INTERNATIONAL MARITIME ORGANIZATION

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SUB-COMMITTEE ON STABILITY AND LOAD LINES AND ON FISHING VESSELS SAFETY
48th session
Agenda item 21

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REPORT TO THE MARITIME SAFETY COMMITTEE

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LIST OF ANNEXES

1 GENERAL

1.1 The Sub-Committee held its forty-eighth session from 12 to 16 September 2005. In the absence of the elected Chairman, Mr. A. Carcantzós (Greece), in accordance with the Committee's Rules of Procedure, the meeting was held under the chairmanship of Mr. R. Gehling (Australia), the Vice-Chairman of the Sub-Committee.

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

ALGERIA
ANTIGUA AND BARBUDA
ARGENTINA
AUSTRALIA
BAHAMAS
BANGLADESH
BRAZIL
CANADA
CHILE
CHINA
COLOMBIA
CUBA
CYPRUS
DENMARK
ECUADOR
EGYPT
FINLAND
FRANCE
GERMANY
GHANA
GREECE
ICELAND
INDONESIA
IRAN (ISLAMIC REPUBLIC OF)
ISRAEL
ITALY
JAPAN
LATVIA
LIBERIA
LITHUANIA
MARSHALL ISLANDS
MEXICO
MOROCCO
NETHERLANDS
NIGERIA
NORWAY
PANAMA
PERU
PHILIPPINES
POLAND
PORTUGAL
REPUBLIC OF KOREA
RUSSIAN FEDERATION
SAUDI ARABIA
SINGAPORE
SOUTH AFRICA
SPAIN
SWEDEN
TURKEY
TUVALU
UKRAINE
UNITED KINGDOM
UNITED STATES
URUGUAY
VENEZUELA

and the following Associate Member of IMO:

HONG KONG, CHINA

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

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)

1.4 The session was also attended by an observer from the following intergovernmental organization:

MARITIME ORGANISATION FOR WEST AND CENTRAL AFRICA (MOWCA)

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

INTERNATIONAL CHAMBER OF SHIPPING (ICS)
INTERNATIONAL UNION OF MARINE INSURANCE (IUMI)
INTERNATIONAL CONFEDERATION OF FREE TRADE UNIONS (ICFTU)
BIMCO
INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)
INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS (IADC)
INTERNATIONAL FEDERATION OF SHIPMASTERS' ASSOCIATIONS (IFSMA)
COMMUNITY OF EUROPEAN SHIPYARDS' ASSOCIATION (CESA)
INTERNATIONAL COUNCIL OF CRUISE LINES (ICCL)
INTERNATIONAL ASSOCIATION OF DRY CARGO SHIPOWNERS (INTERCARGO)
THE INTERNATIONAL MARINE CONTRACTORS ASSOCIATION (IMCA)
WORLD NUCLEAR TRANSPORT INSTITUTE (WNTI)
THE ROYAL INSTITUTION OF NAVAL ARCHITECTS (RINA)

Secretary-General's opening address

1.6 After welcoming participants, the Secretary-General invited the Sub-Committee to join him in conveying to Captain Alexander Carcantzós of Greece, the outgoing Chairman, the appreciation for his valuable contribution and excellent services to the Sub-Committee.

Referring to the devastating impact of hurricane **Katrina**, the Secretary-General informed the Sub-Committee that in his message on behalf of the membership and staff, to Admiral Collins, the Commandant of the US Coast Guard, he expressed sympathy for **Katrina's** victims and the belief that the fortitude, resilience and will of the people of New Orleans would enable them to overcome their hardship and rebuild their city to its original splendour. At the same time, he expressed confidence that every possible effort would be made to free the Mississippi river from any navigational hazards identified and that the river would fully resume its vital role in the service of shipping.

The Secretary-General mentioned the theme for this year's World Maritime Day "International Shipping – Carrier of World Trade", and suggested that this would give an opportunity to direct attention to the image of shipping and contribute in raising its profile. He also referred to the decision of the Council to establish an IMO Award for Exceptional Bravery at Sea which, in addition to recognizing those who, at the risk of losing their own life, go out to sea to rescue persons in distress or to prevent the catastrophic pollution of marine environment, would provide an opportunity to show the humanitarian aspect of shipping.

With regard to the adoption of the revised SOLAS chapter II-1 parts A, B and B-1, the Secretary-General considered this to be a significant achievement in IMO's endeavours to harmonize the provisions on subdivision and damage stability for passenger and cargo ships, and acknowledged the efforts of the Sub-Committee, especially the members of the SDS Working and Correspondence Groups. He stressed the importance, as the next step, of the work on the development of explanatory notes for the harmonized SOLAS chapter II-1 to ensure that the provisions of the revised chapter are applied in a uniform and consistent manner by all SOLAS Contracting Governments.

As another long-term project, the Secretary-General turned to approval by IMO, FAO and ILO of the revised fishing vessel Safety Code and Voluntary Guidelines and expressed his appreciation to all the participants involved. Recalling that the large majority of fatalities occur on small fishing vessels, he emphasized the importance of a new task assigned to the Sub-Committee regarding development of safety standards for small fishing vessels. In this context, he reiterated his encouragement to Governments to consider ratifying both the Torremolinos Protocol and the STCW-F Convention, while emphasizing that a technical co-operation programme is currently under implementation to provide information and assistance to any interested Member Governments, in order to promote acceptance of the two instruments as well as wide and effective implementation of the Safety Code and Voluntary Guidelines.

In respect of the work on passenger ship safety, the Secretary-General, referring to the revised work plan approved by the Committee, highlighted the importance of the contribution by the Sub-Committee on this subject and particularly on improving ship survivability in the event of grounding, collision or flooding, and urged delegates to make every effort to provide the Committee with the expert input.

The Secretary-General further mentioned the importance of the work on the comprehensive review of the Code on Intact Stability, which would significantly affect the design and, ultimately, enhance the safety of ships. He pointed out that the trend towards goal- or performance-based standards was in line with the objectives in the Organization's Strategic Plan and provided the opportunity for a flexible response, allowing for technological developments and novel solutions, whilst still meeting the highest practicable international standards agreed or to be agreed.

Chairman's remarks

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

Adoption of the agenda

1.8 The Sub-Committee adopted the agenda (SLF 48/1) and agreed, in general, to be guided in its work by the annotations to the provisional agenda contained in document SLF 48/1/1. The agenda, as adopted, with the list of documents considered under each agenda item, is set out in document SLF 48/INF.10.

2 DECISIONS OF OTHER IMO BODIES

2.1 The Sub-Committee noted the decisions and comments pertaining to its work, made by DSC 9, MEPC 52, C 93, MSC 79, STW 36, FP 49, COMSAR 9, DE 48, FSI 13, BLG 9, MSC 80, NAV 51, C 94 and MEPC 53, as reported in documents SLF 48/2, SLF 48/2/1 and SLF 48/2/2, and took them into account in its deliberations when dealing with relevant agenda items.

New reporting procedures and related matters

2.2 The Sub-Committee noted that MSC 79, having taking into account the relevant recommendations of MEPC 52 and their endorsement by C 93, had decided to halt the trial of new reporting procedures and to re-establish the previous reporting procedure with immediate effect.

Improving the efficiency of meetings

2.3 The Sub-Committee noted that MSC 80 had agreed that working groups could start their work on Monday mornings on the basis of the draft terms of reference presented by the Chairman of the committee or sub-committee concerned, pending formal discussion of those terms of reference under the relevant agenda item, and that these measures should be decided by the chairman of the committee or sub-committee concerned, on a case-by-case basis.

Terms of reference of the Sub-Committee

2.4 The Sub-Committee noted that MSC 80 had approved its terms of reference, as set out in annex 2 to document SLF 48/2/1 and agreed that the sub-committees should periodically review their terms of reference to ensure that they accurately reflect the work being carried out.

Invitation to experts

2.5 The Sub-Committee noted that MSC 80 had decided that experts could participate in the committee and sub-committee sessions on condition that they provided written advice or expertise only through the Secretariat, participated only in sessions, or parts thereof, to which they had been specifically invited and did so without taking part in debate and without vote; and had adopted amendments to the Committee's Rules of Procedure to include a new rule 45 on "Invitation to experts".

3 DEVELOPMENT OF EXPLANATORY NOTES FOR HARMONIZED SOLAS CHAPTER II-1

General

3.1 The Sub-Committee recalled that SLF 47, noting that the SDS Working Group had not been able to consider the Explanatory notes for the harmonized SOLAS chapter II-1 due to time constraints, had agreed to invite the Committee to extend the target completion date for the work programme item to 2006.

3.2 The Sub-Committee also recalled that SLF 47 had instructed the SDS Correspondence Group to further develop the draft Explanatory notes for harmonized SOLAS chapter II-1, on the basis of document SLF 47/4, and had agreed to establish, at this session, a working group on the subdivision and damage stability (including passenger ship safety).

3.3 The Sub-Committee noted that MSC 80, having considered a submission by France and Sweden (MSC 80/3/8), providing draft Guidelines for damage control plans and information to the master, prepared on the basis of MSC/Circ.919, had referred the document to SLF 48 for detailed consideration.

3.4 The Sub-Committee had for its consideration part 2 of the report of the SDS Working Group at SLF 47 (document SLF 48/3); and the report of the SDS Correspondence Group (SLF 48/3/1) submitted by Sweden and the United States and comments thereon contained in documents SLF 48/3/2, SLF 48/3/3, SLF 48/3/8 and SLF 48/3/10 (Norway), SLF 48/3/4 (Sweden and the United States), SLF 48/3/5 (Italy), SLF 48/3/6 (Poland), SLF 48/3/7 (Japan), SLF 48/3/9 (ICCL) and MSC 80/3/8 (France and Sweden).

Reports of the working and correspondence groups established at SLF 47

3.5 The Sub-Committee considered part 2 of the report of the SDS Working Group at SLF 47 (SLF 48/3) and the report of the SDS Correspondence Group (SLF 48/3/1) and agreed that they should form the basis for the work of the Working Group on Subdivision and Damage Stability (SDS). The Sub-Committee noted in particular that the following complex items had been identified for priority consideration by the correspondence group: intermediate stage flooding, equalization time, progressive flooding and escape routes.

Proposal on development of the Explanatory notes

3.6 Following consideration of the documents submitted by Norway, in particular:

.1 SLF 48/3/2, proposing an interpretation on how to handle steps in the bulkhead deck in relation to revised SOLAS regulations II-1/13, II-1/13-1 and II-1/15;

.2 SLF 48/3/3, proposing a clarification on the interaction between regulations II-1/10 and II-1/16 with respect to the test pressure to be applied to watertight doors;

.3 SLF 48/3/8, referring to document SLF 45/3/6, which contains a proposal for a MSC circular on guidance notes for consideration of various aspects of equalization of damage cases in new and existing passenger ships, and requesting its consideration under the agenda item; and

.4 SLF 48/3/10, commenting on notes included in annex 2 of the report of the SDS Correspondence Group (SLF 48/3/1),

the Sub-Committee agreed to refer them to the SDS Working Group for detailed consideration.

3.7 The Sub-Committee considered document SLF 48/3/4 (Sweden and the United States), recommending that the Explanatory notes include guidance by which Administrations may determine the impact on survivability of open watertight doors permitted by the revised SOLAS regulation II-1/22.4 and proposing a basis for guidance. Following a brief discussion in plenary, during which different views regarding the appropriateness of such guidance were expressed, Sub-Committee agreed to refer the above document to the SDS Working Group for further consideration.

3.8 Following consideration of document SLF 48/3/5 (Italy), discussing the application of the revised SOLAS regulation II-1/9.9 to ro-ro and passenger ferries and proposing that the requirement in that regulation may be applied as described in the annex to the document, and that this specific item should be considered for inclusion in the draft Explanatory notes for harmonized SOLAS chapter II-1, the Sub-Committee referred the proposal to the SDS Working Group for further consideration.

3.9 The Sub-Committee considered document SLF 48/3/6 (Poland), commenting on the report of the SDS Correspondence Group (SLF 48/3/1) and proposing that the identification of all the issues which should be included in the Explanatory notes should be finalized during this session of the Sub-Committee, and that the structure and contents of the Explanatory notes should be agreed. Subsequently, the Sub-Committee agreed to refer the proposal for further consideration to the SDS Working Group.

3.10 Having considered document SLF 48/3/7 (Japan), providing proposals for clarifications to SOLAS regulations II-1/7-1, II-1/7-2 and II-1/13, the Sub-Committee referred it for further consideration to the SDS Working Group.

3.11 The Sub-Committee considered document SLF 48/3/9 (ICCL**),** commenting on the report of the SDS correspondence group (SLF 48/3/1) and proposing that the SDS Working Group make every effort to reach consensus at this meeting regarding the Explanatory notes, and referred the above proposal to the SDS Working Group for further consideration.

3.12 As instructed by MSC 80, the Sub-Committee also considered document MSC 80/3/8 (France and Sweden), providing draft Guidelines for damage control plans and information to the master, prepared on the basis of MSC/Circ.919, and, recognizing that this was a very complex issue with diverging views put forward by Member States, agreed to refer the above matter to the SDS Working Group for further consideration.

Related issues

3.13 In the context of the item, the delegation of Norway recalled that, in previous drafts of the revised SOLAS chapter II-1, the factor "s_{wod}" was included in the formulas for the calculation of the factor "s" to account for damages involving large undivided deck spaces close to the damage waterline. Following the discussions at SLF 47, it was decided to delete "s_{wod}" from regulation 7-2, as it was considered surplus in terms of ship survivability (SLF 47/WP.6, paragraph 7). Based on this, Norway deemed it appropriate to revisit the 1995 SOLAS Conference resolution 14 (Regional agreement on specific stability requirements for ro-ro passenger ships), concerning compliance with damage stability requirements when taking into account the effect of seawater on deck, in terms of applicability to new ships following the entry into force of the adopted revised SOLAS chapter II-1 in 2009. The delegation of Norway, therefore, proposed that consideration of the applicability of Conference resolution 14 to ships built to the new damage stability standard should be included in the terms of reference for the SDS Working Group.

3.14 Following discussion, the Sub-Committee, having recognized that the above proposal was beyond the Sub-Committee's mandate, invited the delegation of Norway to submit an appropriate proposal to the Committee in accordance with the Guidelines on the organization and method of work.

Establishment of the working group

3.15 The Sub-Committee established the Working Group on Subdivision and Damage Stability under the chairmanship of Dr. M. Huss (Sweden), and instructed it, taking into account relevant comments made and decisions taken in plenary, to:

.1 further develop the draft Explanatory notes for harmonized SOLAS chapter II-1, using as a basis the texts annexed to documents SLF 48/3/1 and SLF 47/4, taking into consideration documents SLF 48/3, SLF 48/3/2, SLF 48/3/3, SLF 48/3/4, SLF 48/3/5, SLF 48/3/6, SLF 48/3/7, 48/3/8, SLF 48/3/9, SLF 48/3/10 and MSC 80/3/8; and

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

Report of the working group

3.16 Having received the report of the working group (SLF 48/WP.1), the Sub-Committee approved it in general and took action as outlined in the following paragraphs.

3.17 The Sub-Committee agreed that clarifications or interpretations to the following regulations of harmonized SOLAS chapter II-1 as adopted at MSC 80 needed to be included in the Explanatory notes (EN).

Regulation 2 ─ Definitions

3.18 In considering document SLF 48/3/9 (ICCL), proposing the development of clarifications to the definitions of subdivision length and light service draught, the Sub-Committee agreed that the definition of subdivision length L_s was sufficiently covered by the text and figures in document SLF 47/4, although some additional figures could be included and H_{max} should be replaced by d_s + 12.5 m. The definition of light service draught d_l is sufficient, but the EN should clarify that the purpose of this condition is to represent the lower limit of the GM - limit curve. The 10% arrival condition given in document SLF 47/4 is not necessarily the specific condition to be used for all ships, but represents in general a suitable lower limit for all loading conditions.

Regulation 4 ─ General

3.19 The Sub-Committee agreed that some clarifications are necessary concerning the applicability of damage stability requirements to cargo ships which are shown to comply with subdivision and damage stability regulations in other IMO instruments.

Regulation 6 ─ Required subdivision index R

3.20 Regarding the link of requirements for life-saving appliances to the damage stability provisions contained in the existing old SOLAS chapter II-1, the Sub-Committee noted that this matter was being dealt with by the DE Sub-Committee and, following relevant instructions of MSC 80, was expected to be resolved at FP 50 which had been instructed to consider the LSA-related agenda items of DE 48. The matter, therefore, did not need to be considered any further by the SLF Sub-Committee.

Regulation 7 ─ Attained subdivision index A

3.21 With regard to paragraph 2 of regulation 7, concerning the calculations for different trims, the Sub-Committee accepted the proposal by Germany as contained in the report of the correspondence group (SLF 48/3/1, annex 2, page 3), for inclusion in the EN.

3.22 With regard to paragraph 5 of regulation 7, concerning the extent of damages beyond the centreline bulkhead, the Sub-Committee noted that the group had discussed in detail whether damage penetration could go beyond the centreline bulkhead or not for those parts of the ship ends where the sectional breadth is less than the ship's breadth B. The Sub-Committee agreed that it would be consistent with the methodology to account for penetrations of a centreline bulkhead at such positions and that this should be clearly stated in the EN in order to avoid different interpretations. The Sub-Committee noted, in this regard, that the majority of the sample ship calculations used as the basis for the required index R did not take into account penetrations beyond the centreline.

