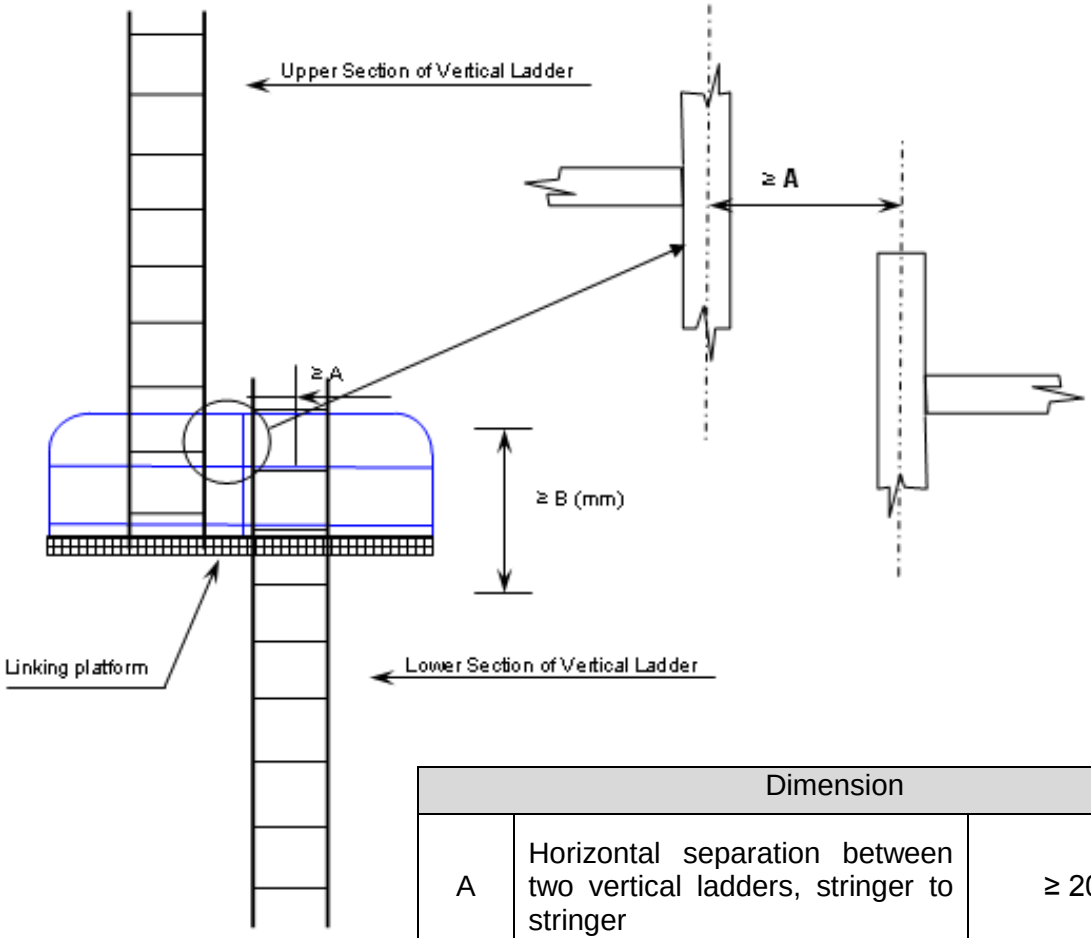
- No section of the access ladder should be terminated directly or partly above an access opening.

Paragraph 3.14

42 Deck is defined as "weather deck".

Figure "A"

Vertical Ladder – Ladder through the linking platform



Dimension		
A	Horizontal separation between two vertical ladders, stringer to stringer	≥ 200 mm
B	Stringer height above landing or intermediate platform	≥ 1500* mm
C	Horizontal separation between ladder and platform	100 mm ≤C< 300 mm
*	Note: the minimum height of the handrail stanchions of resting platform is of 1000 mm (Technical Provision, resolution MSC.158(78), paragraph 3.3)	

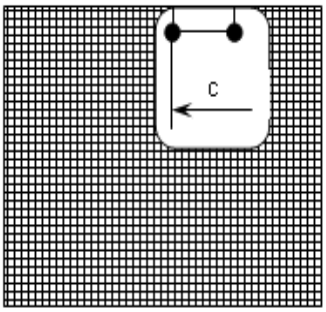
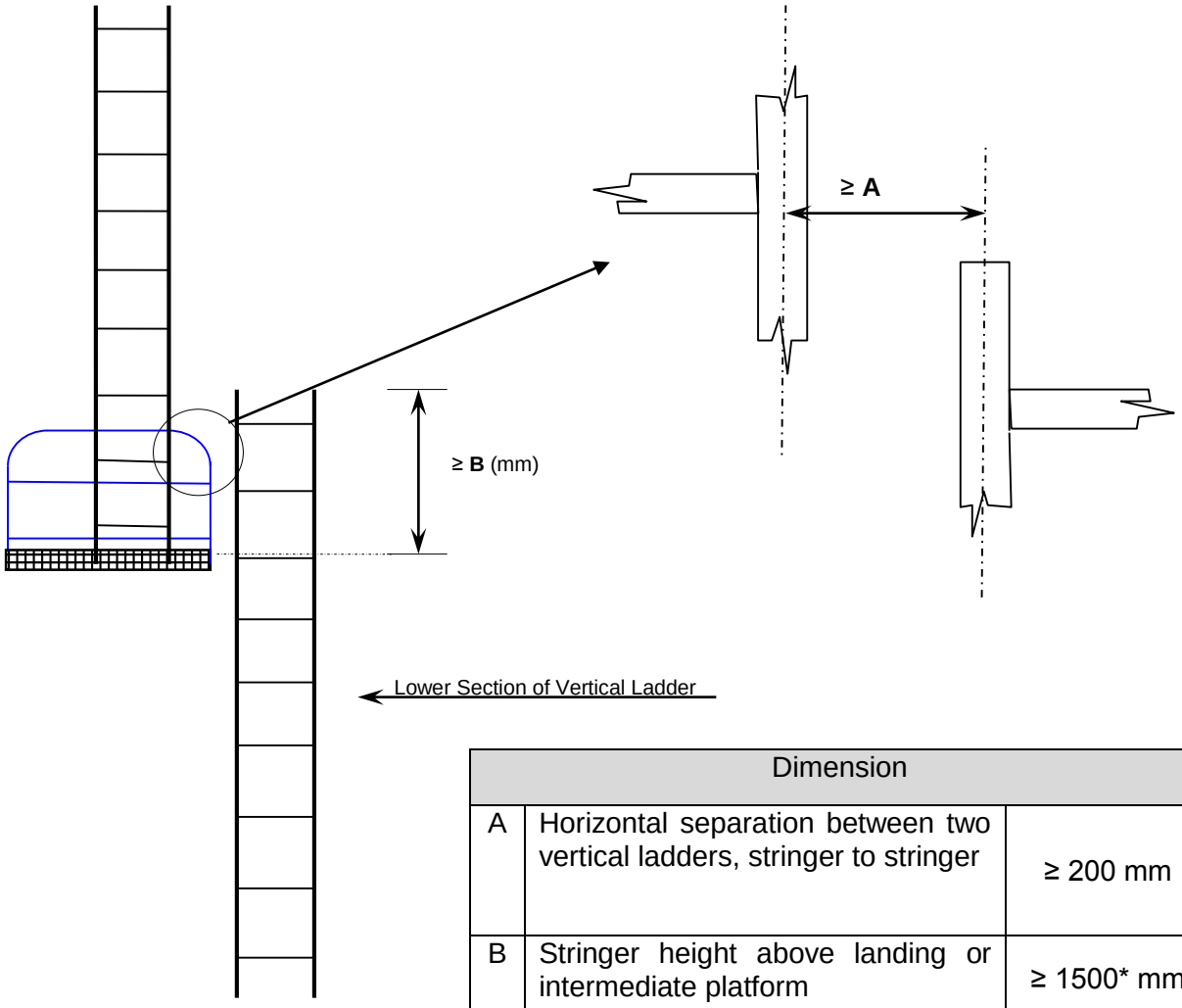


Figure "B"

Vertical Ladder – Side mount



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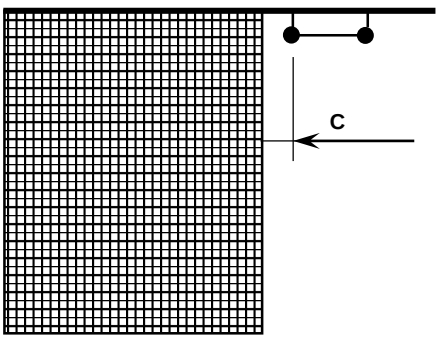

Table 1 – Means of access, paragraph 1.1

43 For tanks containing oil products other than crude oil (e.g. fuel oil, diesel oil, base oil) where lower corrosion is expected, section 1.1 of table 1 shold not be applied. For tanks containing products considered corrosive (e.g. brine, drilling mud), section 1.1 should be applied.

