



SUB-COMMITTEE ON DANGEROUS
GOODS, SOLID CARGOES AND
CONTAINERS
15th session
Agenda item 18

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REPORT TO THE MARITIME SAFETY COMMITTEE

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1 GENERAL

Introduction

1.1 The Sub-Committee held its fifteenth session from 13 to 17 September 2010 under the chairmanship of Mrs. Olga Lefèvre Pestel (France). The Vice-Chairman, Mr. Arsenio A. Domínguez (Panama), was also present.

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

ALGERIA	LIBERIA
ANGOLA	LIBYAN ARAB JAMAHIRIYA
ARGENTINA	MALTA
AUSTRALIA	MARSHALL ISLANDS
BAHAMAS	MEXICO
BANGLADESH	MOROCCO
BELGIUM	NETHERLANDS
BOLIVIA (PLURINATIONAL STATE OF)	NEW ZEALAND
BRAZIL	NIGERIA
CANADA	NORWAY
CHILE	PANAMA
CHINA	PERU
COOK ISLANDS	PHILIPPINES
CUBA	POLAND
CYPRUS	REPUBLIC OF KOREA
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	ROMANIA
DENMARK	RUSSIAN FEDERATION
ECUADOR	SAUDI ARABIA
EGYPT	SINGAPORE
ESTONIA	SOUTH AFRICA
FINLAND	SPAIN
FRANCE	SWEDEN
GERMANY	SWITZERLAND
GREECE	TRINIDAD AND TOBAGO
IRAN (ISLAMIC REPUBLIC OF)	TURKEY
ISRAEL	TUVALU
ITALY	UKRAINE
JAPAN	UNITED KINGDOM
KIRIBATI	UNITED STATES
LATVIA	VANUATU
	VENEZUELA (BOLIVARIAN REPUBLIC OF)

and the following Associate Member of IMO:

HONG KONG, CHINA

1.3 The session was also attended by observers from the following intergovernmental organizations:

MARITIME ORGANIZATION FOR WEST AND CENTRAL AFRICA (MOWCA)
MARINE ACCIDENT INVESTIGATORS' INTERNATIONAL FORUM (MAIIF)

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

INTERNATIONAL CHAMBER OF SHIPPING (ICS)
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)
BIMCO
INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)
ICHCA INTERNATIONAL (ICHCA)
EUROPEAN CHEMICAL INDUSTRY COUNCIL (CEFIC)
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)
INSTITUTE OF INTERNATIONAL CONTAINER LESSORS (IICL)
INTERNATIONAL FEDERATION OF SHIPMASTERS' ASSOCIATIONS (IFSMA)
INTERNATIONAL ASSOCIATION OF INDEPENDENT TANKER OWNERS
(INTERTANKO)
THE INTERNATIONAL TANKER OWNERS POLLUTION FEDERATION LTD (ITOPF)
DANGEROUS GOODS ADVISORY COUNCIL (DGAC)
INTERNATIONAL ASSOCIATION OF DRY CARGO SHIPOWNERS
(INTERCARGO)
INSTITUTE OF MARINE ENGINEERING, SCIENCE AND TECHNOLOGY
(IMarEST)
INTERNATIONAL PARCEL TANKERS ASSOCIATION (IPTA)
THE INTERNATIONAL MARINE CONTRACTORS ASSOCIATION (IMCA)
WORLD NUCLEAR TRANSPORT INSTITUTE (WNTI)
INTERNATIONAL HARBOUR MASTERS' ASSOCIATION (IHMA)
INTERNATIONAL BULK TERMINALS ASSOCIATION (IBTA)
INTERNATIONAL VESSEL OPERATORS DANGEROUS GOODS ASSOCIATION
(IVODGA)
INTERNATIONAL TRANSPORT WORKERS' FEDERATION (ITF)
HOT BRIQUETTED IRON ASSOCIATION (HBIA)
WORLD SHIPPING COUNCIL (WSC)
THE NAUTICAL INSTITUTE (NI)

Secretary-General's opening address

1.5 The Secretary-General welcomed participants and delivered his opening address, the full text of which is reproduced in document DSC 15/INF.11.

Chairman's remarks

1.6 The Chairman, in thanking the Secretary-General, stated that the Secretary-General's words of encouragement as well as his advice and requests would be given every consideration and taken into account under relevant agenda items and that his helpful guidance on the subjects to be considered by the Sub-Committee was very much appreciated, in particular concerning the further work on the amendments to the International Maritime Dangerous Goods Code, the amendments to the International Maritime Solid Bulk Cargoes Code and the ongoing work on the dangers of entering enclosed spaces aboard ships.

Adoption of the agenda and related matters

1.7 The Sub-Committee adopted the agenda for the fifteenth session (DSC 15/1/Rev.1) and agreed to be guided in its work, in general, by the annotations contained in document DSC 15/1/1. The agenda, as adopted, with the list of documents considered under each agenda item, is set out in document DSC 15/INF.12.

2 DECISIONS OF OTHER IMO BODIES

General

2.1 The Sub-Committee noted the decisions and comments pertaining to its work made by STW 41, SLF 52, BLG 14, COMSAR 14, MEPC 60, FP 54, MSC 87 and FSI 18, as reported in documents DSC 15/2 and DSC 15/2/1, and took them into account in its deliberations when dealing with relevant agenda items.