3.23 The Sub-Committee noted that the delegation of Norway had raised the question how corrugated bulkheads at the centreline should be treated and agreed, in general, with the approach to treat corrugated bulkheads as ordinary stiffened bulkheads as long as the corrugation was of the same order as the stiffening structure and that the matter should be included in the EN.

3.24 The Sub-Committee noted that, with regard to paragraph 7 of regulation 7, concerning minor progressive flooding, the question of how to define "minor progressive flooding" was discussed, possibly in relation to the bilge pump capacity as required by regulation II-1/35-1, but no consensus was reached. The Sub-Committee agreed that well-defined criteria for minor flooding needed to be included in the EN and invited further input from Members on the issue.

Regulation 7-1 ─ Calculation of the factor p_i

3.25 The Sub-Committee noted that the group had considered document SLF 48/3/7 (Japan), concerning the words "and where *r(x1, x2, b*0) = 0" in paragraph 1 of regulation 7-1, and agreed to include in the EN a clarification stating that the words "where r(*x1, x2, b*0) = 0" mean that, where k=0, $r(x1_j, x2_j, b) = 0$.

Regulation 7-2 ─ Calculation of the factor s_i

3.26 Regarding document SLF 48/3/7 (Japan), the Sub-Committee agreed:

.1 concerning the parameter *B* used in paragraph 4.1.1, to include in the EN a clarification stating that beam, in this case, means breadth as defined in regulation II-1/2.8;

.2 concerning the parameter *A* (projected lateral area) used in paragraph 4.1.2, to include in the EN a clarification stating that A, in this case, does not refer to the attained index; and

.3 concerning the parameters x_1 and x_2 used in paragraph 6.1, in order to harmonize the parameters with those used in regulation II-1/7-1, to include in the EN a clarification stating that "x_1" means "*x1*" and "x_2" means "*x2*".

Intermediate stages of flooding

3.27 The Sub-Committee noted that the group had considered the issue in detail in connection with documents SLF 48/3/8 and SLF 48/3/10 (Norway) and agreed that clear guidance on how to treat intermediate stages of flooding was necessary. It further agreed that the case of instantaneous flooding in open spaces would not require intermediate stages calculations. Where intermediate stages are calculated in connection with progressive flooding of several spaces, they should reflect the sequence of filling as well as filling stages. Calculations for intermediate stages of flooding should be performed when equalization is not instantaneous, i.e. of a duration greater than 60 s. Such calculations consider the progress through one or more floodable (non-watertight) spaces. Bulkheads surrounding refrigerated spaces, incinerator rooms and longitudinal bulkheads fitted with non-watertight doors are typical examples of structures that may significantly slow down equalization of main compartments.

Definition of flooding boundaries and non-watertight compartments

3.28 The Sub-Committee agreed that if a compartment contains decks, inner bulkheads, structural elements and doors of sufficient tightness and strength to seriously restrict the flow of

water, for calculation purposes it should be divided into the corresponding non-watertight spaces. It is assumed that the analysis is limited to "A" class fire-rated bulkheads and does not apply to "B" class fire-rated bulkheads normally used in accommodation areas (e.g. cabins and corridors). Consideration should be given to large volumes only. Some sketches should be added to illustrate what such spaces look like for typical situations on board ships.

Sequential flooding computation

3.29 The Sub-Committee agreed that for each damage scenario the damage extent and location determine the initial stage of flooding. Calculations will be performed in stages, each stage comprising at least two filling phases – half full and full – per flooded space. Spaces in way of damage should be considered as flooded immediately. Every subsequent stage involves all connected spaces being flooded simultaneously until an impermeable boundary or final equilibrium is reached. If due to the configuration of the subdivision in the ship it is expected that other intermediate stages of flooding are more onerous, then those should be investigated. Sketches should be added which distinguish between damaged spaces and flooded spaces.

Cross-flooding

3.30 The Sub-Committee noted that the group had considered the issue in connection with document SLF 48/3/10 (Norway) and in conjunction with agenda item 11 (Revision of resolution A.266(VIII)) and agreed on the following:

.1 flooding/cross-flooding could be treated as instantaneous, if the flooding occurs in less than 60 s;

.2 only passive open cross-flooding arrangements without valves should be considered effective for instant flooding; and

.3 resolution A.266(VIII) should be amended with additional information regarding flooding through ducts and air escape counter pressure.

The requirements of a maximum 10 minute cross-flooding should also apply to cargo ships, as in the previous EN.

Equalization

3.31 The Sub-Committee agreed that if a complete fluid equalization has taken place after a cross-flooding time of 60 s, no further calculations needed to be carried out. The cross-flooding time should be calculated according to the standard given in resolution A.266(VIII). If the equalization can be finalized within 10 min, the assessment of the survivability can be carried out for passenger ships as the smallest values of $s_{intermediate,I}$. or s_{final}. For the purpose of this regulation, the value of $s_{final,I}$ may be established from the minimum of the values according to the formula for $s_{final,I}$ after 10 min and after final equalization.

Escape routes

3.32 The Sub-Committee agreed on the following:

.1 horizontal evacuation routes on the bulkhead deck include only escape routes (stairway enclosures as category 2 spaces according to SOLAS regulation II-2/9) used for the evacuation of undamaged spaces;

.2 horizontal evacuation routes do not include corridors within the damaged space; and

.3 there should be no allowance for partial immersion of escape routes, even if there will be 0.9 m "dry passage" width.

Regulation 7-3 – Permeability

3.33 With regard to paragraph3 of regulation 7-3, concerning the use of other figures for permeability if substantiated by calculations, the Sub-Committee agreed that acceptable conditions for using other than standard permeabilities should be covered by the EN. Although there was no consensus on how this should be done, there was a general agreement that such permeabilities should reflect the general conditions of the ship throughout its service life rather than specific conditions.

Regulation 8 – Special requirements concerning passenger ship stability

3.34 The Sub-Committee agreed on clarification that the number of persons to be carried as per regulations 8.3.1 to 8.3.5 equals the total number of persons on board and not $N = N_1 + 2 N_2$ as in regulation 6.

3.35 The delegation of Japan pointed out that the revised SOLAS chapter II-1 does not contain requirements for full survivability in case of damages in front of the collision bulkhead. The Sub-Committee was of the view that this was probably an oversight when the revised SOLAS chapter II-1 was drafted but felt that this oversight could not be rectified in the EN.

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

3.36 The Sub-Committee agreed that a clarification regarding the required minimum double bottom height as explained in document SLF 48/3/5 (Italy) should be included in the EN.

Regulation 10 – Construction of watertight bulkheads

3.37 With regard to proposals by Norway (SLF 48/3/2 and SLF 48/3/3) concerning guidance on how to treat steps in the bulkhead deck with regard to watertightness and water pressure head for watertight doors, the Sub-Committee agreed that this matter needed to be included in the EN, noting that this issue also concerned regulations II-1/2, 16 and 17.

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

3.38 The Sub-Committee noted that the reference to an IEC standard in regulation II-1/13 was no longer correct (document SLF 48/3/7 by Japan) since it had recently been replaced by a newer standard (IEC 60529:2003) and that the relevant footnote, therefore, needed to be corrected.

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

3.39 The Sub-Committee noted information by the delegation of the Netherlands concerning watertightness of air pipe closing devices and agreed that the matter should be considered by the correspondence group for inclusion in the EN, noting that the definition of watertightness in regulation II-1/2.17 could not be changed. Some delegations were of the view that these closures should not be considered watertight.

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

3.40 The Sub-Committee agreed that the clarifications to regulation II-1/10 (see paragraph 3.37) also concern regulation II-1/16 and, therefore, a relevant clarification to this regulation needed to be included in the EN.

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

3.41 The Sub-Committee found that paragraph 3 of regulation 17 was not relevant with respect to the new damage stability requirements. As a temporary solution, the EN should advise that the referenced waterline could be taken from conditions where s = 1.

Regulation 19 – Damage control information

3.42 Concerning document MSC 80/3/8 (France and Sweden), proposing guidelines for damage control plan and information to the master to provide guidance to Administrations when applying regulation 19.5 of the revised SOLAS chapter II-1, the Sub-Committee noted that opinions in the group were divided. Whereas some delegations supported the proposal, stating that the master needed such basic information, other delegations were of the view that this was too complex issue to be simplified as proposed. Several delegations indicated that shore-based emergency response systems and onboard computer systems could be used instead of diagrams. Having considered the above views, the Sub-Committee agreed that Guidelines on damage consequence diagrams should be further considered and referred the matter to the correspondence group for examination with regard to explanatory notes for regulation II-1/19, noting the view of the group that the issue of support in emergency situations should also be dealt with in other relevant IMO bodies.

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

3.43 Concerning document SLF 48/3/4 (Sweden and the United States), proposing guidance by which Administrations may determine the impact on survivability of open watertight doors permitted by new SOLAS regulation II-1/22.4, the Sub-Committee supported the need for such guidance in principle. However, it noted that there was some concern that the proposed methodology was too strict and that the survivability criteria used were not linked to any similar criteria used in the regulations. The Sub-Committee agreed that consideration of the guidance should be included as a specific item in the terms of reference for the correspondence group.

Guidance notes for consideration of various aspects of equalization of damage cases in new and existing passenger ships

3.44 Concerning documents SLF 48/3/8 and SLF 45/3/6 (Norway), proposing guidance notes on intermediate stages of flooding and equalisation when calculating damage stability, the

Sub-Committee agreed that the proposal should be referred to the correspondence group for consideration and incorporation of relevant parts into the EN.

Other items

3.45 The Sub-Committee further agreed on the following items of special importance for inclusion in the EN:

.1 standardized presentation of results;

.2 clarification of terms "zones", "compartments", "spaces", etc.;

.3 clarification of the expression "any controls intended for the operation of watertight doors ... become inaccessible";

.4 clarification of cases of combination of zones with bulkheads having different "b" values; and

.5 applicability of regulations to passenger and/or cargo ships.

Format of the Explanatory notes

3.46 The Sub-Committee agreed that the EN should be a "living" document with the possibility of regular revisions until the entry into force of the revised SOLAS chapter II-1 in 2009 and that they should have the same format as the previous EN adopted by resolution A.684(17), i.e. consisting of part A containing background information and part B containing notes to the regulations. Priority should be given to the development of part B. Consequently, the Sub-Committee agreed to finalize Interim Explanatory notes, to be issued as an MSC circular, at the next session. The Sub-Committee noted the recommendation to keep the item in the work programme and agenda of the Sub-Committee until 2009 so that the EN could be regularly updated in light of the experience gained with the application of the revised chapter II-1, and agreed to discuss the matter further at SLF 49.

Establishment of the correspondence group

3.47 The Sub-Committee agreed to re-establish the SDS Correspondence Group, under the co-ordination of Sweden and the United States*, with the following terms of reference:

.1 to further develop the Explanatory notes for the revised SOLAS chapter II-1 (resolution MSC.194(80)) based on the report of the SDS Working Group (SLF 48/WP.1), in a format that reflects the regulations of the revised chapter;

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.2 to revise the information in resolution A.266(VIII) to include cross-flooding arrangements other than pipes and air ventilation to assure efficient cross flooding, and include that information in the Explanatory notes;

.3 to further consider the Guidelines on damage consequence diagrams and, if considered appropriate, for inclusion in the Explanatory notes;

.4 to consider the inclusion of guidance by which Administrations may determine the impact on survivability of open watertight doors permitted by new SOLAS regulation II-1/22.4 in the Explanatory notes;

.5 to endeavour to develop additional information for inclusion in the Explanatory notes that includes historical background on damage statistics, survivability criteria, etc.; and

.6 to submit a report to SLF 49.

3.48 The Sub-Committee noted the following preliminary schedule for the correspondence group's work on the Explanatory notes:

Co-ordinators (Sweden and United States)/Members	Action	Target
Co-ordinators	Circular 1: EN draft 1 (based on decisions during SLF 48 and including notes on unsolved issues and possibly needed additions and actions)	1 December 2005
Members	Submissions/comments to Circular 1	1 February 2006
Co-ordinators	Circular 2: EN draft 2 (including members submissions)	15 February 2006
Members	Submissions/comments to Circular 2	1 April 2006
Co-ordinators	Circular 3: Draft report to SLF 49	15 April 2006
Members	Comments on draft report	15 May 2006
Co-ordinators	Submit ISCG report to SLF 49	30 May 2006

4 REVISION OF THE INTACT STABILITY CODE

General

4.1 The Sub-Committee recalled that SLF 47, having received the report of the IS Working Group (SLF 47/WP.2), had:

.1 concurred with the group's view that, at this stage, the restructuring of the Code should be limited basically to the present ship types and provisions in the Code and agreed, in general, to the proposed new structure of the Code; and

.2 invited MSC 80 to include in the DE and STW Sub-Committees' work programmes and the provisional agendas for their next sessions, a new high priority item on the revision of the Intact Stability Code, with the target completion date of 2006.

4.2 The Sub-Committee also recalled that SLF 47 had re-established the Correspondence Group on Intact Stability, under the co-ordination of Germany, instructing it to submit a report to SLF 48, and agreed to re-establish, at this session, a Working Group on Intact Stability.

Outcome of the working and correspondence groups

4.3 The Sub-Committee considered document SLF 48/4 (Chairman of the IS Working Group at SLF 47), containing part 2 of the report of the group at that session; and documents SLF 48/4/1, SLF 48/4/2 and SLF 48/4/3 (Germany), containing the report of the IS Correspondence Group, together with documents SLF 48/4/5, SLF 48/4/13 and SLF 48/4/15 (Japan), SLF 48/4/6 (Italy), SLF 48/4/7 (Germany), and SLF 48/4/9 and SLF 48/4/10 (Poland), commenting on the working and correspondence groups' reports as well as on short-term tasks contained in the plan of action agreed at SLF 46, which may affect the text of the revised IS Code proposed by the correspondence group.

4.4 In considering matters related to the weather criterion, some delegations proposed to move it from the mandatory part A of the draft revised IS Code to the recommendatory part B, taking into account the changes in ship design in recent years, whilst other delegations preferred to keep it in part A since, in their opinion, problems related to weather criterion would be solved by the alternative assessment prescribed in the revised IS Code. Having noted the above views, the Sub-Committee agreed that this matter should be further considered by the working group.

4.5 With regard to the performance-based criteria, the Sub-Committee noted the short-term and long-term approaches , as referred to in annex 2 to document SLF 46/16, and agreed that the short-term approach had already been addressed in the course of the revision of the IS Code.

4.6 The Sub-Committee also discussed the application of onboard computers and agreed that the hardware for stability computers should not be approved by the Administration.

Long-term tasks on intact stability work

4.7 The Sub-Committee had for its consideration documents SLF 48/4/4 (Australia and Spain), SLF 48/4/8 (Germany), SLF 48/4/12 (Italy), SLF 48/4/14 (Japan), SLF 48/4/16 and SLF 48/4/17 (Russian Federation), all containing comments and proposals with regard to the revision of MSC/Circ.707.

4.8 Regarding the revision of MSC/Circ.707, the Sub-Committee noted that some delegations preferred to have separate guidance for parametric rolling in head seas, whilst other delegations favoured comprehensive revision of the present guidance. In this context, the observer from ICS expressed the view that excessive information may affect the judgement of the master, which could jeopardise the safety of ships.

4.9 The Sub-Committee, noting that further amendments to SOLAS chapter II-1 to make parts of the IS Code mandatory cannot be adopted before the amendments' entry-into-force date of 1 January 2009, agreed to refer the issue of the time schedule for revising the IS Code, together with the above-mentioned revision of MSC/Circ.707, to the working group for detailed consideration.

Establishment of the working group

4.10 The Sub-Committee established the Working Group on Intact Stability and instructed it, taking into account comments made and decisions taken in plenary, to:

.1 further develop the draft text of the revised Code on the basis of the draft contained in the report of the correspondence group (SLF 48/4/1 to SLF 48/4/3), taking into account part 2 of the report of the SLF 47 working group (SLF 48/4) and documents SLF 48/4/5, SLF 48/4/6, SLF 48/4/7, SLF 48/4/9, SLF 48/4/10, SLF 48/4/11, SLF 48/4/13 and SLF 48/4/15;

.2 consider the parts of the draft revised Code to be referred to the DE and STW Sub-Committees for further consideration;

.3 continue work on remaining tasks, including work on the revision of MSC/Circ.707 on Guidance to the master for avoiding dangerous situations in following and quartering seas and possible performance-oriented criteria, taking into account documents SLF 48/4/1, SLF 48/4/2, SLF 48/4/3, SLF 48/4/4, SLF 48/4/8, SLF 48/4/12, SLF 48/4/14, SLF 48/4/16 and SLF 48/4/17;

.4 review the plan of action for completing this item by the target date (SLF 46/16, annex 2), including completion of the revised IS Code, regulatory amendments to give effect to its proposed mandatory provisions, review of MSC/Circ.707 (if not included in the revised IS Code) and possible performance-oriented criteria to be included in the revised plan of action;

.5 consider whether it is necessary to re-establish the IS Correspondence Group and, if so, prepare draft terms of reference for the group; and

.6 submit a written report (part 1) by Thursday, 15 September, and continue working through to the end of the week and submit a further report (part 2) to SLF 49, as soon as possible after this session so that it can be taken into account by the correspondence group, if established.