44 Sub-paragraphs .1 to .3 define access to underdeck structure, access to the uppermost sections of transverse webs and connection between these structures.

45 Sub-paragraphs .4 to .6 define access to vertical structures only and are linked to the presence of transverse webs on longitudinal bulkheads.

46 If there are no underdeck structures (deck longitudinals and deck transverses) but there are vertical structures in the tank supporting transverse and longitudinal bulkheads, access in accordance with sub-paragraphs .1 to .6 should be provided for inspection of the upper parts of vertical structure on transverse and longitudinal bulkheads.

47 If there is no structure in the tank, section 1.1 of table 1 should not be applied.

48 The vertical distance below the overhead structure should be measured from the underside of the main deck plating to the top of the platform of the means of access at a given location.

49 The height of the tank should be measured at each tank. For a tank the height of which varies at different bays, item 1.1 should be applied to such bays of a tank that have height 6 m and over.

Table 1 – Means of access, paragraph 1.1.2

50 There is need to provide continuous longitudinal permanent means of access when the deck longitudinals and deck transverses are fitted on deck but supporting brackets are fitted under the deck.

Table 1 – Means of access, paragraph 1.1.3

51 Means of access to tanks may be used for access to the permanent means of access for inspection.

Table 1 – Means of access, paragraph 1.1.4

52 The permanent fittings required to serve alternative means of access such as wire lift platform, that are to be used by crew and surveyors for inspection should provide at least an equal level of safety as the permanent means of access stated by the same paragraph. These means of access should be carried on board the unit and be readily available for use without filling of water in the tank.

53 Therefore, rafting should not be acceptable under this provision.

54 Alternative means of access should be part of Access Manual which is to be approved on behalf of the flag State.

Table 1 – Means of access paragraph 2.1

55 Paragraph 2.1.1 represents requirements for access to underdeck structures, while paragraph 2.1.2 is a requirement for access for survey and inspection of vertical structures on longitudinal bulkheads (transverse webs).

Table 1 – Means of access, paragraph 2.1.1

56 For a tank, the vertical distance between horizontal upper stringer and deck head of which varies at different sections, item 2.1.1 should be applied to such sections that fall under the criteria.

57 The continuous permanent means of access may be a wide longitudinal, which provides access to critical details on the opposite side by means of platforms as necessary on web frames. In case the vertical opening of the web frame is located in way of the open part between the wide longitudinal and the longitudinal on the opposite side, platforms should be provided on both sides of the web frames to allow safe passage through the web frame.

58 Where two access hatches are required by the 2009 MODU Code, paragraph 2.2.2.2, access ladders at each end of the tank should lead to the deck.

Table 1 – Means of access, paragraph 2.1.2

59 The continuous permanent means of access may be a wide longitudinal, which provides access to critical details on the opposite side by means of platforms as necessary on webframes. In case the vertical opening of the web is located in way of the open part between the wide longitudinal and the longitudinal on the opposite side, platforms should be provided on both sides of the web to allow safe passage through the web.

60 A "reasonable deviation", as noted in MODU TP, paragraph 1.4, of not more than 10% may be applied where the permanent means of access is integral with the structure itself.

Table 1 – Means of access, paragraph 2.2

61 Permanent means of access between the longitudinal continuous permanent means of access and the bottom of the space should be provided.

62 The height of a bilge hopper tank located outside of the parallel part of the unit should be taken as the maximum of the clear vertical distance measured from the bottom plating to the hopper plating of the tank.

63 The foremost and aftmost bilge hopper ballast tanks with raised bottom, of which the height is 6 m and over, a combination of transverse and vertical MA for access to the upper knuckle point for each transverse web should be accepted in place of the longitudinal permanent means of access.

Table 1 – Means of access, paragraph 3.1

64 Means of access should be provided to the crossdeck structures of the foremost and aftermost part of the each hold.

65 Interconnected means of access under the cross deck for access to three locations at both sides and in the vicinity of the centreline should be acceptable as the three means of access.

66 Permanent means of access fitted at three separate locations accessible independently, one at each side and one in the vicinity of the centreline should be acceptable.

67 Special attention should be paid to the structural strength where any access opening is provided in the main deck or cross deck.

Table 1 – Means of access, paragraph 3.3

68 Particular attention should be paid to preserve the structural strength in way of access opening provided in the main deck or cross deck.

Table 1 – Means of access, paragraph 3.4

69 The movable means of access to the underdeck structure of cross deck need not necessarily be carried on board the unit. It is sufficient if it is made available when needed.

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ANNEX 20

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATIONS RELATING TO THE APPLICATION OF SOLAS REGULATION II-1/3-6, AS AMENDED, AND THE REVISED TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS (RESOLUTION MSC.158(78))

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], approved the Unified interpretations relating to the application of SOLAS regulation II-1/3-6, as amended, and the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78)), prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex, with a view to ensuring a uniform approach towards the application of the provisions of SOLAS regulation II-1/3-6.

2 Member Governments are invited to use the annexed Unified interpretations when applying the relevant provisions of SOLAS regulation II-1/3-6, as amended, and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATIONS RELATING TO THE APPLICATION OF SOLAS REGULATION II-1/3-6, AS AMENDED, AND THE REVISED TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS (RESOLUTION MSC.158(78))

Revised technical provisions for means of access for inspections (resolution MSC.158(78)), paragraphs 3.13.2 and 3.13.6

Adjacent sections of vertical ladder need to be installed so that the following provisions are complied with:

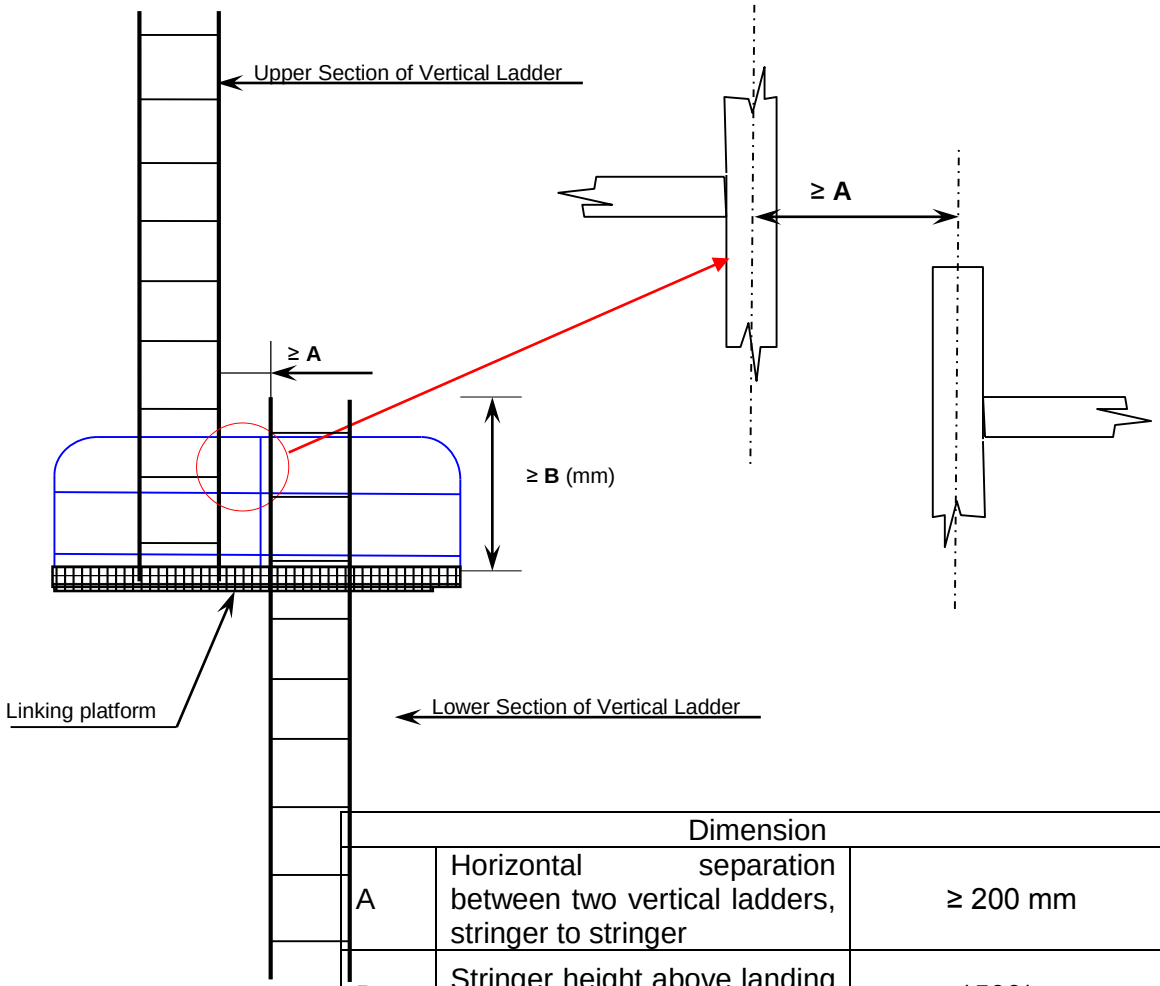
- the minimum "lateral offset" between two adjacent sections of vertical ladder, is the distance between the sections, upper and lower, so that the adjacent stringers are spaced of at least 200 mm, measured from half thickness of each stringer.

- adjacent sections of vertical ladder should be installed so that the upper end of the lower section is vertically overlapped, in respect to the lower end of the upper section, to a height of 1500 mm in order to permit a safe transfer between ladders.

- no section of the access ladder should be terminated directly or partly above an access opening.

Figure "A"

Vertical Ladder – Ladder through the linking platform



	Dimension	
A	Horizontal separation between two vertical ladders, stringer to stringer	≥ 200 mm
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*Note: the minimum height of the handrail stanchions of resting platform is of 1000 mm (Technical Provision, resolution MSC.158(78), paragraph 3.3)		

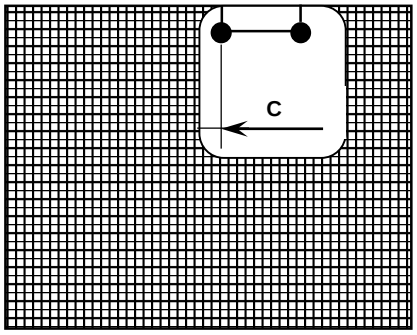
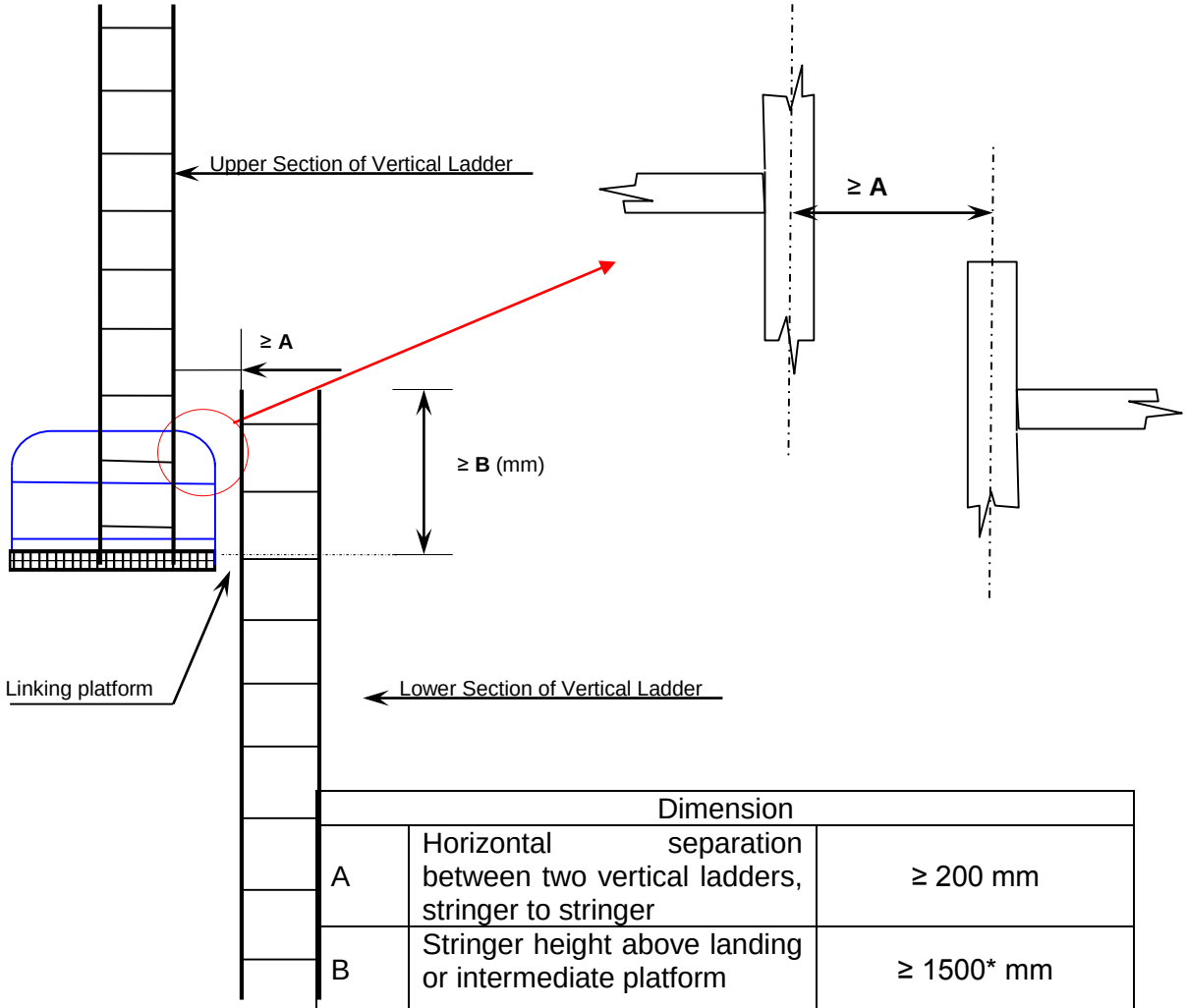


Figure "B"

Vertical Ladder – Side mount



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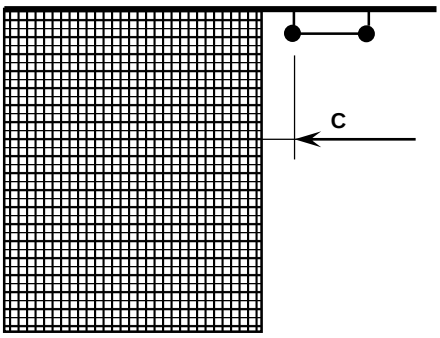

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ANNEX 21

DRAFT MSC CIRCULAR

UNIFIED INTERPRETATION OF THE 1969 TM CONVENTION

1 The Maritime Safety Committee, at its [ninety-sixth session (11 to 20 May 2016)], approved the Unified interpretation of the 1969 TM Convention, relating to heat exchangers (collers) fitted on the hull, prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex, with a view to ensuring a uniform approach towards the application of the relevant provisions the 1969 TM Convention.