Report of the working group

4.11 Having received the report of the working group (SLF 48/WP.2), the Sub-Committee approved it in general and took action as indicated hereunder.

Weather criteria

4.12 The Sub-Committee noted the group's thorough discussion on the issue of whether the weather criterion (severe wind and rolling criterion) should be kept in part A (mandatory part) of the Code or should be moved to part B (recommendatory part), and noted the views of some delegations that the criteria is unrealistic for certain types of ships, especially those with large windage areas or small ships. Taking into account the fact that there is no other established criteria for such ships and expecting that the new performance-based criteria could be developed in a few years' time which would replace the present weather criteria, the Sub-Committee endorsed the group's decision that the present weather criterion should remain as it is in the short term.

Interim Guidelines for alternative assessment of the weather criterion

4.13 The Sub-Committee noted that the group, taking into consideration comments contained in documents SLF 48/4/13 and SLF 48/4/15 (Japan), had reviewed and amended annex 1 (Interim Guidelines for alternative assessment of the weather criterion) of the Code.

4.14 In this regard, the Sub-Committee, having reiterated the fact (see paragraph 4.9) that the latest amendments to SOLAS chapter II-1 (the most likely instrument under which the IS Code might be made mandatory) would only enter into force on 1 January 2009, which means that the IS Code, together with relevant amendments to SOLAS chapter II-1, would not be adopted prior to that date, concurred with the group's view on the urgent need of providing the industry with the guidelines for alternative assessment of the weather criterion (e.g. model experiments) and agreed to the draft MSC circular on Interim Guidelines for alternative assessment of the weather criterion, set out in annex 1, for submission to MSC 81 for approval.

4.15 In this respect, the Sub-Committee also noted that the group had discussed the possibility of making parts of the revised IS Code mandatory earlier than 2009 by amending the 1988 Load Lines Protocol. However, due to the fact that a full clear draft revised IS Code could not be made available during this session and that other sub-committees might be invited to review the draft revised Code, the group did not reached any conclusion on this issue.

Text of the draft revised IS Code

4.16 The Sub-Committee noted the proposed changes to the draft revised IS Code, as contained in annexes to documents SLF 48/4/1, SLF 48/4/2 and SLF 48/4/3, which are set out in annex 2 to document SLF 48/WP.2, and agreed that the correspondence group should review the draft revised Code for editorial improvements and provide a complete draft revised IS Code to SLF 49.

Two proposals made by the correspondence group (SLF 48/4/1)

4.17 The Sub-Committee endorsed the group's decision to develop guidelines for the approval of stability instrument software and instructed the correspondence group accordingly (see also paragraph 4.21.4).

4.18 The Sub-Committee also endorsed the group's view that performance-based criteria should be developed as along-term work item, taking into account the dynamic phenomena in seaways leading to large roll angles and/or accelerations and the proposed methodology to develop such criteria (annex 3 to document SLF 48/4/1), and instructed the correspondence group accordingly (see also paragraph 4.21.3).

Involvement of the DE and STW Sub-Committees

4.19 Noting that MSC 80, at the request of SLF 47, included in the work programmes and provisional agendas of the DE and STW Sub-Committees, an item relating to the revision of the IS Code, the Sub-Committee:

.1 agreed that part B, chapter 4 (Stability calculations performed by stability instruments) of the draft revised Code should be referred to the DE Sub-Committee for its review and comments with a view to possible harmonization with other relevant onboard instruments (e.g. loading instruments) and for its information in the development/revision of relevant IMO instruments;

.2 agreed that part B, chapter 5 (Operational provisions against capsizing) of the draft revised Code should be referred to the STW Sub-Committee for its review and comments from an operational perspective and for possible use in its development of relevant guidelines relating to training of seafarers; and

.3 instructed the Secretariat to prepare, with the assistance of the co-ordinator of the correspondence group, the clean texts of the above-mentioned parts of the draft revised Code for consideration by the above Sub-Committees, soon after the session.

Updating the plan of action

4.20 The Sub-Committee agreed to the Updated plan of action for intact stability work, set out in annex 3 to document SLF 48/WP.2.

Establishment of a correspondence group

4.21 The Sub-Committee agreed to establish the correspondence group, under the co-ordination of Germany*, with the following terms of reference:

.1 to review the draft text of the revised Code prepared by the working group at SLF 48, as contained in annexes to documents SLF 48/4/1, SLF 48/4/2 and SLF 48/4/3 and modified by annex 2 to document SLF 48/WP.2 and part 2 of the working group's report (a submission to SLF 49), in order to make further editorial improvements, as appropriate, and to submit a complete and clear draft revised IS Code to SLF 49, with a view to approval;

.2 to prepare a draft revision of MSC/Circ.707 on Guidance to the master for avoiding dangerous situations in following and quartering seas, taking into account documents SLF 47/6/3, SLF 47/6/6, SLF 47/6/12, SLF 48/4/4, SLF 48/4/8, SLF 48/4/14, SLF 48/4/16 and SLF 48/4/17, in particular to develop ship-independent and qualitative guidance to upgrade description of dangerous phenomena and to consider parametric rolling in head seas;

.3 to continue to work on items as contained in the Updated plan of action for intact stability work, set out in annex 3 to document SLF 48/WP.2, based on the progress made at SLF 48, taking into account documents SLF 48/4/1 (annex 3), SLF 48/4/11, SLF 48/4/12, SLF 48/WP.2 and relevant documents submitted to SLF 46 and SLF 47, as appropriate, with a view towards the completion of the tasks by 2007;

.4 to consider the development of guidelines for the approval of stability instrument software, taking into account relevant parts of the draft revised Code, contained in annex 2 to document SLF 48/WP.2, document SLF 47/6/15, annex 2 to document SLF 48/4/1, MSC/Circ.854 and other instruments, as appropriate; and

.5 to submit a report to SLF 49.

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Observation by the delegation of the Russian Federation

4.22 The delegation of the Russian Federation, referring to their proposals for draft revision of MSC/Circ.707 (documents SLF 48/4/16 and SLF 48/4/17) which took into account individual characteristics of a particular ship and its stability, observed that, in the course of discussions of the issues relating to the revision of MSC/Circ.707 within the working group, while some delegations expressed the opinion that ship-dependent guidance should be developed, to provide an appropriate level of safety, other delegations, in view of the short time available to complete such a comprehensive work, were in favour of developing ship-independent guidance. The delegation of the Russian Federation, in agreeing with the development of the ship-independent guidance at this stage, as referred to in paragraph 4.21.2, considered, nevertheless, that such guidance may lead, for some ships, to unreasonable change of speed and course. Therefore, the delegation considered that the development of more definite ship-dependent guidance should remain as a long-term task.

5 REVIEW OF THE LHNS AND OSV GUIDELINES

General

5.1 The Sub-Committee recalled that SLF 47, having considered the outcome of the IS Correspondence Group on the matter together with documents SLF 47/7 and SLF 47/7/1 (Australia) and SLF 47/7/2 (Secretariat), had agreed to use the annex to document SLF 47/7 as a basis for its deliberations, and instructed the Secretariat to provide a clean version of the draft OSV Guidelines, for consideration at this session.

5.2 The Sub-Committee also recalled that SLF 47, in considering document SLF 47/7/1, containing suggestions for improvement of subdivision and damage stability provisions, had agreed that the aforementioned issues needed further study, and further agreed to establish, at this session, a drafting group to finalize work on this issue.

5.3 The Sub-Committee noted that MSC 80 had considered that the inclusion of a reference to the Guidelines for vessels with dynamic positioning systems (the DPS Guidelines) (MSC/Circ.645) in the OSV Guidelines may be useful and had instructed SLF 48, as the co-ordinator, to consider the above recommendation when preparing the final text of the aforementioned Guidelines.

5.4 The Sub-Committee had for its consideration document SLF 48/5 (Secretariat), providing draft modifications to the LHNS and OSV Guidelines, and documents SLF 48/5/1 (the United States), SLF 48/5/2 (Australia) and SLF 48/5/3 (Norway), containing comments and proposals on documents SLF 47/7 and SLF 47/7/1.

5.5 Following the consideration of various issues referred to in the aforementioned documents, the Sub-Committee, with regard to the OSV Guidelines, agreed, in general, on issues relating to subdivision and damage stability, document of compliance and the acceptance of hinged type watertight access doors, and referred them to the drafting group to finalize the relevant texts.

5.6 In the course of the discussion on the item, the delegation of Norway proposed to modify the definition of offshore supply vessel in paragraph 1.2.1.2 in the OSV Guidelines; however, the Sub-Committee did not agree to the proposal at this stage, in view of the potential unintended

consequence of such a late amendment to the definition, and invited Norway to submit document with justification to the Committee, if appropriate.

Establishment of the drafting group

5.7 The Sub-Committee established the Drafting Group on the Revision of the LHNS and OSV Guidelines and instructed it, taking into account comments and decisions made in plenary, to:

.1 finalize the draft revised OSV Guidelines, using as a basis the text of annex 1 to document SLF 48/5, taking into consideration documents SLF 48/5/1, SLF 48/5/2 and SLF 48/5/3 together with documents SLF 47/7 and SLF 47/7/1;

.2 finalize the revision of the LHNS Guidelines, using annex 2 to document SLF 48/5; and

.3 prepare a draft MSC resolution for adoption of amendments to the OSV Guidelines and draft MSC and MEPC resolutions for adoption of amendments to the LHNS Guidelines.

Report of the drafting group

5.8 Having received the report of the drafting group (SLF 48/WP.4), the Sub-Committee approved it in general and took specific actions as indicated in the following paragraphs.

Revision of the OSV Guidelines

Dynamic positioning systems

5.9 The Sub-Committee decided that the reference to the guidelines for vessels with dynamic positioning systems (DPS Guidelines) should be made in the revised OSV Guidelines, and agreed to include a general statement into the new paragraph 1.1.4 thereof referring to the DPS guidelines and Guidelines for dynamic positioning system operator training with an appropriate footnote to the relevant MSC circulars, and, consequently, renumbered paragraphs of section 1.1.

Near-coastal voyages

5.10 Having agreed on the adequacy of the definition of "near-coastal voyage" and having confirmed SLF 47's decision to retain paragraphs 1.1.4 and 1.1.6 of the existing OSV Guidelines, as well as section 1.3 "Principles governing near-coastal voyages", unaltered, the Sub-Committee agreed to delete square brackets around section 1.3.

Intact stability

5.11 The Sub-Committee confirmed that the provisions of the Guidelines relating to intact stability should remain in the IS Code and deleted the relevant paragraphs of section 2 substituting them by a new paragraph providing general reference to the IS Code. Noting that paragraphs 2.5.3 to 2.5.5 of the existing OSV Guidelines address operational matters associated with stability criteria, the Sub-Committee agreed to transfer these paragraphs to appendix 1 to the revised Guidelines. As recommended by the group, the Sub-Committee agreed to refer these paragraphs to the IS Working Group for inclusion in the revised IS Code as well.

Damage assumptions

5.12 The Sub-Committee recalled its decision to maintain a one-compartment standard while specifying the extent of damage, as further elaborated by the group on the basis of the proposal in document SLF 48/5/1 pertaining to the extent of damage, and reverted to the current provisions of the Guidelines as regards the vertical extent of damage. The Sub-Committee also agreed to introduce a refined cut-off point for the vessel's length for the longitudinal damage specifying this at 43 m in length.

5.13 The Sub-Committee agreed to add a new paragraph 3.2.7, based on the existing SOLAS regulation II-1/7.7, providing clear guidance regarding the minimum distance between transverse watertight bulkheads, which, in order to be considered effective, should not be less than the longitudinal extent of damage as specified in paragraph 3.2.2.1 of the revised Guidelines.

Subdivision

5.14 Having agreed to permit hinged watertight doors under certain conditions, the Sub-Committee noted that paragraph 4 of SOLAS regulation II-1/25-9, and paragraph 4 of regulation 13-1 of the revised SOLAS chapter II-1, permit installation of hinged doors and, therefore, the reference to the relevant provisions of SOLAS chapter II-1 would adequately address the possibility of fitting hinged doors.

5.15 The Sub-Committee noted that the group had incorporated in the revised Guidelines the provisions for collision and afterpeak bulkheads as specified in document SLF 48/5/1, as well as the additional requirement for watertight bulkheads to separate machinery spaces and other working and living spaces in the hull.

5.16 The Sub-Committee considered the concern expressed by the observer from ICS that the provisions of paragraph 3.5.2 would appear to require a sliding watertight door for access to machinery spaces above the freeboard deck, and concluded that paragraph 3.5.1 only referred to machinery and other working and living spaces in the hull and, therefore, did not refer to access from superstructures.

Sections 4, 5, 6 and 7

5.17 The Sub-Committee, bearing in mind that sections 4, 5, 6 and 7 of the Guidelines should apply only to ships of 500 gross tonnage and above, agreed to the inclusion in the revised Guidelines the amendments proposed by the relevant Sub-Committees with some editorial modifications.

Documentation

5.18 Having agreed that, in order to demonstrate to the port State authorities compliance with the revised Guidelines, the vessel should be issued with the Document of Compliance (DOC) certifying that the design and construction of the vessel meet the provisions in the revised Guidelines, the Sub-Committee decided to include a new section 8 "Documentation" in, and the model form of the Offshore Supply Vessel Document of Compliance as appendix 2 to, the revised Guidelines.

5.19 In this context, recognizing that the revised Guidelines permit the Administration, under section 1 thereof, to grant relaxations from the provisions of the revised Guidelines (paragraph 1.1.4), the Sub-Committee added the statement in the model form to the effect that the

Administration should list the provisions of the revised Guidelines for which a relaxation was granted.

Vessels other than those falling under the definition of "offshore supply vessel"

5.20 In discussing the proposal by Norway to revise the definition of "offshore supply vessel" with a view to relaxing the design constraints placed by the current definition, the Sub-Committee considered that paragraph 1.1.7 of the revised Guidelines addressed vessels which are not designed strictly in accordance with the definition in paragraph 1.2.1.2 of the revised Guidelines.

Revised OSV Guidelines

5.21 Following the above decisions, including incorporation of a definition of "Convention" and other editorial changes, the Sub-Committee agreed to the draft Guidelines for the design and construction of offshore supply vessels, [2007] and associated draft MSC resolution on adoption of the Guidelines, set out in annex 1 to document SLF 48/WP.4 and, noting that the DSC Sub-Committee would review the OSV Guidelines as regards to parts under its purview, decided to refer the draft Guidelines to the DSC Sub-Committee for finalization and subsequent submission to the Committee, for adoption, and instructed the Secretariat accordingly. Consequently, the Sub-Committee invited the Committee to note the above course of action.

Amendments to the Guidelines for the transport and handling of limited amounts of hazardous and noxious liquid substances in bulk on offshore support vessels

5.22 Following discussions of the conclusions on the review of the LHNS Guidelines by the sub-committees concerned and, having considered the draft amendments to the Guidelines and the associated draft MSC and MEPC resolutions on adoption of amendments, as prepared by the drafting group, the Sub-Committee agreed to the draft amendments to the LHNS Guidelines and the draft resolutions, set out in annexes 2 and 3 to document SLF 48/WP.4 and, noting that the DSC Sub-Committee would review the LHNS Guidelines as regards to parts under its purview, decided to refer the draft amendments to the DSC Sub-Committee for finalization and subsequent submission to the MSC and the MEPC, for adoption, and instructed the Secretariat accordingly. Consequently, the Sub-Committee invited the Committees to note the above course of action.

5.23 Noting that BLG 9 had considered that the model form of Certificate of Fitness should be brought in line with the format contained in the revised IBC Code and that, accordingly, the group prepared the revised model form of the certificate, the Sub-Committee decided to refer the model form contained in the draft amendments to the LHNS Guidelines to the BLG Sub-Committee for consideration and comments, as appropriate and referral to the DSC Sub-Committee.

Completion of the work on the item

5.24 Considering that work on the item had been completed, the Sub-Committee invited the Committee to delete it from the Sub-Committee's work programme.

6 PASSENGER SHIP SAFETY

General

6.1 The Sub-Committee recalled that SLF 47 had re-established the Correspondence Group on Subdivision and Damage Stability (SDS) to consider passenger ship safety issues and instructed it to submit a report to SLF 48.