2 Member Governments are invited to use the annexed Unified interpretations when applying the relevant provisions of the 1969 TM Convention and to bring them to the attention of all parties concerned.

ANNEX

UNIFIED INTERPRETATION OF THE 1969 TM CONVENTION

Regulation 2(4) – Enclosed spaces
Regulation 6(2) – Calculation of volumes

Heat exchangers (coolers) fitted in hull recesses or outside of the hull should be treated as machinery under the Unified interpretations relating to the International Convention on Tonnage Measurement of Ships, 1969 (TM.5/Circ.6), interpretation R.2(4)-9, and not as appendages.

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ANNEX 22

SUITABLE OPTIONS, INCLUDING ADVANTAGES AND DISADVANTAGES OF EACH OPTION, AND POTENTIAL WAYS FORWARD ON MATTERS RELATED TO A MANDATORY INSTRUMENT AND/OR PROVISIONS ADDRESSING SAFETY STANDARDS FOR THE CARRIAGE OF MORE THAN 12 INDUSTRIAL PERSONNEL ON BOARD VESSELS ENGAGED ON INTERNATIONAL VOYAGES

OPTION 1

1 Scope

Same as the scope of application of 2008 SPS Code.

2 Time frame/interim/mandatory

As soon as MSC could amend 2008 SPS Code on an interim voluntary basis, until such time, as the 2008 SPS Code can be incorporated into SOLAS as a mandatory Code.

3 Existing code/new code

Existing Code

4 Definition of Industrial Personnel

That the definition of industrial personnel be very broadly defined, i.e. "Industrial Personnel for the purpose of the 2008 SPS Code shall include any person being transported who is employed or engaged in the installation, maintenance, operation, servicing or management of offshore installations".

5 Ship type

Based on 2008 SPS Code Ship type with modifications:

> *"For the purposes of this Code, a special purpose ship is a ship which carries more than 12 special personnel, i.e. persons who are carried on board in connection with the special purpose of that ship or industrial personnel being transported to or from offshore installations and are carried in addition to those persons required for the normal navigation, engineering and maintenance of the ship or engaged to provide services for the persons carried on board".*

6 Road map

Step 1, amending 2008 SPS Code by the inclusion of industrial personnel, keep its voluntary/non-mandatory nature, as the first step and an interim solution to echo the urgent needs form the industry.

Step 2, based on the amended 2008 SPS Code, find a proper way/location to make the Code mandatory under SOLAS.

7 Advantages

The following elements could be considered as **advantages**:

.1 provides a non-binding solution that can be later extended to be made mandatory;

.2 the solution is broad and is based on existing legislation;

.3 requiring a comprehensive review of the 2008 SPS Code will serve to address the safe transport of industrial personnel; and

.4 offering a long term binding and comprehensive solution needed by the shipping/maritime industry.

8 Disadvantages

The following elements could be considered as **disadvantages**:

.1 tackles only SPS ships. There is a need to expand on scope to provide a complete solution and the impacts are not known;

.2 a solution is needed for lower size of ships;

.3 a solution is needed for craft operating at high speed;

.4 requires some work on the definition of industrial personnel to fit in a mandatory solution;

.5 in case of a mandatory solution careful consideration is needed on the relationship with SOLAS chapter I and/or the other chapters; and

.6 requires identifying all the issues concerning to carriage industrial personnel within the frame work of the requirements of the 2008 SPS Code.

OPTION 2

1 Scope

The scope of application of [Industrial] Codes & Guideline. By developing Industrial Personnel standards to align with resolution A.1079(28) Category A, B and C personnel as non-passengers/non-children under one year of age, should allow carriage of those Personnel on 2008 SPS Code, OSV, HSC Code Category D, SOLAS certificated cargo ships, MODU Code and SOLAS certificated passenger vessels to the extent of their LSA equipment, berthing and Safety Management System. Within the context of the draft Guidelines addressing the carriage of more than 12 industrial personnel on board vessels engaged on international voyages (annex to the document SDC 2/8).

2 Time frame/interim/mandatory

Definition of Industrial Personnel needs to be developed; experience to date suggests that this may require further detailed work. As noted once experience has given Administrations confidence with this approach, review work on the most effective codes could be undertaken in order to make mandatory for certain profiled operational missions as needed.

3 Existing code / new code

Applicability would be for all self-propelled ship types; there is no immediate need for any new code.

4 Definition of Industrial Personnel

The definition of Industrial Personnel would be very broadly defined in line with the mandate from the Committee. Along the line of draft Guidelines addressing the carriage of more than 12 industrial personnel on board vessels engaged on international voyages (annex to the document SDC 2/8).

5 Ship type

All ship type could use Industrial Personnel definition, modelled after resolution A.1079(28) to fulfil the urgent needs of industry and promote maritime commerce without undue interruption.

6 Road map

Way forward involves recognition of Industrial Personnel definition and context to be adopted by MSC (one session). This could be developed later into a mandatory application by either of two methods; First, the adoption of a resolution clearly defining and limiting the application of carriage of Industrial Personnel to certain conditions, second, the amendment of relevant codes (based on Member States experience with the carriage of Industrial Personnel.

7 Advantages

The following elements could be considered as **advantages**:

.1 does not need to amend SOLAS. No immediate need to review any of the acceptable ship type codes and guideline; and

.2 building on a resolution that has recently been adopted.

8 Disadvantages

The following elements could be considered as **disadvantages**:

.1 caution would be needed during the interim non-mandatory phase with administrative oversight;

.2 uniform implementation at international level, would be a challenge owing to the non-mandatory status of the option; and

.3 careful consideration is needed on the relationship with SOLAS chapter I and/or the other chapters.

OPTION 3

1 Scope

Make a distinction between industrial personnel for which enclosed sleeping berths are provided and for which not.

2 Time frame/interim/mandatory

Mandatory for SPS type vessels: new SOLAS chapter how industrial personnel could be treated as "other persons employed or engaged in any capacity on board a ship on the business of that ship" based on first line of SOLAS chapter I regulation 2:

.1 this is not unprecedented. SOLAS chapter II-1 regulation 1.5 has used this for instance for pilgrims;

.2 this route would of course have to be decided on by MSC but it would be a feasible solution that does not require any amendment to SOLAS chapter I and legal advice from the Secretariat for feasibility required.

Short term (non-mandatory):

.1 a guideline as originally intended but this time with proper explanation on how the definition of industrial personnel is to be applied; or

.2 amending 2008 SPS Code to include definition of industrial personnel and remove restrictions that 2008 SPS code is not applicable to industrial personnel and that persons have to work on board.

Mandatory for HSC type vessels: Within the HSC Code provide an equivalent standard for vessels carrying more than 12 industrial personnel.

Short term (non-mandatory): draft guideline for HSC type vessels could be applied on case-by-case bases on bases of SOLAS chapter I regulation 5.

3 Existing code / new code

No new codes, amendment to existing codes and introducing new chapter to SOLAS.

4 Definition of Industrial Personnel

Industrial personnel, for which enclosed sleeping berths are provided, are to be regarded as "other persons on board engaged on the business of the ship", whilst industrial personnel for which enclosed sleeping berths are not provided are in principle to be regarded as passengers.