6.2 In considering documents SLF 48/6 and SLF 48/6/1 (Secretariat), containing information on the outcomes of MSC 79, FP 49, DE 48 and MSC 80, the Sub-Committee noted that:

.1 MSC 79 had agreed to delete the word "large" from the title of this agenda item and instructed the working group and subsidiary bodies to continue to develop relevant parameters, as necessary, for application purposes of any proposed requirements and recommendations, bearing in mind that a "one size fits all approach" should be avoided since each area of safety (i.e. fire, machinery, stability, lifesaving, search and rescue, etc.) has different concerns;

.2 FP 49 had agreed to the functional requirement for possible inclusion in SOLAS chapter II-2 and invited the COMSAR, NAV, DE, SLF and STW Sub-Committees to consider with a view to providing comments to FP 50;

.3 DE 48 had prepared draft performance standards for essential systems and services, as set out in annexes 5 and 6 to document DE 48/WP.4, with a view to finalization at DE 49. In this context, DE 48 invited the FP, NAV and SLF Sub-Committees to provide comments on the draft performance standards, to DE 49, for the essential systems under their purview;

.4 MSC 80 had approved definitions for the terms "casualty threshold" and "time for orderly evacuation and abandonment" for clarification purposes;

.5 in considering the 3-hour timeframe for habitability agreed at MSC 78, MSC 80 had reiterated its previous decision that future passenger ships should be designed to meet the safe return to port concept after a casualty and that relevant casualty thresholds should be developed. However, in the event a casualty exceeds the above threshold, MSC 80 endorsed the group's recommendation that an additional casualty scenario, for design purposes, should be developed by the FP and SLF Sub-Committees to support the concept that the ship will remain viable for at least 3 hours to allow for a safe and orderly evacuation and abandonment; and

.6 MSC 80 had approved the revised work plan, as set out in the annex to document MSC 80/WP.11, as modified by MSC 80/WP.11/Corr.1, and forwarded it to the COMSAR, DE, FP, NAV, SLF and STW Sub-Committees for action as appropriate and conveyed the group's reports (MSC 79/WP.13 and MSC 80/WP.11 and addenda) for background purposes.

6.3 The Sub-Committee briefly discussed documents SLF 48/6/2 (Sweden and the United States), SLF 48/6/3 (Poland), SLF 48/INF.2 (United States), SLF 48/INF.5 (Germany) and SLF 48/INF.9 (Republic of Korea), and agreed to refer them to the SDS Working Group for detailed consideration.

Instructions to the SDS Working Group

6.4 Following discussions, the Sub-Committee agreed to instruct the SDS Working Group, established under agenda item 3, taking into account comments made and decisions taken in plenary, to:

.1 review the tasks, set out in the annex to document SLF 48/6/1, with a view to clearly identifying which tasks required further action by the Sub-Committee and propose revisions if necessary, especially regarding tasks needing no further action and provide appropriate explanatory text and target completion dates for the tasks requiring further consideration for submission to MSC 81;

.2 consider in detail documents SLF 48/6/2, SLF 48/6/3, SLF 48/INF.2, SLF 48/INF.5 and SLF 48/INF.9, and make recommendations as appropriate, taking into account documents SLF 48/6 and SLF 48/6/1; and

.3 prepare terms of reference for the SDS Correspondence Group to progress the work on passenger ship safety matters.

Report of the working group

6.5 Having considered the part of the report of the working group (SLF 48/WP.1/Add.1) relating to this item, the Sub-Committee took action as indicated hereunder.

Review of the tasks assigned by MSC 80

Casualty threshold for return to port and casualty scenario for the time for orderly evacuation and abandonment (Tasks 1.1 and 1.4)

6.6 The Sub-Committee noted that the group had considered the tasks associated with the casualty thresholds and timeframes for evacuation and abandonment and agreed to focus its deliberations on how best to proceed, taking into account the impact the revised SOLAS chapter II-1 had on the tasks assigned by the Committee (SLF 48/6 and SLF 48/6/1).

6.7 In considering task 1.1, the Sub-Committee endorsed the group's view that there should, in general, be no differentiation made between return to port "under own power" and "under tow" for developing the relevant casualty threshold under the Sub-Committee's purview.

6.8 For developing the "return to port" casualty threshold, the Sub-Committee agreed to use the new SOLAS regulation II-1/8 as a basis since this regulation has already been accepted as an appropriate means for defining the extent of damage for passenger ships, bearing in mind that additional boundary conditions may need to be derived to ensure survivability (e.g. heel angle and freeboard).

6.9 In considering task 1.4, the Sub-Committee, having noted the extensive amount of research currently underway on the survivability of passenger ships in a damaged condition (SLF 48/INF.2, SLF 48/INF.5 and SLF 48/INF.9), agreed that it would not be possible to prepare the casualty scenario criteria for the time for orderly evacuation and abandonment since the above research would not be concluded for several years.

6.10 The Sub-Committee noted the ongoing EU project SAFEDOR, which among other issues focuses on flooding prediction and survivability assessment techniques for damaged ships, and

noted the group's view that associated project members should be encouraged to submit papers to IMO when relevant data becomes available.

6.11 Recognizing the need to make progress on time domain flooding and (dynamic) damage ship stability prediction models and methodologies, the Sub-Committee noted the group's view that the International Towing Tank Conference (ITTC) should include further benchmarking and assessment of computer codes that simulate time-to-flood and related ship motion behaviour of damaged ships in their current work programme. To this end, the Sub-Committee instructed the Secretariat to forward the above view to ITTC so that they may consider it and take action if deemed appropriate.

6.12 Notwithstanding the above views and recognizing the importance of this issue, the Sub-Committee endorsed the group's recommendation to develop mandatory requirements for water ingress detection and flooding level monitoring systems, taking into account best industry practice (MSC 77/4/1), with a view to providing the master with real time information on the progression of flooding. In endorsing the recommendation, the Sub-Committee agreed that the DE Sub-Committee should be involved to work on the technical aspects under its purview and instructed the Secretariat to inform DE 49 accordingly.

6.13 In addition, the Sub-Committee considered the group's recommendation to include a separate item on "Time-dependant survivability of passenger ships in a damaged condition" in its work programme with a target completion date of 2008 to monitor the above research over the long term and noted that a relevant justification may need to be prepared in accordance with the Guidelines on the organization and method of work. To this end, the Sub-Committee agreed to develop, if appropriate, such a justification at SLF 49, taking into account any submissions made to MSC 81 on this issue.

Measures to limit the spread of flooding (Task 1.2)

6.14 The Sub-Committee agreed to delete the task to develop measures to limit the spread of flooding, since the revised SOLAS chapter II-1 already adequately addresses measures to limit the spread of flooding. The delegation of the United Kingdom expressed the view that matters related to flood monitoring would be better placed under this task in lieu of task 1.4, as highlighted in paragraph 6.12 above.

Raking damage issues (Task 1.3)

6.15 In discussing issues related to raking damage, the Sub-Committee considered that this matter had already been adequately addressed by the probability ascribed to long, shallow penetration damage cases within the probabilistic methodology. Therefore, the Sub-Committee agreed that this item should be deleted from the list of tasks in light of the adoption of the revised SOLAS chapter II-1.

Alternative designs and arrangements (Task 6)

6.16 The Sub-Committee considered the task to prepare guidelines for the approval of alternative designs and arrangements and, having recognized that this task was assigned several years before the revised SOLAS chapter II-1 was adopted, agreed that the new SOLAS regulation II-1/4.2 adequately addresses this issue. Moreover, the Sub-Committee noted that the probabilistic method is inherently a goal-oriented standard which permits any subdivision arrangement subject to complying with the required survivability level. Therefore, the

Sub-Committee agreed that this item should be deleted from the list of tasks assigned by the Committee.

6.17 The Sub-Committee invited MSC 81 to consider the above recommendations and take action as appropriate.

Outcome of other sub-committees

Outcome of FP 49

6.18 The Sub-Committee considered the request of FP 49 to review the draft amendments to SOLAS chapter II-2 (FP 49/WP.1, annex 1) on functional requirement for safe areas and agreed that the aforementioned draft regulations should also address flooding issues.

6.19 To this end, the Sub-Committee proposed the following modifications to the draft amendments prepared by FP 49 (referred to in annex 1 to document FP 49/WP.1):

.1 in draft regulation II-2/3, the following new paragraph should be inserted after paragraph 53:

"54 *Safe area* in the context of a flooding casualty is, from the perspective of habitability, any area which will not be flooded such that it can safely accommodate all persons onboard to protect them from hazards to life or health and provide them with basic services.";

.2 in draft regulation II-2/21.3.1, the words "if installed" should be inserted between the words "systems" and "should";

.3 in regulation II-2/21.3.1, the following subparagraph .5 should be added after subparagraph .4:

".5 bilge systems."; and

.4 in regulation II-2/22.5.1, the following subparagraph .24 should be added after subparagraph .23:

".24 flooding detection systems."

6.20 The Secretariat was instructed to forward the above recommendations to FP 50 for consideration and action as appropriate.

Outcome of DE 48

6.21 In considering the request of DE 48 to review the draft performance standards for essential systems and equipment on passenger ships for safe return to port after a casualty (DE 48/WP.4, annex 5), the Sub-Committee agreed that flooding detection systems, if installed, should be included in the performance standards.

6.22 In considering the draft performance standards for essential systems and equipment on passenger ships for the time for orderly evacuation and abandonment (DE 48/WP.4, annex 6), the Sub-Committee agreed that bilge systems should be included in the aforementioned standards.

6.23 The Secretariat was instructed to forward the above recommendations to DE 49 for consideration and action as appropriate.

Terms of reference for the SDS Correspondence Group

6.24 In order to finalize the work on this issue at SLF 49, the Sub-Committee agreed to add the following tasks to the SDS Correspondence Group's terms of reference (see also paragraph 3.47):

.1 to develop criteria for safe return to port, either under own power or under tow, using, as a basis, the casualty threshold contained in the new SOLAS regulation II-1/8; and

.2 to prepare mandatory requirements for water ingress detection and flooding level monitoring systems.

7 HARMONIZATION OF DAMAGE STABILITY PROVISIONS IN OTHER IMO INSTRUMENTS

General

7.1 The Sub-Committee recalled that SLF 47 had considered documents SLF 47/9 (Secretariat), SLF 47/9/1 (Australia) and SLF 47/9/2 (Germany) and, after having a general discussion on the general approach to dealing with this matter, instructed the SDS Correspondence Group to consider the matter in detail and advise SLF 48 as to which damage stability provisions in IMO instruments should be based on probabilistic principle.

7.2 The Sub-Committee had for its consideration:

.1 document SLF 48/7 (Sweden and United States), containing the report of the SDS Correspondence Group; and

.2 document SLF 48/7/1 (China), commenting on amendments to SOLAS chapter II-1, adopted by resolution MSC.194(80) (annex 1 to document MSC 80/24/Add.1) and suggesting to harmonize requirements for damage stability in part B and bilge pumping arrangements in part C of the revised SOLAS chapter II-1.

IMO instruments subject to harmonization

7.3 After extensive discussion regarding IMO instruments in which damage stability provisions should be based on probabilistic principles, in the course of which account was taken of the proposals in document SLF 48/7, the Sub-Committee, with regard to:

.1 the 2000 HSC Code, the OSV Guidelines and the MODU Code, agreed not to pursue the matter further as adequate damage statistics justifying the need for such a harmonization were not available (SLF 48/7, paragraph 7);

.2 MARPOL 73/78, the IBC Code and the IGC Code, agreed that these instruments should not be subject to the harmonization as the work by the SDS Working and Correspondence Groups had mainly focused on dry cargoes and there is no compelling need to extend the probabilistic approach to include vessels carrying bulk liquid cargoes and criteria associated with prevention of marine pollution;

.3 the INF Code and the SPS Code, agreed to consider further harmonization through amendments to these Codes. The Sub-Committee also agreed that the relevant amendments to the SPS Code should be developed under the item on "Review of the SPS Code"; and

.4 the 1988 LL Protocol, realizing that the desired harmonization may be achieved by way of deletion of the footnote in regulation 4.1 of the revised SOLAS chapter II-1, referring to the 1966 LL Convention and the 1988 LL Protocol, agreed to give further consideration to the matter only for type "B" ships assigned reduced freeboards, carrying solid bulk cargoes.

7.4 The delegation of France expressed the opinion that there was no reason, at this stage, to delete the footnote in SOLAS chapter II-1 referring to the 1966 LL Convention and the 1988 LL Protocol. The objective of the deletion is to subject ships that fall under regulation 27 of the 1966 LL Convention and the 1988 LL Protocol to an additional damage stability study, although it has never been proven that a study carried out under the 1966 LL Convention and the 1988 LL Protocol revealed any deficiency. The delegation of France, therefore, considered that there was no reason to resort to this proposal unless the urgent need to do so was clearly demonstrated.

7.5 Subsequently, the Sub-Committee agreed to instruct the SDS Correspondence Group referred to in paragraph 3.47, taking into account the Sub-Committee's conclusions referred to in paragraphs 7.3.3 and 7.3.4 and comments made in plenary, to consider the matter further and develop appropriate proposals for revisions to the INF and SPS Codes and to the revised SOLAS chapter II-1, and to report on the outcome to SLF 49.

7.6 In view of the above decisions, the Sub-Committee agreed to invite the Committee to extend the target completion date to 2006.

Harmonization of requirements for damage stability and bilge pumping arrangements

7.7 Following consideration of the proposal by China (SLF 48/7/1) for harmonization of the requirements for damage stability in part B and for bilge pumping arrangements in part C of the revised SOLAS chapter II-1, the Sub-Committee acknowledged that the proposal constitutes amendments to the revised SOLAS chapter II-1 which is expected to enter into force on 1 January 2009 and invited the delegation of China to submit, in due course, their proposal to the Committee in accordance with the Guidelines on the organization and method of work.

8 CONSIDERATION OF IACS UNIFIED INTERPRETATIONS

8.1 The Sub-Committee recalled that SLF 47, having considered IACS unified interpretations, agreed to:

.1 the unified interpretations to the 1974 SOLAS Convention, 1966 LL Convention and the 1988 LL Protocol, which were approved by MSC 80 for dissemination by means of circulars MSC/Circ.1158 and LL.3/Circ.162; and

.2 the unified interpretations for regulation 25A (Intact stability) of Annex I to MARPOL 73/78, for submission to the MEPC for appropriate action.

8.2 The Sub-Committee, noting that no documents had been submitted to the session under this agenda item, further noted the information provided by the observer from IACS that a number of unified interpretations were being developed by IACS which would be submitted to IMO once they are finalized and decided to keep the item on the agenda for SLF 49.

9 REVISION OF TECHNICAL REGULATIONS OF THE 1966 LL CONVENTION

9.1 The Sub-Committee recalled that SLF 47, having considered the submissions by Australia (SLF 47/11/1), Japan (SLF 47/11/2 and SLF 47/INF.12) and Poland (SLF 47/11), agreed that the following areas should be considered as a priority:

.1 revision of the freeboard tables;

.2 ships with low freeboards; and

.3 corrections for sheer and superstructures.

9.2 The Sub-Committee had for its consideration documents submitted by:

.1 IADC (SLF 48/9), suggesting to consider revision of Annex B regulations of the 1988 LL Protocol based on the unique hull self-elevatory MODUs, current practice of completing deterministic damage stability analysis of hull design and successful operational experience;

.2 Japan (SLF 48/9/1), proposing a methodology for the revision of the freeboard tables and corrections in the 1966 LL Convention and (SLF 48/INF.8), providing an assessment of the safety level in terms of freeboard and corrections in the 1966 LL Convention; and

.3 IACS (SLF 48/9/2), proposing to consider possible future revisions to Annex B regulations of the 1988 LL Protocol.

9.3 With regard to the proposed amendments to the 1988 LL Protocol, concerning special consideration for self-elevating MODUs (SEDUs), contained in document SLF 48/9 regarding regulations 39(3) and 39(5) and document SLF 48/9/2 regarding regulation 39(3), the Sub-Committee, supporting, in principle, the concept of providing relaxationfor SEDUs in respect of these provisions and, recognizing that these matters would be more appropriately dealt with in the MODU Code, which is under review by the DE Sub-Committee, agreed to refer these documents to the DE Sub-Committee for consideration and appropriate action and instructed the Secretariat to inform DE 49 of the above outcome.

9.4 In considering the proposed amendments to regulations 22(4) and 39(1) of 1988 LL Protocol contained in document SLF 48/9/2, the Sub-Committee, following the debate, agreed to the draft amendments to Annex B to the 1988 LL Protocol, set out in annex 2, for submission to MSC 81 for approval with a view to adoption at MSC 82.

Matters related to further work

9.5 The Sub-Committee, supporting generally the conclusions contained in document SLF 48/9/1, agreed that no further revision of the technical regulations of the 1966 LL Convention was needed at this stage, except if found necessary for the harmonization of damage stability provisions in IMO instruments which the Sub-Committee dealt with under

item 7 (Harmonization of damage stability provisions in IMO instruments) (see also paragraph 7.3.4). Therefore, the Sub-Committee concluded that the work on the item had been completed and agreed to invite the Committee to delete the item from the Sub-Committee's work programme.

9.6 In this context, the Sub-Committee discussed a proposal by the delegation of Denmark made in plenary to keep the item in the agenda, due to the problem of hatch cover loading, and, subsequently, agreed to invite the delegation of Denmark to submit the proposal with a proper justification to the Committee, in accordance with the Guidelines on the organization and method of work.

Statement by the delegation of the Islamic Republic of Iran

9.7 The delegation of the Islamic Republic of Iran, having referred to the name "Arabian Gulf" in table 1 of document SLF 48/9, pointed out that the name of the region should, in accordance with the United Nations practice, be "Persian Gulf" and requested the appropriate rectification.