Draft definition as stated in the annex 5 to document SDC 2/25 could be used, because industrial personnel will possibly be treated different than special personnel in other conventions such as for instance MLC, we propose to not merge the two, but to have instead two separate definitions, one for industrial personnel and one for special personnel.

5 Ship type

No description provided

6 Road map

Best feasible way forward for a mandatory solution would seem to be to put a footnote in SOLAS regulation I/2(e) i after "ship" to divert to a new SOLAS chapter X where the definition of IP is introduced based on "other persons employed or engaged in any capacity on board a ship on the business of the ship".

In the new SOLAS chapter X it shall be absolutely clear that for small high speed type ships, without enclosed sleeping berths, of which the sole purpose is to transport more than 12 industrial personnel on an international voyage industrial personnel cannot be regarded as "other persons employed or engaged in any capacity on board a ship on the business of the ship".

Also it shall be made clear what minimum requirements a slow speed service craft would have to meet to enable the industrial personnel to be regarded as "other persons employed or engaged in any capacity on board a ship on the business of the ship".

For offshore construction vessels the new chapter should divert to the 2008 SPS Code where industrial personnel shall be treated identical to special personnel.

It shall be investigated to what extend SOLAS chapters II-1, II-2, III, IV and V are required.

Also possible impact in relation to other instruments such as OSV Code, MODU Code, MLC, STCW, etc. should be investigated.

As a temporary (non-mandatory) measure the above could be achieved in a MSC circular.

Amending the 2008 SPS Code to include the definition of industrial personnel and to remove the restriction of carriage of more than 12 industrial personnel and to remove or clarify the restriction that these persons have to work on board would be a stronger short term solution for applicable ship types because the 2008 SPS Code is already ratified by a large number of countries.

7 Advantages

The following elements could be considered as **advantages**:

.1 precedents in SOLAS Convention may allow to follow this direction; and

.2 provides a non-binding solution that can be later extended to be made mandatory.

8 Disadvantages

The following elements could be considered as **disadvantages**:

.1 in order to establish a difference between passengers and industrial personnel it depends on the issue of "accommodation" (i.e. sleeping berths);

.2 requires some work on the definition of industrial personnel to fit in a mandatory solution;

.3 slow speed vessels of small size below 500 GT are not covered; and

.4 it would lead to difficulties in distinguishing industrial personnel working in any capacities on board from other persons on board of the vessels not working in any capacities on board the vessels.

OPTION 4

1 Scope

Consider industrial personnel as passenger with special risk profiles and develop mandatory code(s) as alternative to the SOLAS passenger requirements based on existing instruments where possible.

2 Time frame/interim/mandatory

The timeframe needed would be approximately 3 years (average calculations).

3 Existing code/new code

Creation of new code or amending existing code(s). MSC circular identifying industrial personnel as passengers.

Would apply to any vessel to which SOLAS passenger requirements apply (more than twelve passengers or industrial persons).

Ensure that all vessels are covered by amending applicable codes, such as 2008 SPS Code, HSC Code, and OSC Guidance, that are best suited to the ship's mission.

2008 SPS Code and OSV guidelines would have to be amended to reflect the mandatory nature of industrial personnel standards.

4 Definition of Industrial Personnel

Industrial personnel are considered passengers with a unique risk profile.

5 Ship type

No description provided

6 Road map

Following determination by MSC that industrial personnel are passengers, either create a new mandatory code (based upon existing codes) or amend existing codes to address industrial personnel status as passengers with unique risk profiles.

SOLAS itself will need to be amended to reflect that compliance with passenger requirements may be demonstrated by adherence to the aforementioned new (or amended) codes.

7 Advantages

The following elements could be considered as **advantages**:

.1 in case of a mandatory solution, amendments to SOLAS chapter I may not be needed;

.2 provides both a binding and non-binding solution and a suitable road map can be easily established;

.3 gives flexibility to be used in different codes and allow wider application on different ship types; and

.4 a possible way forward for vessels of all sizes is available.

8 Disadvantages

The following elements could be considered as **disadvantages**:

.1 codes need to be amended to allow the carriage of passengers on non-passenger vessels. Time delays to provide technical guidance (draft/amend codes), or may require to draft a new code;

.2 the definition of industrial personnel as a subtype of passenger with unique risk profiles might lead into providing stringent requirements that might not easily adapted to current ship designs;

.3 cautions would be needed on the consequences of the introduction of the new sub-category of passengers, due to the potential conflicts for other conventions, SOLAS, and international instruments and its practical consequences; and

.4 it would lead to difficulties in the implementation of ISM Code.

OPTION 5

1 Scope

Application of the 2008 SPS Code to include transport and/or accommodation of Industrial Personnel for vessel under and above 500 GT.

2 Time frame/interim/mandatory

As soon as MSC can amend the 2008 SPS Code on an interim voluntary basis, until such time, as the 2008 SPS Code can be incorporated into SOLAS as mandatory Code.

3 Existing code / new code

Use an amended 2008 SPS Code, including definition of Industrial Personnel and deleting 1.2.3 in the 2008 SPS Code.

4 Definition of Industrial Personnel

Special personnel is not considered passengers. The new definition of Special Personnel in the 2008 SPS Code is suggested:

"Special personnel" including Industrial Personnel means all persons who are not passengers or members of the crew or children of under one year of age and who are carried on board in connection with the special purpose of that ship or because of special work being carried out by that ship. Wherever in this Code the number of special personnel appears as a parameter, it should include the number of passengers carried on board which may not exceed 12.

Special personnel are expected to be medical fit in accordance with STCW or equivalent standards with a fair knowledge of the layout of the ship and to have received some training in safety procedures and the handling of the ship's safety equipment in accordance with STCW ch VI/1 or equivalent standards before leaving port.

5 Ship type

The carriage of Industrial Personnel should be allowed on the following type of vessels, with basis in cargo design and construction certificates:

.1 conventional slow steaming SPS vessels, and

.2 high Speed Vessels, and

.3 vessels without berthing of Industrial Personnel, and

.4 non-steel vessels.

6 Road map

Not provided

7 Advantages

The following elements could be considered as **advantages**:

.1 provides a non-binding solution that can be later extended to be made mandatory;

.2 the solution is broad and is based on existing legislation;

.3 requiring a comprehensive review of the 2008 SPS Code will serve to address the safe transport of industrial personnel; and

.4 offering a long term binding and comprehensive solution needed by the shipping/maritime industry.

8 Disadvantages

The following elements could be considered as disadvantages:

.1 tackles only SPS ships. There is a need to expand on scope to provide a complete solution and the impacts are not known;

.2 a solution is needed for lower size of ships;

.3 a solution is needed for craft operating at high speed;

.4 requires some work on the definition of industrial personnel to fit in a mandatory solution;

.5 in case of a mandatory solution careful consideration is needed on the relationship with SOLAS chapter I and/or the other chapters; and

.6 requires identifying all the issues concerning to carriage industrial personnel within the frame work of the requirements of the 2008 SPS Code.

OPTION 6

1 Scope

Not provided

2 Time frame/interim/mandatory

Not provided

3 Existing code/new code

Not provided

4 Definition of Industrial Personnel

Recognize "industrial personnel" as a group of special personnel. Appropriate standards for the design, certification and operation of cargo ships that carry industrial personnel could then be developed. For this group similar training and medical requirements should be met and could be based on existing requirements as STCW or industrial standards. In comparison to Special Personnel, Industrial personnel do not perform their work on board of the vessel, but are being carried on board of the vessel.

Additional elements are amongst others:

.1 it concerns well trained personnel, able bodied, etcetera;

.2 the group of Industrial Personnel is not working on board of the vessel;

.3 industrial personnel does not pay for the journey.

5 Ship type

The vessel is equipped for the transfer of industrial personnel and materials to and from the installation.

6 Road map

Not provided

7 Advantages

The following elements could be considered as **advantages**:

.1 provides a non-binding solution that can be later extended to be made mandatory;

.2 the solution is broad and is based on existing legislation;

.3 requiring a comprehensive review of the 2008 SPS Code will serve to address the safe transport of industrial personnel; and

.4 offering a long term binding and comprehensive solution needed by the shipping/maritime industry.

8 Disadvantages

The following elements could be considered as disadvantages:

.1 tackles only SPS ships. There is a need to expand on scope to provide a complete solution and the impacts are not known;

.2 a solution is needed for lower size of ships;

.3 a solution is needed for craft operating at high speed;

.4 requires some work on the definition of industrial personnel to fit in a mandatory solution;

.5 in case of a mandatory solution careful consideration is needed on the relationship with SOLAS chapter I and/or the other chapters; and

.6 requires identifying all the issues concerning to carriage IP within the frame work of the requirements of the 2008 SPS Code.

OPTION 7

1 Scope

For ship ≥500 GT (Scope A*): the scope of application of 2008 SPS Code will apply to slow ships; and the HSC code to high speed crafts, with SOLAS fire safety standards for passenger spaces if IP are berthed.

For ship <500 GT (Scope B): a new code for all small ships for the carriage of industrial personnel.

2 Time frame/interim/mandatory

Mandatory, long-term solution. No interim solution required.

Step one: make the 2008 SPS code mandatory through a SOLAS amendment. Since it will enter force on 1st January 2020, the code can remain voluntary until that date.

Step two: development of a new mandatory code for small ships carrying industrial personnel (slow and high speed). This code must be adopted by 1st July 2018 to enter into force on 1st January 2020. Can remain voluntary until that date.

3 Existing code / new code

Existing code for step one (ships ≥ 500 GT). New code for step two (ships <500 GT).

* Slow ships: the scope of application of 2008 SPS Code will apply
High speed ships:
If IP unberthed > HSC Code
If IP berthed > HSC Code with SOLAS fire safety standards for passenger spaces

4 Definition of Industrial Personnel

Based on 2008 SPS Code Ship type with modifications:

> "For the purposes of this Code, a special purpose ship is a ship which carries more than 12 special personnel, i.e. persons who are carried on board in connection with the special purpose of that ship or industrial personnel being transported to or from offshore installations and are carried in addition to those persons required for the normal navigation, engineering and maintenance of the ship or engaged to provide services for the persons carried on board".

5 Ship type

As per 2008 SPS Code

6 Road map

Step 1: MSC make the 2008 SPS Code mandatory through a SOLAS amendment.

Step 2: SDC and other Sub-Committees development of a new mandatory code for small ships carrying industrial personnel (slow and high speed).

Step 3: MSC approves the code for small ships carrying industrial personnel.

Step 4: MSC 99 adopts the code for small ships carrying industrial personnel.

1st January 2020: code for small ships carrying industrial personnel coming into force on. Entry into force of the mandatory 2008 SPS Code (because of 4-years SOLAS amendment cycle).

7 Advantages

The following elements could be considered as **advantages**:

.1 in case of a mandatory solution, amendments to SOLAS chapter I may not be needed.

For scope A:

.1 it covers all of the vessels carrying more than 12 industrial personnel, the proposal is based on existing instruments;

.2 requiring a comprehensive review of the 2008 SPS Code will serve to address the safe transport of industrial personnel;

.3 offering a long term binding and comprehensive solution needed by the shipping/maritime industry; and

.4 taking the advantages of HSC Code for the carriage of industrial personnel by high speed craft.

For scope B:

.1 provides for a new code to address the safe transport of industrial personnel on vessels below 500 GT;

.2 the new code can be developed from existing local, regional, or appropriate international regulations; and

.3 may provide a non-binding solution that can be later extended to be made mandatory.

8 Disadvantages

The following elements could be considered as **disadvantages**:

.1 requires some work on the definition of industrial personnel to fit in a mandatory solution; and

.2 in case of a mandatory solution careful consideration is needed on the relationship with SOLAS chapter I and/or the other chapters.

For scope A:

.1 requires identifying all the issues concerning to carriage industrial personnel within the frame work of the requirements of the 2008 SPS Code; and

.2 in order to establish a difference between passengers and industrial personnel it depends on the issue of "accommodation" (i.e. sleeping berths).

For scope B:

.1 a new code need to be developed for vessels below 500 GT; and

.2 a code just cover a single purpose vessel, it would be difficult to justify the rational of the development of this new code.

OPTION 8

1 Scope

All vessels on international voyages carrying more than 12 industrial personnel, distinguished between conventionally designed vessels and craft operating at high speed as defined in 2000 HSC Code.

2 Time frame/interim/mandatory

A mandatory long term solution as SOLAS chapter I amendment. For a medium term solution the mechanism of early implementation is preferred. A short term solution would be acceptable if the final targets are determined and defined clearly.

3 Existing code / new code

Define alterations/relaxations to the 2008 SPS Code as well as to the 2000 HSC Code as reasonable and make them mandatory by including them into a new SOLAS chapter.

4 Definition of Industrial Personnel

The annex 5 to document SDC 2/25 should be used as a working definition.

The amended definition of SOLAS chapter I would be:

"A passenger is defined as every person other than

(i) the master and the members of the crew or other persons employed or engaged in any capacity on board a ship on the business of that ship;

(ii) industrial personnel; and

(iii) a child under one year of age."

5 Ship type

Vessels that are built as High Speed Craft are regulated by the 2000 HSC Code and its alterations/relaxations, every other vessel falls under the 2008 SPS Code with its necessary amendments. No geometric thresholds (i.e. max. GT, max. length) should be implemented for the application of the new chapter.

6 Road map

Work out a final definition of industrial personnel by the Member States.

Draft a new SOLAS chapter containing regulations carrying more than 12 industrial personnel. This new chapter regulates two kinds of vessels carrying industrial personnel:

.1 (slow steaming) conventional designed vessels and

.2 vessels operating at high speed.

In this new chapter references to the 2008 SPS Code and the 2000 HSC Code with the necessary amendments/relaxations with regard to the transport of more than 12 industrial personnel for those two types of vessels are to be included.

Amend SOLAS regulation I/2(e) by introducing the term "industrial personnel" and add the new SOLAS chapter for transport of industrial personnel.

7 Advantages

The following elements could be considered as **advantages**:

.1 industrial personnel would be recognized under SOLAS. Overall approach which grants a unified/harmonised application by administrations;

.2 a SOLAS consistent use of the provisions of a modified 2008 SPS Code;

.3 existing codes can be used as starting point;

.4 it offers the opportunities to develop solutions to the difficulties arising from carriage of persons other than crew under the existing codes;

.5 not hindering innovations in future shipbuilding projects by setting limitations too narrow;

.6 a SOLAS consistent use of the provisions of a modified 2008 SPS Code resolving some of the legal conflicts that may arise in the future within SOLAS; and

.7 there is already a broad support within Member States for the use of the definition from the annex 5 to the document SDC 2/25 and doesn´t require an extensive work on the definition of industrial personnel.

8 Disadvantages

The following elements could be considered as **disadvantages**:

.1 there is uncertainty when such an amendment will enter into force; and

.2 requires some work on the definition of industrial personnel to fit in a mandatory solution.