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

10.1 The Sub-Committee recalled that SLF 47, having considered the submissions from Australia (SLF 47/13/2) and the United Kingdom (SLF 47/INF.7 and SLF 47/INF.8) relating to damage stability and raking damage for high-speed craft, had agreed that these matters needed further consideration.

10.2 The Sub-Committee also recalled that SLF 47, having considered the submissions from Australia (SLF 47/13/1) and the United Kingdom (SLF 47/13, SLF 47/13/Add.1, SLF 47/INF.7 and SLF 47/INF.8), containing proposed amendments to the 2000 HSC Code, and having received the report of the drafting group (SLF 47/WP.4), had agreed to the proposed amendments to the 2000 HSC Code and referred them to DE 48 for co-ordination purposes. Regarding the issues identified in paragraphs 6 and 7 of document SLF 47/WP.4, SLF 47 had agreed to reconsider them at this session.

10.3 The Sub-Committee further recalled that SLF 47 had agreed to establish, at this session, a Working Group on the Review of the 2000 HSC Code and Amendments to the DSC Code and the 1994 HSC Code.

10.4 The Sub-Committee briefly discussed the documents submitted by the United Kingdom (SLF 48/10, SLF 48/10/1, SLF 48/10/2, SLF 48/INF.6 and SLF 48/INF.7) and Australia (SLF 48/10/3 and SLF 48/10/4) and agreed not to consider bottom raking damage (SLF 48/10), or the intact stability criteria issue (SLF 48/10/1).

Establishment of the working group

10.5 Having considered the above issues, the Sub-Committee established the Working Group on Amendments to the 2000 HSC Code, the DSC Code and the 1994 HSC Code, and instructed it, taking into account relevant comments made and decisions taken in plenary, to finalize the text of the draft amendments to the 2000 HSC Code taking into account documents SLF 48/10/2 (excluding paragraph 2.2.3.2.4.2), SLF 48/10/3 and SLF 47/WP.4.

Report of the working group

10.6 Having received the report of the working group (SLF 48/WP.3), the Sub-Committee approved it in general and, in particular, agreed to the proposed amendments to the 2000 HSC Code, as set out in the annex to document SLF 48/WP.3, and instructed the Secretariat to convey the outcome to DE 49 for co-ordination purposes.

10.7 The Sub-Committee considered that the work on the item had been completed and invited the Committee to delete the item from the Sub-Committee's work programme.

11 REVISION OF RESOLUTION A.266(VIII)

11.1 The Sub-Committee recalled that SLF 45, in considering document SLF 45/3/8, had noted that the SDS Working Group had agreed with the suggestion by Norway that resolution A.266(VIII) needed to be revised, taking into account the proposed provision concerning air pipes in compartments used for cross-flooding. SLF 45 also agreed to request MSC 76 to include a new item on "Revision of resolution A.266(VIII)" in its work programme and agenda. Subsequently, MSC 79 had included, in the Sub-Committee's work programme, a high priority item on revision of resolution A.266(VIII), with a target completion date of 2006.

11.2 The Sub-Committee also recalled that the SDS Working Group established at SLF 47 (SLF 48/3) had proposed that the SDS Correspondence Group consider several issues, including cross-flooding and tank venting issues related to the revision of resolution A.266(VIII), during their work on the development of the draft Explanatory notes, and noted that the SDS Correspondence Group had considered those issues, as set out in the annexes to document SLF 48/3/1.

11.3 Having considered the above documents, the Sub-Committee agreed to instruct the SDS Working Group, established under agenda item 3, taking into account comments made and decisions taken in plenary, to:

.1 consider, in detail, the part of the correspondence group's report (SLF 48/3/1) dealing with the item, together with documents SLF 45/3/8 and SLF 48/3/10, and develop a draft revised Recommendation on a standard method of establishing compliance with the requirements for cross-flooding arrangements in passenger ships (resolution A.266(VIII)); and

.2 prepare draft terms of reference for the SDS Correspondence Group to progress the work on the matter.

Report of the working group

11.4 Having considered the part of the report of the working group (SLF 48/WP.1) relating to this item, the Sub-Committee agreed that the following two issues should be included in a revision of resolution A.266(VIII):

.1 cross-flooding times through ducts; and

.2 restrictive effect of counter pressure in tanks,

and invited Member Governments and international organizations to collect data for the development of formulae/computational methods for cross-flooding devices and submit them to the correspondence group.

11.5 The Sub-Committee noted that, due to the time constraints, the group had not been able to develop a draft revised Recommendation on a standard method of establishing compliance with the requirements for cross-flooding arrangements in passenger ships (resolution A.266(VIII)) and, therefore, instructed the SDS Correspondence Group, referred to in paragraph 3.47, to revise the information in resolution A.266(VIII) to include cross-flooding arrangements other than pipes and air ventilation to assure efficient cross-flooding, also including that information in the Explanatory notes for harmonized SOLAS chapter II-1 (see section 3), and submit a report to SLF 49.

12 TONNAGE MEASUREMENT OF OPEN-TOP CONTAINERSHIPS

12.1 The Sub-Committee recalled that, following consideration of document MSC 78/24/5 (Germany) which, referring to the existing interpretation of the 1969 Tonnage Measurement Convention (TM.5/Circ.4) had proposed to amend the interpretation to better address the tonnage measurement of open-top containerships in line with practice adopted by some Administrations, MSC 78 had decided to include, in the Sub-Committee's work programme, a new item on "Tonnage measurement of open-top containerships", with the target completion date of 2006.

12.2 The Sub-Committee had for its consideration documents submitted by:

.1 Australia (SLF 48/12), outlining how the problems being addressed under the item extend beyond open-top containerships and that long-term solution should take account of the effect of tonnage measurement upon ship design and safety and (SLF 48/INF.4), providing background analysis of the proposals presented in document SLF 48/12;

.2 Germany (SLF 48/12/2), presenting a summary of observations and recent developments made with regard to open-top containerships;

.3 the Islamic Republic of Iran (SLF 48/12/3), commenting on documents SLF 48/12/1 and SLF 48/12/2 regarding a proposal to change the calculation instrument of the 1969 TM Convention; and

.4 the United States (SLF 48/12/1), commenting on the proposal of document MSC 78/24/5 to change the calculation instrument of the 1969 TM Convention and to review the measurement treatment of other types of ships with large quantities of deck cargoes.

12.3 After an extensive discussion on submitted documents, the Sub-Committee agreed to amend the provisional formula of reduced gross tonnage (GT) for open-top containerships prescribed in TM.5/Circ.4, based on the proposal by Germany (SLF 48/12/2), and, having established a correspondence group, under the co-ordination of Germany*, to progress the matter intersessionally, instructed it to:

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.1 finalize the revised text of TM.5 circular, based on document SLF 48/12/2; and

.2 submit a report to SLF 49.

12.4 With regard to the entry for the above-mentioned reduced GT, the Sub-Committee confirmed that it should be placed in the "Remarks" column on the reverse side of the International Tonnage Certificate (1969). In this context, the Sub-Committee did not agree to the proposal to develop a supplement to the Certificate indicating the reduced gross tonnage.

12.5 The Sub-Committee discussed, as raised in documents SLF 48/12 and SLF 48/INF.4, broader issues relating to tonnage measurement, in particular the possible revision of the 1969 TM Convention. While a number of delegations supported the need to address long-term effect of tonnage measurement upon ship design and safety, the Sub-Committee, recognizing that those issues were beyond the current Sub-Committee's mandate, invited the delegation of Australia to submit, in due course, an appropriate proposal to the Committee in accordance with the Guidelines on the organization and method of work.

13 REVIEW OF THE SPS CODE

13.1 The Sub-Committee recalled that MSC 78, having noted that, since the Code of safety for special purpose ships (SPS Code) was adopted in 1983, many requirements of the SOLAS Convention had been amended and considerable experience had been gained in the Code's application, had agreed to include a high priority item on review of the SPS Code in the work programmes of the DE (co-ordinator), COMSAR, DSC, FP, NAV and SLF Sub-Committees, with the target completion date of 2006.

13.2 The Sub-Committee considered document SLF 48/13 (Australia), proposing a possible approach with regard to amending the subdivision and damage stability requirements of the Code.

13.3 The Sub-Committee, generally supporting proposals by Australia and recognizing, at the same time, the complexity of the application of the requirements to special purpose ships, agreed to further discuss the issue and invited Member Governments and international organizations to submit appropriate comments and proposals on the matter to SLF 49, taking into account the outcome of the SDS Correspondence Group (see paragraph 7.5).

13.4 In this regard, the Sub-Committee noted that, bearing in mind the target completion date of 2006, the delegation of Australia kindly volunteered to submit a document on the subject to SLF 49 and invited Member Governments and international organizations to contribute to the Australian submission and convey their proposals and comments to Australia*.

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14 SAFETY ASPECTS OF BALLAST WATER MANAGEMENT

14.1 The Sub-Committee recalled that the Committee, having recalled the request of MEPC 49 to confirm the acceptability of transitory non-compliance with safety regulations when conducting ballast water exchange, had decided to instruct the NAV and SLF Sub-Committees to specify the permissible limits of transitory deviation for safety problem areas and to report to the Committee, so that it can consider the aforementioned proposal of MEPC 49 and take action as appropriate.

14.2 The Sub-Committee further recalled that SLF 47, after having considered the submission by Australia (SLF 47/16), agreed to place this item on its agenda for SLF 48 and invited Member Governments and international organizations to submit to SLF 48 comments and proposals on the matter, in particular on permissible limits of transitory deviation for safety problem areas referred to in paragraph 14.1.

14.3 The Sub-Committee considered the submission by Australia (SLF 48/14), wherein Australia confirmed its opinion that the safety aspects of ballast water exchange should be viewed from a holistic safety perspective and that no methodology has been presented which would enable ship-board aspects of transitory non-compliance with safety standards (particularly safety standards within the purview of the SLF Sub-Committee) to be addressed from such a perspective. Australia also drew the Sub-Committee's attention to the fact that no mention was made of transitory deviation from intact stability, damage stability or load line standards in section 5 of the Guidelines for Ballast Water Exchange (G6) adopted by MEPC 53 by resolution MEPC.124(53). Therefore, Australia was of the view that it would be inappropriate for the Sub Committee to recommend that transitory deviation from intact stability, damage stability or load line standards should be permitted under any circumstances.

14.4 Following the debate, the Sub-Committee, supporting Australia's view, agreed to recommend to the Committee that no transitory deviation from safety standards (i.e., intact and damage stability and load lines standards), within the Sub-Committee's purview, should be permitted during ballast water exchange and invited MSC 81 to concur with this view. In addition, MEPC was invited to note the Sub-Committee's recommendation.

14.5 The Sub-Committee considered that the work on the item had been completed and invited the Committee to delete the item from the Sub-Committee's work programme.

15 ANALYSIS OF DAMAGE CARDS: REVISION OF THE IMO DAMAGE CARD

15.1 The Sub-Committee recalled that SLF 46 had agreed with the recommendation of the SDS Working Group that the IMO damage card contained in annex 5 of MSC/Circ.953 should be revised and had decided to recommend to the Committee the inclusion of a relevant item in the work programme of the Sub-Committee. Subsequently MSC 78, having accepted that the IMO damage card be revised under the Sub-Committee's work programme item on "Analysis of damage cards", agreed to include the item in the work programme of the Sub-Committee, with a target completion date of 2006.

15.2 The Sub-Committee, noting that no documents had been submitted under the item to this session, invited Member Governments and international organizations to submit, to SLF 49, appropriate comments and proposals on the IMO damage card annexed to document SLF 46/3/7, for consideration by the Sub-Committee with a view to finalizing the revision of the format of the IMO damage card in annex 5 to MSC/Circ.953.

16 SAFETY OF SMALL FISHING VESSELS

16.1 The Sub-Committee noted that MSC 79, after having considered the recommendation of SLF 47 that a new item on "Safety of small fishing vessels" be placed in its work programme and the provisional agenda for the session to develop safety standards for fishing vessels below 12 m in length, included this item in the Sub-Committee's work programme, with a target completion date of 2009.

16.2 The Sub-Committee had for its consideration documents submitted by:

.1 FAO (SLF 48/16), outlining ideas relating to the development of new safety standards for decked fishing vessels of less than 12 m in length and undecked vessels of any size; and

.2 Ireland (SLF 48/INF.3), containing a copy of Code of Practice developed for small fishing vessels of less than 15 m in length overall.

16.3 The Sub-Committee, after extensive exchange of views, generally supported the format proposed by FAO for new safety standards for small fishing vessels, with some delegations commenting that relevant national, regional and industry requirements should be taken into consideration, and agreed to establish a drafting group at this session and a correspondence group to progress the matter intersessionally.

16.4 Noting the high number of fatalities annually on these small fishing vessels as indicated in the Secretary-General's opening address, the Sub-Committee agreed to progress this item as a matter of urgency with the intention of finalizing the new standards well before the target completion date, if possible.

Establishment of the drafting group

16.5 The Sub-Committee established the Drafting Group on Safety of Small Fishing Vessels and instructed it, taking into account the comments made and decisions taken in plenary, to:

.1 give initial consideration to the contents of the draft Safety standards for small fishing vessels on the basis of documents SLF 48/16 and SLF 48/INF.3; and

.2 prepare draft terms of reference for a correspondence group on the development of Safety standards for small fishing vessels.

Report of the drafting group

16.6 Having received the report of the drafting group (SLF 48/WP.7), the Sub-Committee approved it in general and took specific actions as indicated in the following paragraphs.

16.7 The Sub-Committee noted that the new standards should apply to decked fishing vessels of less than 12 m in length and undecked fishing vessels of any length, and that it may be necessary to divide the standards into two or more parts to reflect the differences in fishing vessel design, such as decked vessels, undecked vessels and vessels of traditional design, as well as the differences between those engaged in industrial and small-scale fishing.

16.8 Having noted that in some countries the safety of small fishing vessels is delegated to bodies other than the maritime authority, such as the ministries of fisheries or agriculture, the

Sub-Committee recommended that Member States ensure the involvement of all appropriate bodies, concerned with fishing vessel safety, in the development of the new standards.

16.9 The Sub-Committee agreed that, in view of its previous involvement in fishing vessel safety, the International Labour Organization (ILO) should also be invited to participate in the development of the standards and instructed the Secretariat to inform ILO of the outcome of this item with a view to their involvement in the development of the standards from the outset.

16.10 Recognizing that the standards may serve as a guide to those framing national laws and regulations relating to these subjects and that the primary users of the standards would be those competent authorities which intend to upgrade their national laws and regulations, the Sub-Committee noted that:

.1 the document should be user-friendly, consisting of a comprehensive set of guidelines concerning the safety of fishing vessels and their crews;

.2 the document need not have the same depth of technical detail as the FAO/ILO/IMO Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels, 2005, on all subjects;

.3 issues of interest to the target group, such as construction and stability, should receive more extensive coverage; and

.4 the format of the document should follow the fishing vessels Voluntary Guidelines in that the chapter/annex and subject order are the same, and if necessary, with addition of chapter(s)/annex(es) on topics not included in the Voluntary Guidelines.

16.11 The Sub-Committee approved the initial table of contents for the draft Safety standards for small fishing vessels set out below:

Chapter/ Annex	**Contents**	**Country/Organizations leading the development of chapters**
Preamble		
Chapter 1	General provisions	Denmark
Chapter 2	Construction, watertight integrity and equipment	Japan
Chapter 3	Stability and associated seaworthiness	FAO/Spain
Chapter 4	Machinery and electrical installations	Norway
Chapter 5	Fire protection, detection and extinction	Japan
Chapter 6	Protection of the crew	Denmark/[ILO]
Chapter 7	Life-saving appliances	Republic of Korea
Chapter 8	Emergency procedures and safety training	Venezuela
Chapter 9	Communications	Norway
Chapter 10	Navigational equipment	Iceland
Chapter 11	Crew accommodation	ICFTU
Chapter 12	Manning and training	Republic of Korea
Annex I	Illustration of terms used in the definitions	
Annex II	Recommendation for testing lifejackets	
Annex III	Annotated list of pertinent publications	

16.12 The Sub-Committee noted that the provisional title of the standards would be "Safety standards for small fishing vessels", subject to further consideration, taking account of the titles and application of existing standards for larger fishing vessels.

16.13 The Sub-Committee agreed to establish a correspondence group, under the co-ordination of South Africa*, with the following terms of reference:

> In co-operation with FAO [and ILO], and referring to existing information relevant to the safety standards of small fishing vessels, currently available from a number of diverse sources, the group should:
>
> .1 examine existing regional and national safety standards for small fishing vessels and the FAO/ILO/IMO Fishing Vessel Safety Code and Voluntary Guidelines for small fishing vessels, as well as any appropriate recommendations emanating from recent IMO/FAO sponsored regional seminars on the safety of small fishing vessels, as well as any other relevant material;
>
> .2 develop a consolidated draft text of the Safety standards for small fishing vessels covering decked fishing vessels of less than 12 m in length and undecked fishing vessels of any length;
>
> .3 give further consideration to the title of the Safety standards;
>
> .4 examine the possibility of completing the development of the standards in 2008; and
>
> .5 submit a report to SLF 49.

16.14 The Sub-Committee, noting that a considerable amount of information relevant to the safety standards of small fishing vessels was currently available from a number of diverse sources, requested that appropriate existing standards be provided to the Co-ordinator of the correspondence group, with a copy to the group's webmaster**. The Sub-Committee urged the

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correspondence group to make every effort to accelerate the development and finalization of the safety standards.

16.15 The Sub-Committee approved the following timeframe for the development of the Safety standards for small fishing vessels covering decked fishing vessels of less than 12 m in length and undecked fishing vessels of any length:

2006:	SLF Sub-Committee agrees on draft texts of the Safety standards and refers them to the relevant sub-committees, as appropriate, for review (DE, COMSAR, FP, NAV and STW Sub-Committees);
2007/2008:	the sub-committees concerned finalize the relevant chapters of the Safety standards; and
2009:	SLF Sub-Committee submits final text of the Safety standards to the MSC for approval.

16.16 In light of the anticipated increased workload generated by the correspondence group, the Sub-Committee agreed to establish a working group on the above safety standards at SLF 49.

17 REVISION OF MSC/CIRC.650

17.1 The Sub-Committee recalled that SLF 47 had noted that MSC 78, having considered document MSC 78/24/9 (Norway) proposing to clarify the term "existing cargo ships" referred to in MSC/Circ.650, instructed the Sub-Committee to consider the matter and advise MSC 79 whether it would be an issue for further consideration.

17.2 Accordingly, SLF 47, following consideration of documents SLF 47/3/7 (Norway) and SLF 47/3/19 (Germany), agreed to recommend to the Committee the inclusion of a new item on "Revision of MSC/Circ.650" in the Sub-Committee's work programme and in the provisional agenda for this session. Subsequently, MSC 79 included the item in the work programme of the Sub-Committee with a target completion date of 2006.

17.3 The Sub-Committee had for its consideration documents submitted by the Republic of Korea (SLF 48/17), proposing amendments to MSC/Circ.650 for clarifying the term "existing ships", and by IACS (SLF 48/17/1), containing a proposal for clarifying the term "repairs, alterations and modifications of a major character" used in SOLAS regulation II-1/1.3.1.

17.4 In considering document SLF 48/17, the Sub-Committee agreed to forward the document to the SDS Correspondence Group, referred to in paragraph 3.47, instructing it to develop the revision of MSC/Circ.650. The following modified sentence, proposed by the delegation of the United Kingdom for inclusion in MSC/Circ.650 was also forwarded, for consideration, to the correspondence group, in addition to document SLF 48/17:

> "In the context of this circular, the term "existing cargo ships" applies to dry cargo ships not hitherto subject to the probabilistic damage stability requirements of SOLAS chapter II-1, part B-1."

17.5 In the context of the item, the Sub-Committee considered document SLF 48/17/1 (IACS) in which, referring to implementation of regulations I/13G and I/13H of MARPOL 73/78, IACS envisaged the potential increase in single-hull tankers converting to double-hull tankers and,

considering that there is a need to determine the applicability of SOLAS regulation II-1/3-6 (Means of access to cargo holds and other spaces) upon such a conversion, was of the opinion that regulation II-1/3-6 should not be applied retroactively in case of ships modified to comply with regulations I/13G and I/13H of MARPOL 73/78.

17.6 Following the discussion, the Sub-Committee concluded that it would be appropriate for the DE Sub-Committee to consider the proposal and requested DE 49 to deal with the matter and take action as appropriate. Subsequently, the Sub-Committee invited the Committee to note this course of action.

18 WORK PROGRAMME AND AGENDA FOR SLF 49

Work programme and agenda for SLF 49

18.1 Taking into account the progress made at this session and the provisions of the agenda management procedure contained in paragraphs 3.11 to 3.23 of the Guidelines on the organization and method of work (MSC/Circ.1099 – MEPC/Circ.405), the Sub-Committee revised its work programme (SLF 48/WP.5) based on that approved by MSC 80 (SLF 48/2/1, annex 1) and prepared the proposed revised work programme and provisional agenda for SLF 49. While reviewing the work programme, the Sub-Committee agreed to invite the Committee to:

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

.1.1 item H.3 - Safety aspects of ballast water management;

.1.2 item H.6 - Review of the LHNS and OSV Guidelines;

.1.3 item H.7 - Review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code; and

.1.4 item H.8 - Revision of technical regulations of the 1966 LL Convention;

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

.2.1 item L.1 - Harmonization of damage stability provisions in other IMO instruments, including the 1993 Torremolinos Protocol (probabilistic method), to 2006;

.3 renumber the work programme items accordingly.

The Sub-Committee invited the Committee to approve the revised work programme of the Sub-Committee and provisional agenda for SLF 49, set out in annex 3.

Arrangements for the next session

18.2 The Sub-Committee agreed to establish, at SLF 49, working groups on the following subjects:

.1 subdivision and damage stability (including passenger ship safety);

.2 review of the Intact Stability Code; and

.3 safety of small fishing vessels,

and drafting groups on tonnage measurement of open-top containerships and on review of the SPS Code.

18.3 The Sub-Committee agreed that the SDS Working Group would commence its work at the start of the next meeting, i.e. at 9.30 a.m. on Monday, 11 September 2006, on the basis of the draft terms of reference which will be prepared by the Chairman, pending formal discussion of those terms of reference under the agenda item on "Development of explanatory notes for harmonized SOLAS chapter II-1".

Date of the next session

18.4 The Sub-Committee noted that the forty-ninth session of the Sub-Committee had been tentatively scheduled to take place from 11 to 15 September 2006.

19 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2006

19.1 Having noted that Mr. A. Carcantzós (Greece) was no longer available to serve as Chairman, the Sub-Committee, in accordance with the Rules of Procedure of the Maritime Safety Committee, unanimously elected Mr. R. Gehling (Australia) as Chairman and elected Mr. Z. Szozda (Poland) as Vice-Chairman, both for 2006.

Expression of appreciation

19.2 The Sub-Committee expressed to Mr. A. Carcantzós deep appreciation for his valuable contributions to the work of the Sub-Committee over the years and wished him success in his new assignment.

20 ANY OTHER BUSINESS

20.1 The Sub-Committee noted that no submissions had been received under this agenda item.

21 ACTION REQUESTED OF THE COMMITTEES

21.1 The Maritime Safety Committee is invited to:

.1 note the progress made on the development of the Explanatory notes for the harmonized SOLAS chapter II-1, in particular the Sub-Committee's decision to finalize the Interim Explanatory notes at SLF 49 to be issued as an MSC circular with the possibility of regular revisions until the entry into force of the revised SOLAS chapter II-1 in 2009 (paragraphs 3.16 to 3.48);

.2 note the progress made on the development of the revision of the Intact Stability Code (paragraphs 4.12 to 4.21);

.3 approve the draft MSC circular on Interim Guidelines for alternative assessment of the weather criterion (paragraph 4.14 and annex 1);

.4 note the Sub-Committee's referral of the draft revised OSV Guidelines to the DSC Sub-Committee for finalization and subsequent submission to the Committee, for adoption (paragraph 5.21);

.5 note the Sub-Committee's referral of the draft amendments to the LHNS Guidelines to the DSC Sub-Committee for finalization and subsequent submission to the MSC and the MEPC, for adoption, and also the Sub-Committee's referral of the model form of Certificate of Fitness contained in the draft amendments to the LHNS Guidelines to the BLG Sub-Committee for comments and referral to the DSC Sub-Committee (paragraphs 5.22 and 5.23);

.6 note the progress made on passenger ship safety, in particular the Sub-Committee's recommendations regarding the tasks assigned by the Committee and take action as appropriate (paragraphs 6.5 to 6.24);

.7 note that, in the context of its work on the harmonization of damage stability provisions in IMO instruments, the Sub-Committee decided that the INF and SPS Codes and the 1988 LL Protocol should be the instruments in which damage stability should be based on probabilistic principles (paragraphs 7.3 to 7.5);

.8 endorse, with regard to the proposed amendments to 1988 LL Protocol concerning special consideration for self-elevating MODUs, the Sub-Committee's referral of the proposal to the DE Sub-Committee for consideration under the item on the review of the MODU Code (paragraph 9.3);

.9 approve the draft amendments to Annex B to the 1988 LL Protocol with a view to adoption at MSC 82 (paragraph 9.4 and annex 2);

.10 note that the Sub-Committee prepared draft amendments to the 2000 HSC Code and forwarded them to the DE Sub-Committee for co-ordination purposes (paragraph 10.6);

.11 concur with the Sub-Committee's recommendation that no transitory deviation from safety standards (i.e. intact and damage stability and load line standards), within the Sub-Committee's purview, should be permitted during ballast water exchange (paragraph 14.4);

.12 note the progress made on safety of small fishing vessels, in particular the Sub-Committee's decision to progress the item as a matter of urgency with the intention of finalizing the new standards well before the target completion date, if possible, and concur with the recommendation that the International Labour Organization (ILO) should be invited to participate in the development of the standards for small fishing vessels (paragraphs 16.6 to 16.16);

.13 note that, in the context of the item on the revision of MSC/Circ.650, the Sub-Committee requested the DE Sub-Committee to deal with the matter of applicability of SOLAS regulation II-1/3-6 (Means of access to cargo holds and other spaces) in case of the conversion of single-hull tankers into double-hull tankers to comply with regulations I/13G and I/13H of MARPOL 73/78), as raised in document SLF 48/17/1 (paragraphs 17.5 and 17.6);

.14 approve the draft revised work programme of the Sub-Committee and the draft provisional agenda for SLF 49 (paragraph 18.1 and annex 3); and

.15 approve the report in general.

21.2 The Marine Environment Protection Committee is invited to:

.1 note the Sub-Committee's referral of the draft amendments to the LHNS Guidelines to the DSC Sub-Committee for finalization and subsequent submission to the MSC and the MEPC, for adoption, and also the Sub-Committee's referral of the model form of Certificate of Fitness contained in the draft amendments to the LHNS Guidelines to the BLG Sub-Committee for comments and referral to the DSC Sub-Committee (paragraphs 5.22 and 5.23); and

.2 note the Sub-Committee's recommendation that no transitory deviation from safety standards (i.e. intact and damage stability and load line standards), within the Sub-Committee's purview, should be permitted during ballast water exchange (paragraph 14.4).

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ANNEX 1

DRAFT MSC CIRCULAR

INTERIM GUIDELINES FOR ALTERNATIVE ASSESSMENT OF THE WEATHER CRITERION

1 The Maritime Safety Committee, at its [eighty-first session (10 to 19 May 2006)], approved Interim Guidelines for alternative assessment of the weather criterion, aiming at providing the industry with alternative means (in particular, model experiments) for the assessment of severe wind and rolling criterion (weather criterion), as contained in resolution A.749(18) on Code on Intact Stability for All Types of Ships covered by IMO Instruments. The Interim guidelines should be applied when the wind heeling lever and/or the angle of roll (as defined in paragraphs 3.2.2.1.1 and 3.2.2.1.2 of the Code) need to be determined by means of model experiments.

2 Member Governments are invited to bring the Interim Guidelines to the attention of interested parties as they deem appropriate.

ANNEX

INTERIM GUIDELINES FOR ALTERNATIVE ASSESSMENT OF THE WEATHER CRITERION

1 INTRODUCTION

1.1 The purpose of these Guidelines is to provide alternative means for the assessment of severe wind and rolling criterion (weather criterion) as reported in paragraph 3.2 of the Code on Intact Stability for All Types of Ships covered by IMO Instruments (resolution A.749(18)). In the following guidelines, the angle of roll is referred as ϕ, while in the Code the angle of roll is referred as θ.

1.3 The Guidelines provide procedures for the determination of the wind heeling lever l_{w1}, as defined in paragraph 3.2.2.1.1 of the Code, by means of direct measurements.

1.4 In addition, the Guidelines are given for the experimental determination of the angle of roll ϕ_1 as defined in paragraph 3.2.2.1.2 of the Code.

1.5 For quantities used but not defined in the following, the definitions of the Code apply.

2 APPLICATION

2.1 The tables and formulae described in paragraph 3.2.2.3 of the Code are based on data from ships having:

- *B/d* smaller than 3.5;
- *OG/d* between -0.3 and 0.5;
- *T* smaller than 20 s.

2.2 For ships with parameters outside the above limits, the angle of roll (ϕ_1) may be determined with model experiments of a subject ship, following the procedure described in the Guidelines as the alternative. In addition, the Administration may accept such alternative determinations for any ship if deemed appropriate.

2.3 The alternative means for determining the wind heeling lever (l_{w1}) may be accepted, to the satisfaction of the Administration, as an equivalent to calculation in paragraph 3.2.2.2 of the Code. When such alternative tests are carried out, reference should be made to the relevant part of the Guidelines. The wind speed used in the tests should be 26 m/s in full scale with uniform velocity profile. The value of wind speed used for ships in restricted services may be reduced to the satisfaction of the Administration.

2.4 The test programme should be approved by Administration in advance.

2.5 Tests should be documented by means of a report and a video or other visual records containing all relevant information on the model, the procedure and the test results, which should be approved by the Administration.

2.6 Any procedure different from those provided in the Guidelines should be subject to the approval of the Administration.

3 GUIDELINES FOR EXPERIMENTAL DETERMINATION OF THE WIND HEELING LEVER L_{W1}

3.1 Objectives and definitions

3.1.1 The purpose of the tests addressed in this section is to ensure uniform applicability of model tests for the determination of the steady wind heeling lever, l_{w_1} (paragraph 3.2.2.2 of the Code). It is allowed by this procedure to consider the steady wind heeling lever as dependent on the heeling angle (see figure 3.1.1).

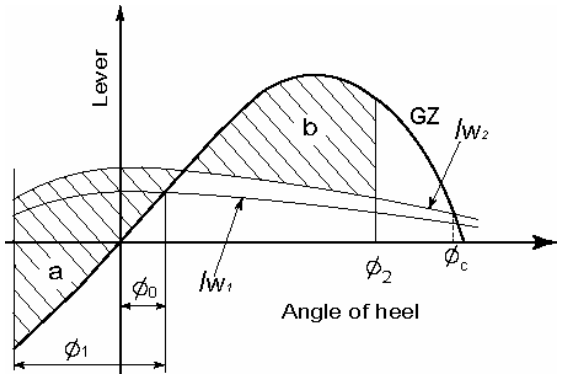

Figure 3.1.1: Weather criterion when the wind heeling lever is dependent on the heeling angle

3.1.2 The standard model test procedure consists of two parts. The first part is a procedure for estimating the heeling moment M_{wind} due to steady wind in a wind tunnel. A blower may be used as an alternative as long as the uniformity of wind speed is comparable. The second part addresses the estimation of the heeling moment M_{water} due to steady drifting in a towing tank.

3.1.3 The steady wind heeling lever, l_{w_1}, is obtained by means of the following equation:

$$l_{w1}(\phi) = \frac{M_w(\phi)}{\Delta} = \frac{M_{wind}(\phi) + M_{water}(\phi)}{\Delta} \qquad (3.1.3)$$

where:

$M_w(\phi)$ is the total heeling moment (N*m) when the ship is drifting laterally due to beam steady wind (90° heading angle) with an angle of heel ϕ;

Δ is the displacement (N) of the ship; and

The drifting force is assumed to be equal to the horizontal force F_{wind} due to steady wind.

The equation 3.1.3 assumes that the wind force and the drifting force work as a couple. In that case the heeling moment M_W is independent on the point of reduction of the system of forces. However, due to the unavoidable unbalancing of vertical forces arising from direct measurements, the total heeling moment M_W may depend on the point of reduction. For practical purposes, it is considered sufficient to calculate all moments with respect to the point O given by the intersection of the ship centreplane and the waterplane.

3.1.4 F_{wind} is related to the wind drag coefficient C_D by means of the following equation:

$$F_{wind}(\phi) = \frac{1}{2} \cdot \rho_{air} \cdot U^2 \cdot A_L \cdot C_D(\phi) \qquad (3.1.4)$$

where:

ρ_{air} is the air density (1.222 kg/m^3 for full scale prediction);

U is the wind speed (m/s); and

A_L (m^2) is the lateral projected area of the ship exposed to wind in upright position.

3.1.5 M_{wind} is obtained at full scale by appropriate scaling of results from wind tests carried out as indicated in paragraph 3.3. M_{water} is obtained at full scale by appropriate scaling of results from drifting tests carried out as indicated in paragraph 3.4.

3.2 Model set-up

3.2.1 *Ship model used for wind tests*

The model should copy the above-waterline shape of the actual ship and should comply with the following:

.1 the overall length should be at least 1.25 m;

.2 all sharp corners in the actual ship should be sharp in the model to simulate separated flow;

.3 main fittings on the exposed decks and superstructures, e.g. cranes, masts, bulwarks, should be modelled and fitted properly;

.4 the size of the model should be determined to make the blockage ratio to the wind tunnel less than 5%, where the blockage ratio is defined as the ratio between the lateral projected area of the model above the waterline divided by the area of the test section of the wind tunnel; and

.5 when a blower is used the ship should be within the area of uniform wind speed.

3.2.2 *Ship model used for drifting tests*

The model should copy the under-waterline shape of the actual ship and should comply with the following:

.1 the size of the model should comply with paragraph 4.3.2;

.2 not only underwater fittings (e.g. bilge keels, rudders, etc.) but also potential underwater part when the ship heels (e.g. bulwarks, freeing ports, etc.) should be modelled and fitted properly.