COMPARISON OF CRITERIA WITHIN PROPOSED OPTIONS

	Scope		Timeframe				Code						Definition of IP	
			Interim		Mandatory									
Option	< 500 GT	> 500 GT	YES	NO	YES	NO	New	SPS	HSC	OSV	MODU	SOLAS	PAX	Non-PAX
1 [1]		X	X		X			X				X		X
2 [2]	X	X	X		X			X	X	X	X	X		X
3 [3]	X	X	X		X			X	X			X	X	X
4 [4]	X	X			X		X						X	
5 [5]	X	X	X		X			X				X		X
6 [6]	X	X	X		X		X	X	X	X	X	X		X
7 [7]	X	X			X		X	X	X			X		X
8 [5,8]	X	X	X		X			X	X			X		X

Notes:

1) Amend the SPS Code (interim) and supports making the SPS Code mandatory under SOLAS. > 500 GT SPS Code Certified; < 500 GT
2) All ships. Develop IP standards to align with Res.A.1079(28) Cat A, B and C as non-PAX/non-children < 1 yr, SPS Code, OSV / HSC Code SOLAS.
3) Mandatory for SPS Ships and HSCs with provision of stds for ships carrying > 12 IPs; Non-Mandatory through guidelines and/or amendments to SPS Code; no sleeping berths, IPs = PAX; Sleeping berths provided, IPs = "Other persons on board engaged on the business of the ship"; HSC with a separate guideline to allow on a case-by-case basis. Amending the HSC Code will only cover HSC not slow speed ships.
4) IPs = PAX with special risk profile; HSC Code, OSV Code & Guidelines; Wide range of applicability.
5) All ships; supports modifying the SPS Code as necessary and make it mandatory by including it into a new SOLAS chapter. The interim solution does not include SOLAS amendments.
6) Input on scope, time frame and/or amendments to existing codes or development of a new code is not provided but is applicable. Recognizes "Industrial Personnel" as special personnel. Supports creation of appropriate standards for the design, certification and operation of cargo ships that carry IPs. IPs should meet similar training and medical requirements based on STCW or equivalent industrial standards.
7) SPS Code will apply to ≥500GT slow ships; HSC Code will apply to HSC, with SOLAS fire safety standards for passenger spaces if IP are berthed; supports the creation of a new code for small ships (< 500 GT) carrying industrial personnel (slow and high speed).
8) Supports modifying the SPS Code as well as the 2000 HSC Code as necessary and make them mandatory by including them into a new SOLAS chapter. Proposes changes to SOLAS Chapter I.

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ANNEX 23

BIENNIAL STATUS REPORT AND OUTPUTS ON THE COMMITTEE'S POST-BIENNIAL AGENDA THAT FALL UNDER THE PURVIEW OF THE SUB-COMMITTEE

SUB-COMMITTEE ON SHIP DESIGN AND CONSTRUCTION (SDC)								
Planned 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**
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; SDC 3/21, section 14
2.0.1.1	Amendments to the ESP Code	Continuous	MSC	SDC		Ongoing		SDC 3/21, section 13
5.1.1.1	Guidelines on safe return to port for passenger ships	2016	MSC	SDC		Completed		MSC 81/25, paragraph 23.54; MSC 95/22 paragraph 10.7; SDC 3/21, section 5
5.1.1.3	Amendments to SOLAS and FSS Code to make evacuation analysis mandatory for new passenger ships and review of the Recommendation on evacuation analysis for new and existing passenger ships	2016	MSC	SDC		Extended		MSC 83/28, paragraph 25.25; MSC 93/22, paragraph 20.11; SDC 3/21, section 8
Note: Target completion year extended to 2017								

SUB-COMMITTEE ON SHIP DESIGN AND CONSTRUCTION (SDC)								
Planned 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**
5.1.1.6	Amendments to SOLAS chapter II-1 and associated guidelines on damage control drills for passenger ships	2016	MSC	HTW	SDC	Completed		MSC 93/22, paragraph 20.22.3; MSC 95/22, paragraph 10.24; SDC 3/21, section 9
5.2.1.1	Revised SOLAS regulation II-1/3-8 and associated guidelines (MSC.1/Circ.1175) and new guidelines for safe mooring operations for all ships	2017	MSC	HTW / SSE	SDC	In progress		MSC 95/22, paragraphs 19.22 and 19.23; SDC 3/21, section 15
5.2.1.4	Mandatory instrument and/or provisions addressing safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages	2017	MSC	SDC		In progress		MSC 95/22, paragraphs 10.13, 19.24 to 19.26; SDC 3/21, section 16
5.2.1.6	Revision of section 3 of the Guidelines for damage control plans and information to the master (MSC.1/Circ.1245) for passenger ships	2017	MSC	SDC		In progress		MSC 93/22, paragraphs 6.28 and 20.15 SDC 3/21, section 10
5.2.1.7	Computerized stability support for the master in case of flooding for existing passenger ships	2017	MSC	SDC		In progress		MSC 94/21, paragraph 18.20 SDC 3/21, section 4
5.2.1.12	Finalization of second generation intact stability criteria	2017	MSC	SDC		In progress		SDC 3/21, section 6

SUB-COMMITTEE ON SHIP DESIGN AND CONSTRUCTION (SDC)								
Planned 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**
5.2.1.13	Amendments to SOLAS chapter II-1/6 and II-1/8-1	2017	MSC	SDC		In progress		MSC 85/26, paragraph 23.35; MSC 95/22, paragraph 10.5; SDC 3/21, section 3
5.2.1.19	Classification of offshore industry vessels and a review of the need for a non-mandatory code for offshore construction support vessels	2016	MSC	SDC		Extended		MSC 85/26, paragraph 23.27; SDC 3/21, section 11
Note: Target completion year extended to 2017								
5.2.1.21	Guidelines for use of Fibre Reinforced Plastics (FRP) within ship structures	2017	MSC	SDC		Extended		MSC 95/22, paragraph 10.16; SDC 3/21, section 17
Note: Target completion year extended to 2017								
5.2.1.23	Guidelines for wing-in-ground craft	2016	MSC	SSE / NCSR / HTW	SDC	Postponed		MSC 88/26, paragraph 23.30; SDC 3/21, section 12
Note: Output placed in the post-biennial agenda of the Committee, for inclusion in the provisional agenda of SDC 5, with a view to finalization during the 2018-2019 biennium.								
5.2.1.24	Amendments to Part B of the 2008 IS Code on towing, lifting and anchor handling operations	2016	MSC	SDC		Completed		MSC 88/26, paragraph 23.36; SDC 3/21, section 7

OUTPUTS ON THE COMMITTEE'S POST-BIENNIAL AGENDA THAT FALL UNDER THE PURVIEW OF THE SUB-COMMITTEE

SHIP DESIGN AND CONSTRUCTION (SDC)								
ACCEPTED POST-BIENNIAL OUTPUTS								
Number	**Biennium***	**Reference to High-level Actions**	**Description**	**Parent organ(s)**	**Associated organ(s)**	**Coordinating organ**	**Timescale**	**References**
7	2012-2013	2.0.1	Mandatory application of the Performance standard for protective coatings for void spaces on bulk carriers and oil tankers	MSC	SDC		2	MSC 76/23, paragraphs 20.41.2 and 20.48; DE 50/27, section 4
8	2012-2013	2.0.1	Performance standard for protective coatings for void spaces on all types of ships	MSC	SDC		2	MSC 76/23, paragraphs 20.41.2 and 20.48
9	2012-2013	2.0.1	Revision of the provisions for helicopter facilities in SOLAS and the MODU Code	MSC	SDC		2	MSC 86/26, paragraph 23.39
32	2012-2013	5.2.4	Recommendations related to navigational sonar on crude oil tankers	MSC	SDC		1	MSC 91/22, paragraph 19.23
Note: Passed to the then DE Sub-Committee by MSC 91. It may be necessary to request advice from the MSC about the appropriate associated organ to deal with this output.								
45	2012-2013	5.2.1	Development of a requirement for hoist winches to be tested following any maintenance, repair or modification (MSC.1/Circ.1331)	MSC	~~SDC~~ SSE		1	MSC 90/28, paragraph 25.31, MSC.1/Circ.1331
Note: Any requirements for hoist winches can be further developed under the existing output 5.2.1.22 (Requirements for onboard lifting appliances and winches), which is currently on the 2016-2017 biennial agenda of the SSE Sub-Committee.								
58	2012-2013	5.2.1	Finalization of second generation intact stability criteria	MSC	SDC		4	SLF 55/17, paragraph 3.13