3.3 Wind tests

3.3.1 *Wind characteristics*

The wind speed should comply with the following:

.1 The minimum wind speed to perform tests should be over the critical Reynolds' number, after which C_D is constant.

.2 The wind speed profile should be as uniform as reasonably possible. Except for the boundary layer in the vicinity of the end plate (figure 3.3.1), spatial deviation[1] of the wind speed should be less than 1%.

.3 The effects of end plate (due to its shape, size, roughness, etc.) and of the gap between end plate and model should be minimized.

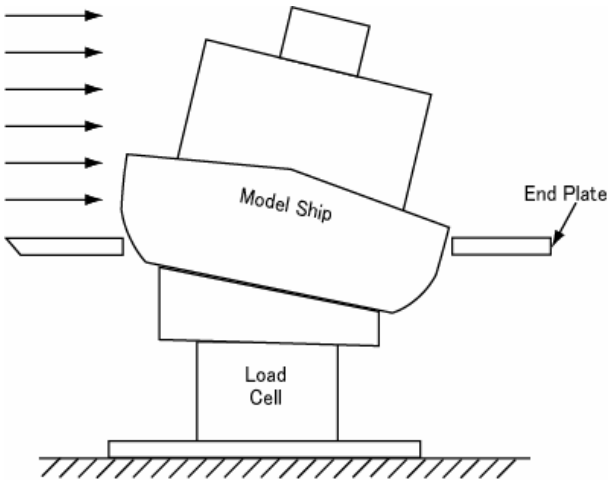

Figure 3.3.1: Example of an arrangement for tests in wind

3.3.2 *Complete test procedure*

The lateral horizontal force F_{wind} (and corresponding drag coefficient C_D) and the heeling moment due to wind M_{wind} with respect to O are obtained by a wind tunnel test or in wind from a blower. In calculating C_D according to equation (3.1.4), the actual value of air density during tests should be used. An example of model test arrangement is shown in figure 3.3.1. Model tests should be carried out in compliance with the following:

.1 Before tests are carried out, the vertical and horizontal distribution of the wind speed at the model position should be verified.

.2 Tests should be carried out in upright condition and at some heeling angles with appropriate increment to lee and wind side covering a sufficient range of heeling angles to the satisfaction of the Administration.

[1] Spatial deviation is the variation of wind speed in longitudinal direction referring to the main flow and shall be measured for the test section without the model.

.3 In heeled conditions the model shape exposed to wind should be the same as the above-water shape when the ship is floating freely. The change of trim due to heel can be neglected.

3.3.3 *Simplified test procedure*

As an alternative simplified procedure, the lateral horizontal force F_{wind} (and corresponding drag coefficient C_D) and the heeling moment due to wind M_{wind} with respect to O can be obtained for the upright condition only and considered as constants (not depending by heeling angle).

3.4 Drifting tests

3.4.1 *Complete test procedure*

The heeling moment M_{water} due to drift with respect to O is obtained by means of towing tank tests. An example of experimental set-up is shown in figure 3.4.1. Model tests should be carried out in compliance with the following:

.1 the ship model should be attached to a guidance system, which allows the model's free sinkage (an example of experimental arrangement is shown in figure 3.4.1);

.2 towing direction is to be at right angle to the longitudinal direction of the model (heading angle 90°);

.3 the towing speed should ensure that the measured drift horizontal force is equal to F_{wind} scaled with the appropriate scaling law. F_{wind} should be calculated by equation (3.1.4) using the measured drag coefficient in paragraph 3.3 and the assumed wind speed as prescribed in paragraph 2.3; and

.4 tests should be carried out in upright condition, and at some heeling angles with appropriate increment to lee and wind side covering a sufficient range of heeling angles to the satisfaction of the Administration.

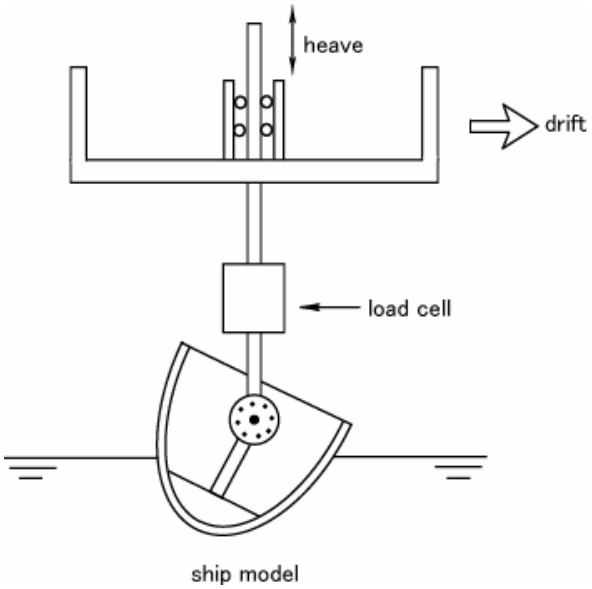

Figure 3.4.1: Example of an arrangement for drifting tests

3.4.2 *Simplified test procedure*

As an alternative simplified procedure, the moment M_{water} due to drift can be considered as given by a force equal and opposite to $F_{wind}(\phi)$ (as following from paragraphs 3.3.2 or 3.3.3) acting at a depth below waterline equal to 0.5 d (where d is the ship draught in upright position).

3.5 Combined use of simplified and complete procedures

The combination of complete procedures and simplified procedures can be used.

3.6 Additional considerations

The steady wind heeling lever, l_{w_1}, is evaluated by means of equation (3.1.3). When extrapolation is needed outside the tested range of heeling angles, such extrapolation should be carried out to the satisfaction of the Administration.

4 GUIDELINES FOR EXPERIMENTAL DETERMINATION OF THE ANGLE ϕ_1

4.1 Objectives and definitions

4.1.1 The objective of the tests addressed in this chapter is the determination of ϕ_1 (paragraph 3.2.2.3 of the Code). The "angle of roll to windward due to wave action" ϕ_1 is defined, according to weather criterion, as follows:

$$\phi_1 = 0.7 \cdot \phi_{1r} \qquad (4.1.1)$$

where ϕ_{1r} is "regular waves roll-back angle", that is the resonant roll amplitude in beam regular waves (heading 90°) having steepness defined in the following sections. The reduction factor 0.7 takes into account the actual irregular nature of the sea.

4.1.2 The standard procedure for the determination of ϕ_{1r} is that by means of tests in regular waves. The use of alternative procedures is permitted. Sufficient justification should be provided to the Administration regarding the selected procedure.

4.1.3 As a reference in selecting the more suitable procedure it should be noted that:

.1 The direct measurement of ϕ_{1r} (see paragraph 4.5) can lead to the need of generating very steep waves close to the breaking limit if the ship roll period is very short (see table 4.5.1). Generation of waves with such steepness and sufficient quality can be sometimes difficult due to breaking close to the wavemaker. In addition, in carrying out roll tests, care should be taken during the transient ship behaviour before steady state is reached, because possible large heeling angles (sometimes eventually leading to capsize) can occur. It should be underlined that ϕ_{1r} is the steady state maximum roll angle, for this reason capsize during initial transient phase of the test does not necessarily lead to not fulfilment of the criterion. It should be underlined that the methodology does not allow for corrections for scale effects on roll damping, and for this reason large models should be preferred when direct measurements are carried out.

.2 The Three steps procedure (see paragraph 4.6.1) is the simplest among the two proposed alternative procedures. This method was adopted when original weather criterion was developed. The procedure is sensitive to the quality of execution and analysis of roll decay tests. The procedure allows to execute tests for the determination of the effective wave slope coefficient r, with reasonably small steepnesses, leading to rather simple tests. The methodology allows, in principle, corrections for scale effects on roll damping.

.3 The Parameter identification technique (PIT) (see paragraph 4.6.2) is a procedure with a large degree of flexibility, that allows to take into account nonlinearities of both damping and restoring, and that provides means for allowing frequency dependence of the "effective wave slope function". The methodology allows, in principle, corrections for scale effects on roll damping. When used with only one series of tests for one single wave steepness, the number of free parameters should be reduced to guarantee robustness of the methodology. The method can take great advantages (regarding robustness and accuracy) from the execution of more than one series of tests at different wave steepness: for this reason the use of at least two different wave steepnesses is strongly recommended. To guarantee correct application of the method, a sufficient basic training of personnel on the theoretical background on which the method is based is needed.

4.2 Model basin

The facilities of the model basin should be such as to avoid wave reflections and shallow water effects. The breadth of the basin should be larger than the over all length of the model plus 2 m. The quality of the basin should be subject to the satisfaction of the Administration.

4.3 Model set-up

4.3.1 *Construction*

4.3.1.1 The model should be built geometrically scaled up to the upper weather deck including forecastle and bulwarks and be sufficiently rigid with a smooth finish. The whole model (excluding free flooded spaces) should be watertight in order to guarantee hydrostatic properties.

4.3.1.2 All superstructures included in stability calculations or that are submerged during the tests should be reproduced to scale to ensure the model has the correct righting arm curve. Superstructures that do not submerge during the tests described below can be omitted.

4.3.1.3 Appendages such as bilge keels or rudder should be fitted, properly scaled and the report should state which appendages were fitted during the tests.

4.3.2 *Scale*

To avoid scale effect on roll damping, the model overall length should be at least 2 m. However, the model should be scaled up, if necessary, to make the breadth of the bilge keels greater than 7 mm. For monohull ships having neither bilge keels nor sharp bilges[2], however, the model

[2] "Sharp bilges" used here means that bilge radius is smaller than 1% of the ship's breadth and the angle between piece-wise lines representing the bilge is smaller than 120°.

overall length should be at least 4 m unless frictional effect on roll damping is corrected with theoretical methods described later, but in any case not less than 2 m or a scale 1:75, whichever is greater.

4.3.3 *Ballast and weight distribution*

4.3.3.1 The model should be ballasted to the appropriate displacement and loading condition for the ship. To ensure correct displacement and attitude, draught marks or suitable gauges should be used. Weights should be adjusted to achieve the correct position of the centre of gravity.

4.3.3.2 Weight distribution should be such as to guarantee reasonable radius of gyration for pitch. Unsymmetrical weights distribution should be avoided as far as practicable.

4.3.3.3 Inclining tests should be carried out to verify that the value of ship's metacentric height GM corresponds to that of the actual ship within an error of 2% or 1mm at model scale, whichever is larger.

4.3.3.4 In addition, depending on the information provided to the model basin, natural roll period $T\phi$ in water or roll radius of gyration in air, should be checked to correspond to that provided within an error of 2%.

4.3.4 *Roll period $T\phi$ to be tested*

The ship natural roll period should be used for tests. In case a sufficiently accurate estimation of $T\phi$ is not available at the time of tests, they should be carried out for a series of at least 3 different roll periods, from which the results can be finally interpolated for the actual ship roll period.

4.4 General experimental set-up

4.4.1 *Instrumentation*

The instrumentation system should be appropriate to the model and type of test carried out. The use of non-intrusive measurement systems is recommended when feasible. If it becomes necessary to attach cables to the model then care should be taken to minimize interference.

4.4.2 *Calibration*

In order to ensure accurate operation of instrumentation, calibrations should be carried out and reported.

4.4.3 *Measurements*

Roll, and yaw if necessary, should be simultaneously measured and recorded as appropriate to the purpose of the test. Wave height measurements should be made for all tests with wave probes fixed in the tank.

4.4.4 *Wave quality*

Wave generation quality should be assessed for the waves corresponding to the minimum and the maximum frequency used in the tests. The wave elevation should be measured by wave probes positioned at least 3 locations along the length of the basin, spanning the drift range of the model.

This should be done without the model because the model can disturb incident waves. When the measured double amplitude of the wave elevation converges to a certain value, this value should be regarded as the wave height, *H*, for each position. Variations in wave height and wave period should be within ±5% among the different measured positions for the same signal.

4.5 Tests in regular waves

Tests in regular waves are the standard procedure for determining the "regular waves roll-back angle" ϕ_{1r}. In some cases the direct determination of ϕ_{1r} is not feasible, as, for example, in case of large models having long natural roll period T_ϕ. In such cases alternative procedures can be used as reported in paragraph 4.6.

4.5.1 *Test conditions*

The wave steepness (factor "s") should be selected from the table 4.5.1.

Table 4.5.1: Wave steepness as a function of the full scale natural roll period.

Ship Roll Period T_ϕ [s]	Wave Steepness $s = H / \lambda$
<6	0.100
6	0.100
7	0.098
8	0.093
12	0.065
14	0.053
16	0.044
18	0.038
20	0.032
22	0.028
24	0.025
26	0.023
28	0.021
30	0.020
>30	0.020

4.5.2 *Direct measurement procedure*

4.5.2.1 Tests in regular waves can be used to directly obtain the "regular waves roll-back angle" ϕ_{1r}. ϕ_{1r} is the peak roll response of the ship in regular waves of steepness according to table 4.5.1. In order to determine ϕ_{1r}, the stationary roll motion amplitude should be measured for a sufficient number of frequencies around the natural roll frequency $\omega_0 = 2\pi/T_\phi$. The following minimum set of test points is recommended ω/ω_0 = 0.8, 0.9, 0.95, 0.975, 1.0, 1.05, 1.2, with ω being the frequency of the regular wave in rad/s. Additional measurements in the proximity of the response peak might be necessary to allow for an accurate determination of ϕ_{1r} especially in case of strong influence of righting lever non-linearity.

4.5.2.2 During the tests the ship model should be positioned to be normal to the direction of the waves (90° heading angle). The heading angle of the model is either:

.1 fixed, with a guide attached to the towing carriage keeping the sway-heave-roll motion free from restraints. An example of experimental arrangement is shown in figure 4.5.2.2. The carriage should trace the drift motion of the model induced by the beam wave's action. Draught, GM and T_ϕ should be adjusted taking into account the effect of the guide; or

.2 controlled by guide ropes which are fitted to the model on the centreline at the stem and stern, in a symmetrical fashion and at a vertical height between the waterline and the centre of gravity. These lines can be used to correct the model in yaw while allowing drift and sway, provided the heading during tests does not deviate from beam sea for more than 15°. However, whenever the yaw motion is corrected by means of the ropes, the corresponding part of the measured record should be neglected in the subsequent analysis, unless the effect of correction on the quantities of interest is clearly negligible.

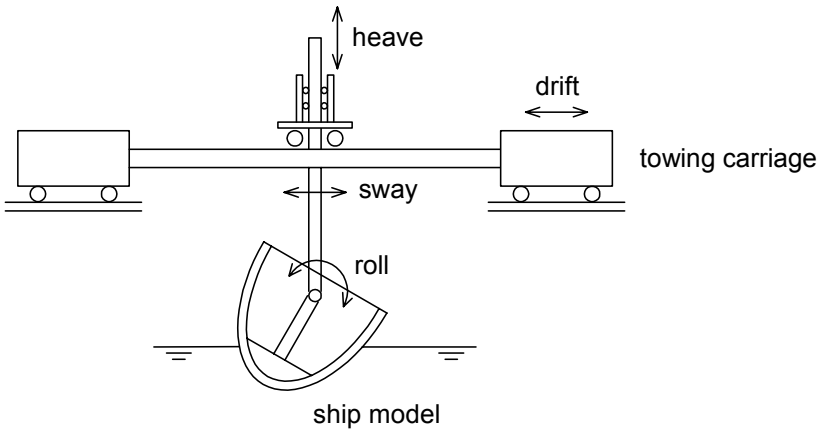

Figure 4.5.2.2: An example of the guide for roll test in beam waves

4.5.2.3 During the tests, care should be taken to use appropriate time windows for the measurements, so that the steady roll amplitude is measured without the influence of reflected waves between the model and the wave maker or the model and the beach.

4.5.2.4 Data to be recorded are model motions in all measured degree of freedom (DOF) and wave elevation.

4.6 Alternative procedures

When direct measurement of ϕ_{Ir} is not feasible, alternative procedures can be used to calculate the angle of roll to windward due to wave action ϕ_1 at the steepness specified in 4.5.1, by means of data obtained from tests in regular waves with different steepnesses and/or other type of tests. In view of the strict interrelation between the many elements constituting present weather criterion assessment, the evaluation of individual parameters relevant to the calculation formula of the angle of roll to windward due to wave action ϕ_1 is permitted only when they are all evaluated through experimental tests or appropriate calculation procedures. In the following, procedures are reported as alternatives to the direct measurement of ϕ_{Ir} (refer to paragraph 4.5).

4.6.1 *Alternative procedure 1: Three steps procedure*

The procedure consists of the sequential evaluation of:

.1 roll damping (Bertin's coefficient N) from roll decay test in calm water;

.2 effective wave slope coefficient r from roll tests in beam waves; and

.3 the "regular waves roll-back angle" ϕ_{1r}.