SHIP DESIGN AND CONSTRUCTION (SDC)								
ACCEPTED POST-BIENNIAL OUTPUTS								
Number	**Biennium***	**Reference to High-level Actions**	**Description**	**Parent organ(s)**	**Associated organ(s)**	**Coordinating organ**	**Timescale**	**References**
76	2014-2015	5.2.1	Application of the Mandatory Code to non-SOLAS ships operating in polar waters	MSC	SDC		3	Formerly output 5.2.1.15
[…]	2016-2017	5.2.1	Guidelines for wing-in-ground craft	MSC	SDC		2	MSC 88/26, paragraph 23.36 SDC 3/21, section 12 Formerly output 5.2.1.23

Notes:

* Denotes biennium when the output was placed on the post-biennial agenda

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ANNEX 24

PROPOSED PROVISIONAL AGENDA FOR SDC 4

Opening of the session

1 Adoption of the agenda

2 Decisions of other IMO bodies

3 Amendments to SOLAS regulations II-1/6 and II-1/8-1 (5.2.1.13)

4 Computerized stability support for the master in case of flooding for existing passenger ships (5.2.1.7)

5 Finalization of second generation intact stability criteria (5.2.1.12)

6 Amendments to SOLAS and FSS Code to make evacuation analysis mandatory for new passenger ships and review of the Recommendation on evacuation analysis for new and existing passenger ships (5.1.1.3)

7 Revision of section 3 of the Guidelines for damage control plans and information to the master (MSC.1/Circ.1245) for passenger ships (5.2.1.6)

8 Mandatory instrument and/or provisions addressing safety standards for the carriage of more than 12 industrial personnel on board vessels engaged on international voyages (5.2.1.4)

9 Classification of offshore industry vessels and a review of the need for a non-mandatory code for offshore construction support vessels (5.2.1.19)

10 Amendments to the 2011 ESP Code (2.0.1.1)

11 Unified interpretation to provisions of IMO safety, security, and environment-related Conventions (1.1.2.3)

12 Revised SOLAS regulation II-1/3-8 and associated guidelines (MSC.1/Circ.1175) and new guidelines for safe mooring operations for all ships (5.2.1.1)

13 Guidelines for use of Fibre Reinforced Plastic (FRP) within ship structures (5.2.1.21)

14 Biennial status report and provisional agenda for SDC 5

15 Election of Chairman and Vice-Chairman for 2018

16 Any other business

17 Report to the Maritime Safety Committee

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ANNEX 25

STATEMENTS BY DELEGATIONS*

OPENING

STATEMENT BY THE DELEGATION OF ANTIGUA AND BARBUDA

On 16 December 2015, at about 20:14 hours Local Time in the Singapore Straights, there was a collision involving the Antigua and Barbuda flagged vessel **Thorco Cloud** and the Cayman Island registered vessel **Stolt Commitment**.

The unfortunate outcome of this collision was that the **Thorco Cloud** sank rapidly with six of its seafarers going missing. Our heartfelt condolences go out to those family members and others affected by this tragic event.

We would like to thank the authorities of Singapore and Indonesia as well as other vessels in the area for their prompt action in instigating the search and rescue operation.

Unfortunately, so far 3 bodies have been recovered and identified as being seafarers from the **Thorco Cloud**, and the search continues for the other 3 missing seafarers.

Indonesia has taken the lead in the subsequent Casualty Investigation with which we are fully cooperating in the hope that lessons learnt from this collision can be utilized to prevent similar incidents in the future.

STATEMENT BY THE DELEGATION OF UKRAINE

I would like to draw your attention to yet another example of gross violation by the Russian Federation of the sovereign rights of Ukraine on the continental shelf ensured by the UNCLOS.

On 14 December 2015, the Russian Federation carried out provocative removal of two jack-up oil rigs B-312 and B-319 and oil platform "Tavryda", property of Ukraine, located in the Black Sea off the coast of Odessa.

This delegation expresses its deep indignation over the Russian Federation's internationally wrongful acts, which have repeatedly been aimed at the violation of Ukraine's sovereign rights as a coastal State for the purpose of exploring and exploiting natural resources in its territorial sea and on the continental shelf.

We consider this incident as another vestige of massive pillage of property and natural resources perpetrated by the aggressor State since the occupation of part of Ukraine's sovereign territory – the Autonomous Republic of Crimea and the city of Sevastopol. These actions complemented the list of proofs of Russian Federation's aggressive behaviour and its neglect of international law, as well as evidence of violation by the Russian Federation of its commitments as an occupying Power, particularly with regard to inviolability of property rights.

* Statements have been included in this annex in the order in which they were given, sorted by agenda items, and in the language of submission (including translation into any other language if such translation was provided). Statements are available in all the official languages on audio file: http://docs.imo.org/Meetings/Media.aspx

Given reported circumstances, the Ukrainian Side defines the above mentioned activities of the Russian Federation as internationally wrongful acts aimed at the systemic violation of sovereignty, sovereign rights and jurisdiction of Ukraine over internal waters, territorial sea, exclusive economic zone and continental shelf in the Black and Azov seas.

In this connection, this delegation calls the Russian Federation to international responsibility, demands from the Russian Federation to take all practically possible measures to prevent internationally wrongful acts, to provide appropriate assurances and guarantees that they will not repeat it in the future and to immediately restitute property to Ukraine.

The Ukrainian Side reserves a right to demand from the Russian Side to be reimbursed for the damage arising out of its actions bearing all evidence of internationally wrongful acts for the purpose of the UNCLOS.

STATEMENT BY THE DELEGATION OF THE ISLAMIC REPUBLIC OF IRAN

I would like to seize this opportunity to congratulate His Excellency Secretary-General of IMO, Mr. Kitack Lim, for starting his term in office, which began on 1 January 2016, and I would like to assure him of my country's readiness to cooperate closely and fully with him and the secretariat.

January is the month that many of the international maritime treaties that we have worked on over the past years will come into fruition. However, today I am honoured to announce the historic implementation of an agreement, that whilst not directly maritime-related, will affect the activities of the Islamic Republic of Iran as a Member State of the IMO. I have the pleasure to announce the entry into force day of the Joint Comprehensive Plan of Action (JCPOA) or as we Iranians call it in Persian" BARJAM", which is an international agreement on the nuclear program of the Islamic Republic of Iran. The JCPOA was agreed upon in Vienna on 14 July 2015 between Iran, and the countries of the P 5+1 (the five permanent members of the United Nations Security Council—China, France, Russia, United Kingdom, United States of America—plus Germany), as well as High Representative of the European Union for Foreign Affairs and Security Policy.

On 16 January 2016, E.U. Foreign Policy Chief Federica Mogherini and Iranian Foreign Minister Mohammad Javad Zarif announced the start of implementation of the nuclear deal. Implementation Day was triggered by the International Atomic Energy Agency certification that Iran has fulfilled its obligations under the nuclear agreement, Joint Comprehensive Plan of Action. As a result, Iran is to receive relief from nuclear-related U.S., E.U. and U.N. sanctions.

There are two major outcomes of this agreement that directly impact the activities of the Islamic Republic of Iran within the IMO. Firstly, we do hope that the Islamic Republic of Iran will be able to pay its contribution arrears of the past two years, now that the international banking sanctions have been lifted. Secondly, the repealing of the sanctions on Iran's shipping industry will lead to a rise in Iran's shipping activities both in Europe and beyond. It is worth mentioning that overall relations between the Islamic Republic of Iran and the World have now entered a new unprecedented era, this is a turning point for the international community at large. I wish to congratulate all those who have made any contribution – however large or small – to make this deal a reality, because without the concentrated effort of all those involved I would not be here today announcing this momentous deal.

This achievement shows that with perseverance, determination, mutual understanding, and cooperation we can overcome even the most difficult issues of our time by finding practical solutions. We wholeheartedly welcomes this achievement as it will boost the Iranian national economy and its international Maritime trade, and at the same time we believe the international community should be encouraged by the progress shown thus far with the hopes that such mutual understanding could be regarded as a Paradigm in every challenges we face in the world.