4.6.1.1 Execution of roll decay tests

4.6.1.1.1 To obtain the roll damping characteristics of the ship, a series of roll decay tests for the scaled model in calm water should be carried out. The model is initially inclined up to a certain heel angle. This initial angle should be larger than about 25°. If the mean roll angle between the initial angle and the next peak angle is smaller than 20°, the initial angle should be increased to obtain a mean angle of 20° or over. When the initial roll angle is given to the model, additional sinkage and trim should be minimum. The model should be released from an initial angle with zero roll angular velocity. During this test, no disturbance including waves propagating in the longitudinal direction of the basin and reflected by its end should be given to the model. At least four tests with different initial angles are required. If the roll damping is very large, the number of tests should be increased to obtain sufficient number of peaks of the roll angle. Recording of the roll time history should start before the release of the model to confirm that no angular velocity is given when releasing. Recording should continue until the model has reached rolling angles smaller than 0.5°. This eventually requires that the length of the basin should be sufficiently large.

4.6.1.1.2 Full details of the experiments, including time histories, should be included in the report.

4.6.1.2 Determination of ϕ_{1r}

4.6.1.2.1 *First step*

The aim of this step is the determination of the Bertin's extinction coefficient curve and the roll period as a function of roll amplitude. Assuming that the absolute values of measured consecutive extremes (one maximum and following minimum or vice-versa) of roll angle during roll decay are $\phi_1, \phi_2, \ldots$ (deg), the mean roll angle $\phi_{m_i} = \frac{\phi_i + \phi_{i-1}}{2}$ and the decrement $\delta\phi_i = \phi_i - \phi_{i-1}$ are calculated. Bertin's extinction coefficient, N, as a function of ϕ_m is obtained by $N_i = N(\phi_{m_i}) = \frac{\delta\phi_i}{(\phi_{m_i})^2}$. It should be noted that N depends on roll amplitude. The obtained raw data for $N(\phi_{m_i})$ should be fitted by a smooth curve. In addition, periods from peaks to peaks should be calculated as a function of mean roll angle, which is necessary for step 2.

An equivalent linear damping coefficient $\nu_e(\phi)$ defined as:

$$\nu_e(\phi) = \frac{1}{\pi} \cdot N(\phi) \cdot \phi$$

where ϕ is in degrees, can be used as an alternative to the Bertin's coefficient. When the equivalent linear damping coefficient is used, all the formulae involving $N(\phi)$ should be modified accordingly.

In case frictional correction on roll damping is required in paragraph 4.3.2, the above value of N should be reduced by the value from the following formula, which represents the model-ship correlation on frictional damping:

$$\delta N = \frac{2.11 * S * r_S^2}{\phi_r * \Delta * GM * T_\phi^{1.5}} \qquad (4.6.1.2.1\text{-}1)$$

where:

$$S = L * (1.7 * d + C_B * B) \qquad (4.6.1.2.1\text{-}2)$$

$$r_S = \frac{1}{\pi}\{(0.877 + 0.145 * C_B)(1.7 * d + C_B * B) + 2 * (KG - d)\} \quad (4.6.1.2.1\text{-}3).$$

All variables should be in model scale and the symbols in the above formulae are defined as follows:

L	= length of the ship at waterline (m)
B	= moulded breadth of the ship (m)
d	= mean moulded draught of the ship (m)
C_B	= block coefficient
GM	= metacentric height corrected for free surface effect (m)
Δ	= displacement (kg)
T_Φ	= roll period (s)
ϕ_r	= roll angle (degrees)

Alternatively a numerical calculation with unsteady boundary layer can be used to the satisfaction of the Administration.

Alternatively, a forced roll test may be used to determine the $N(\phi)$ coefficient by using an internal or external roll motion generator.

The former requires measurement of roll angles and the latter does that of roll moment. The experimental procedure and the subsequent analysis of data should be subject to the satisfaction of the Administration. In order to decide on the suitability of experimental and analysis procedure, as a guide, a reasonable agreement between results from forced roll tests and $N(\phi)$ from roll decay tests, can be considered a good indication.

4.6.1.2.2 *Second step*

The aim of this step is the determination of the effective wave slope coefficient r. The following two methods are provided:

.1 The resonant roll amplitude in regular waves is determined according to the procedure described in paragraph 4.5.2 but using a wave steepness which should be smaller than 1/20. Regardless of the requirement in paragraph 4.5.2, a used

wave period should be the same as the given natural roll period. Once the steady roll amplitude is obtained, the natural roll period for this amplitude should be estimated with the results of roll decay test. If this period is significantly different from the wave period, roll angle measurement should be repeated but by using the newly estimated period as the input to the wave maker. Then the effective wave slope coefficient, r, is determined as follows:

$$r = \frac{g \cdot T_{wave,r}^2 \cdot \phi_r^2 \cdot N(\phi_r)}{180\pi^2 \cdot H_r} \qquad (4.6.1.2.2\text{-}1)$$

where $T_{wave,r}$ and H_r are the wave period in seconds and the wave height in meters respectively used in the test, and g is the gravitational acceleration in m/s^2 In equation (4.6.1.2.2-1) the wave steepness is assumed to be related to wave height and wave period by $s = 2\pi \cdot H / (g \cdot T_{wave}^2)$. The effective wave slope is assumed to be independent on ϕ_r.

.2 Alternatively it is possible to directly measure the roll excitation moment M_{exc} by means of a dynamometer. The model should be connected to the carriage by means of a guide allowing drift, sway, heave and pitch motions but fixing surge, roll and yaw. The dynamometer should measure the moment with respect to centre of gravity between model and the carriage. The dynamometer should be designed to limit the interaction between the detected force components within 2% of the resultant ones. Coefficient r is then determined as follows:

$$r = \frac{M_{exc}}{\Delta \cdot \overline{GM} \cdot \pi \cdot s} \qquad (4.6.1.2.2\text{-}2)$$

4.6.1.2.3 *Third step*

The aim of this step is the prediction of the peak of roll for the steepness specified in table 4.5.1. By using the curve for $N(\phi)$ and the estimated value for r from previous steps, and by using the wave steepness s obtained from table 4.5.1, the predicted angle of roll ϕ_{1r} can be calculated by the following formula:

$$\phi_{1_r} = \sqrt{\frac{90\pi r s}{N(\phi_{1_r})}} \quad (\text{deg rees}) \qquad (4.6.1.2.3)$$

Since this formula includes ϕ_{1r} in both its right- and left- sides, the calculation should be carried out with the following iterative procedure:

.1 ϕ_{1r} is initially assumed to be 20°;

.2 the right-hand-side of this formula is calculated;

.3 the obtained ϕ_{1r} should be substituted into the right-hand-side; and

.4 when the value of ϕ_{1r} converges to a certain value, this should be regarded as the final value.

4.6.2 *Alternative procedure 2: Parameter identification technique (PIT)*

The Parameter identification technique (PIT) approach is outlined below, taking into account linear and nonlinear features of the mathematical model describing the roll motion in beam waves, with other forcing sources or roll decays. The basic structure of the method consists in the regression of the solution (exact or approximate, analytical or numerical) of the system of differential equations describing the time evolution of the system under analysis, containing as unknowns the characteristic parameters (coefficients of the mathematical model adopted to describe damping, restoring, forcing terms). The regression is considered to the experimental values of stationary roll amplitude versus frequency for forced roll. The basic idea on which the PIT relies is thus as follows: the solution of equation (4.6.2.1.1), for any consistent set of parameters and different wave frequencies allows to obtain a prediction for the roll response. The parameters of the model are modified systematically by the minimization procedure in order to obtain the best agreement between the predictions given by the model and measured experimental data. The "optimum" set of parameters is then obtained and used in solving equation (4.6.2.1.1) for the steepness required by table 4.5.1 and different wave frequencies, to obtain, finally, the peak ϕ_{1r} of the roll response curve. The angle of roll to windward due to wave action ϕ_1 is calculated according to paragraph 4.1.

When PIT is used, at least two response curves obtained for two different wave steepness are strongly recommended to be used.

4.6.2.1 Modelling of roll motion in beam sea and determination of model parameters

4.6.2.1.1 *Recommended model in beam sea*

The following differential equation is recommended as a suitable model for describing roll behavior in regular beam sea:

$$\begin{cases} \ddot{\phi} + d(\dot{\phi}) + \omega_0^2 \cdot r(\phi) = \omega_0^2 \cdot \pi \cdot s \cdot \xi\left(\dfrac{\omega}{\omega_0}\right) \cdot \cos(\omega \cdot t) \\ d(\dot{\phi}) = 2\mu \cdot \dot{\phi} + \beta \cdot \dot{\phi}\left|\dot{\phi}\right| + \delta \cdot \dot{\phi}^3 \\ r(\phi) = \phi + \gamma_3 \cdot \phi^3 + \gamma_5 \cdot \phi^5 \\ \xi\left(\dfrac{\omega}{\omega_0}\right) = \alpha_0 + \alpha_1 \cdot \dfrac{\omega}{\omega_0} + \alpha_2 \cdot \left(\dfrac{\omega}{\omega_0}\right)^2 \end{cases} \qquad (4.6.2.1.1)$$

In the recommended model (4.6.2.1.1) the following parameters should, in principle, be considered as to be determined by the PIT: $\omega_0, \mu, \beta, \delta, \gamma_3, \gamma_5, \alpha_0, \alpha_1, \alpha_2$. However, in certain cases, some of these parameters can be considered as constant and/or equal to zero.

4.6.2.1.2 *Definition of* χ^2

4.6.2.1.2.1 From a series of experiments in beam waves according to paragraph 4.5.2 (apart from required wave steepness), a value of roll amplitude $C_{\exp,ij}$ is obtained for each tested wave frequency ω_i and steepness s_j. It is recommended to determine the roll response curve for at least two different value of the wave steepness and a set of frequencies, for each wave steepness, as in paragraph 4.5.2. Given a tentative set of parameters $\{\omega_0, \mu, \beta, \delta, \gamma_3, \gamma_5, \alpha_0, \alpha_1, \alpha_2\}$, the value of roll amplitude $C_{\mathrm{mod},ij}$ can be obtained (by numerical integration or analytical solution) as predicted by the model in equation (4.6.2.1.1) for each tested wave frequency ω_i and steepness s_j.

4.6.2.1.2.2 The following function is used as a measure of the goodness of fit for the model:

$$\chi^2\left(\{\omega_0, \mu, \beta, \delta, \gamma_3, \gamma_5, \alpha_0, \alpha_1, \alpha_2\}\right) = \sum_{i,j}\left(C_{\mathrm{mod},ij} - C_{\exp,ij}\right)^2 \qquad (4.6.2.1.2.2)$$

As can be seen from equation (4.6.2.1.2.2), χ^2 depends on the tentative values of the model parameters.

4.6.2.1.3 *Fitting of the model*

The scope of the PIT is to determine a set of "optimum" parameters $\{\omega_0, \mu, \beta, \delta, \gamma_3, \gamma_5, \alpha_0, \alpha_1, \alpha_2\}_{opt}$ such to minimize χ^2, that is:

$$\chi^2\left(\{\omega_0, \mu, \beta, \delta, \gamma_3, \gamma_5, \alpha_0, \alpha_1, \alpha_2\}_{opt}\right) = \min\left(\chi^2\right)$$

Any numerical or analytical minimization procedure can be used, to the satisfaction of the Administration.

4.6.2.1.4 *Calculation of roll response's peak* ϕ_{1r}

4.6.2.1.4.1 When the "optimum" set of parameters $\{\omega_0, \mu, \beta, \delta, \gamma_3, \gamma_5, \alpha_0, \alpha_1, \alpha_2\}_{opt}$ is determined by the minimization procedure, the response curve for the steepness required in table 4.5.1 can be obtained as follows.

4.6.2.1.4.2 Equation (4.6.2.1.1) is solved by means of standard numerical integration algorithms or analytical solution for different frequencies in order to obtain the roll response curve. The peak of such curve is ϕ_{1r}.

4.6.2.2 Additional comments

The framework of the methodology provided in paragraph 4.6.2.1 could be used, in principle, to obtain damping parameters from free roll decays or forced roll motion by means of roll moment generators (RMGs). Partially different modelling and/or definition of χ^2 could thus be needed and can be used to the satisfaction of the Administration.

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ANNEX 2

DRAFT AMENDMENTS TO ANNEX B TO THE PROTOCOL OF 1988 RELATING TO THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966

ANNEX B
ANNEXES TO THE CONVENTION AS MODIFIED BY THE PROTOCOL OF 1988 RELATING THERETO

ANNEX 1
REGULATIONS FOR DETERMINING LOAD LINES

CHAPTER II
CONDITIONS OF ASSIGNMENT OF FREEBOARD

Regulation 22 – Scuppers, inlets and discharges

1 In paragraph (4) of the regulation, the reference to "(2)" is replaced by reference to "(1)".

CHAPTER III
FREEBOARDS

Regulation 39 – Minimum bow height and reserve buoyancy

2 In paragraph (1) of the regulation, the words "dl is the draught at 85% of the depth D, in metres;" are replaced by the words "dl is the draught at 85% of the least moulded depth, in metres;".

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ANNEX 3

PROPOSED REVISED WORK PROGRAMME OF THE SUB-COMMITTEE AND PROVISIONAL AGENDA FOR SLF 49

PROPOSED REVISED WORK PROGRAMME OF THE SUB-COMMITTEE

		Target completion date/number of sessions needed for completion	Reference
1	Analysis of intact stability casualty records	Continuous	MSC 70/23, paragraph 20.4; SLF 30/18, paragraphs 4.16 and 4.17
2	**Analysis of damage cards**	Continuous	MSC 70/23, paragraph 20.4;
	.1 revision of the IMO damage card	2006	SLF 41/18, paragraph 17.5; MSC 78/26, paragraph 12.10; SLF 48/21, section 15
3	**Consideration of IACS unified interpretations**	Continuous	MSC 78/26, paragraph 22.12
H.1	**Development of Explanatory notes for harmonized SOLAS chapter II-1**	2006	MSC 69/22, paragraph 20.60.1; SLF 48/21, section 3
H.2	**Safety of small fishing vessels** (in co-operation with DE, COMSAR, FP, NAV and STW, as necessary)	2009	MSC 79/23, paragraphs 11.15 and 20.32 SLF 48/21, section 16
~~H.3~~	~~**Safety aspects of ballast water management**~~	~~2005~~	~~MSC 71/23, paragraph 9.11; SLF 47/17, paragraph 16.3~~
~~H. 4~~ H. 3	**Passenger ship safety**	2006	MSC 74/24, paragraph 21.4; SLF 48/21, section 6;
~~H. 5~~ H. 4	**Revision of the Intact Stability Code**	2007	SLF 41/18, paragraph 3.14; SLF 48/21, section 4
~~H.6~~	~~**Review of the LHNS and OSV Guidelines** (in co-operation with BLG, DSC, COMSAR, DE and NAV)~~	~~2005~~	~~MSC 75/24, paragraph 22.4; SLF 47/17, section 7; MSC 78/26,paragraph 12.5~~

Notes: 1 "H" means a high priority item and "L" means a low priority item. However, within the high and low priority groups, items have not been listed in any order of priority.
2 Struck-out text indicates proposed deletions and the shaded text shows proposed additions or changes.
3 Items printed in bold letters have been selected for inclusion in the provisional agenda for SLF 49.

		Target completion date/number of sessions needed for completion	Reference
~~H.7~~	~~**Review of the 2000 HSC Code and amendments to the DSC Code and the 1994 HSC Code** (co-ordinated by DE)~~	~~2005~~	~~MSC 76/23, paragraphs 8.19 and 20.4;~~ ~~SLF 47/17, section 13~~
~~H.8~~	~~**Revision of technical regulations of the 1966 LL Convention**~~	~~2005~~	~~MSC 76/23, paragraph 20.51;~~ ~~SLF 47/17, section 11~~
~~H.9~~ H. 5	**Review of the SPS Code** (co-ordinated by DE)	2006	MSC 78/26, paragraph 24.9; SLF 48/21, section 13
L.1	**Harmonization of damage stability provisions in other IMO instruments, including the 1993 Torremolinos Protocol (probabilistic method)**	~~2005~~2006	MSC 62/25, paragraph 21.23; SLF 48/18, section 7
L. 2	**Revision of resolution A.266(VIII)**	2006	SLF 45/14, paragraphs 3.19 and 11.1.4.1; MSC 76/23, paragraph 20.50; SLF 48/21, paragraph 11
L. 3	**Tonnage measurement of open-top containerships**	2006	MSC 78/26, paragraph 24.50; SLF 48/21, paragraph 12
L. 4	**Revision of MSC/Circ.650**	2006	SLF 48/21, section 17

DRAFT PROVISIONAL AGENDA FOR SLF 49*

	Opening of the session
1	Adoption of the agenda
2	Decisions of other IMO bodies
3	Development of explanatory notes for harmonized SOLAS chapter II-1
4	Passenger ship safety
5	Revision of the Intact Stability Code
6	Safety of small fishing vessels
7	Harmonization of damage stability provisions in other IMO instruments
8	Consideration of IACS unified interpretations
9	Revision of resolution A.266(VIII)
10	Tonnage measurement of open-top containerships
11	Review of the SPS Code
12	Analysis of damage cards: revision of the IMO damage card
13	Revision of MSC/Circ.650
14	Work programme and agenda for SLF 50
15	Election of Chairman and Vice-Chairman for 2007
16	Any other business
17	Report to the Maritime Safety Committee

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* Agenda item numbers do not necessarily indicate priority.