Outcome of the twenty-sixth session of the Assembly

2.2 The Sub-Committee noted that the twenty-sixth session of the Assembly had adopted the Strategic Plan for the Organization (for the six-year period 2010 to 2015) (resolution A.1011(26)), the High-level Action Plan of the Organization and priorities for the 2010-2011 biennium (resolution A.1012(26)) and the Guidelines on the application of the Strategic Plan and the High-level Action Plan of the Organization (resolution A.1013(26)) and decided to consider the consequential changes the above resolutions will have on the agenda management procedures and the work programme of the Sub-Committee under agenda item 14 (Work programme and provisional agenda for DSC 16).

Guidance for coastal States on maritime emergency involving radioactive materials

2.3 In considering the outcome of MSC 87, the Sub-Committee noted that the Committee, having considered an invitation from the IAEA for the IMO Secretariat to collaborate in the preparation of guidance for coastal States on how to respond to a maritime emergency involving radioactive materials (MSC 87/24/12), agreed that the Secretariat should participate in the next IAEA meeting to be held on this matter and requested the Secretariat to prepare a document, for consideration at MSC 88, on the latest developments and provide recommendations on how best to proceed.

Outcome of C 104

2.4 The Committee noted the decisions of C 104 concerning the conduct of IMO meetings with a view to increasing efficiency and effectiveness while also reducing the burden of work.

3 AMENDMENTS TO THE IMDG CODE AND SUPPLEMENTS, INCLUDING HARMONIZATION OF THE IMDG CODE WITH THE UN RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS

General

3.1 The Sub-Committee recalled that DSC 14, having considered the report of the thirteenth session of the Editorial and Technical Group (DSC 14/3), decided to establish a correspondence group to develop a draft revised text of the stowage and segregation provisions of chapters 7.1 and 7.2 of the IMDG Code and prepare consequential changes to the IMDG Code (amendment 35-10), as appropriate.

3.2 The Sub-Committee also recalled that DSC 14 had requested the Secretariat to inform the UN Sub-Committee of Experts on the Transport of Dangerous Goods (TDG Sub-Committee) of relevant issues and to report to DSC 15 the outcome of their consideration of those issues.

3.3 The Sub-Committee noted that the Editorial and Technical (E&T) Group had met, at its fourteenth session, from 28 September to 2 October 2009 to finalize the text of draft amendment 35-10 to the IMDG Code, which was adopted at MSC 87 by resolution MSC.294(87) and is expected to enter into force on 1 January 2012, with a voluntary application date from 1 January 2011.

3.4 The Sub-Committee also noted that the errata and corrigenda for amendment 34-08 to the IMDG Code had been issued and, in this regard, noted that MSC 87 had decided that future editorial corrections to the IMDG Code and amendments thereto should be affected by means of a *note verbale* issued before the entry into force of the amendments to the Code.

3.5 The Sub-Committee further noted that MSC 87 had agreed that the Code would be amended every two years; every four years the amendment would be a consolidated text of the Code, replacing its earlier version and incorporating the relevant amendments adopted or approved by that time; and, in this regard, noted that amendment 36-12 would be the first amendment to follow this approach.

Report of the Editorial and Technical Group

3.6 The Sub-Committee considered the report of the Editorial and Technical (E&T) Group (DSC 15/3) together with document DSC 15/3/20 and, having approved it in general and noted that many of the actions requested had been resolved with the adoption of amendment 35-10 to the IMDG Code, took action as indicated in paragraphs 3.7 to 3.25.

Simplification of the Preamble of the Code

3.7 The Sub-Committee, having agreed to the group's recommendation to update and simplify the Preamble of the Code, requested the Secretariat to prepare a revised draft Preamble for review by the E&T Group at its next session so that it might be incorporated into amendment 36-12.

Mixtures or solutions

3.8 The Sub-Committee was advised that the group, as instructed by DSC 14, had added the words "meeting the classification criteria of this Code" after the words "a mixture or solution" in paragraphs 2.0.2.10 and 3.1.3.4, in amendment 35-10, and noted that the above words had also been added to paragraphs 2.0.2.5 and to 3.1.3.2, and that the last sentence of paragraph 2.0.2.5 had also been added to paragraph 3.1.3.2, in amendment 35-10.

3.9 In this regard, the Sub-Committee, having noted that the group had also invited the TDG Sub-Committee to note the aforementioned view, was advised that it had adopted the proposed additional text in the amendments to the sixteenth revised edition of the UN Recommendations on the Transport of Dangerous Goods (UN Recommendations), as highlighted in annex 1 to document DSC 15/3/20, with the exception of the addition of the last sentence of paragraph 2.0.2.5 to paragraph 3.1.3.2. The Sub-Committee instructed the E&T Group to take the above information into account when preparing amendment 36-12.

UN 1471

3.10 The Sub-Committee noted that the group, when preparing the new entry against UN 1471 for PG III, had aligned the existing proper shipping name against the entry for UN 1471 PG II in the IMDG Code, in amendment 34-08, with that in the UN Recommendations for inclusion in amendment 35-10 and invited the TDG Sub-Committee to decide if it was appropriate to add "DRY with more than 39% available chlorine (8.8% available oxygen)" after

"MIXTURE". In this regard, the Sub-Committee noted that the TDG Sub-Committee had decided that there is no need to modify the proper shipping name in the UN Recommendations, as highlighted in annex 1 to document DSC 15/3/20.

Special Provision 964

3.11 The Sub-Committee noted that the group had assigned the new Special Provision (SP) 964 to UN 1486, UN 1498 and UN 1499 in amendment 35-10, as instructed by DSC 14, and was advised that discussions on this issue had been initiated at the UN level (i.e. the TDG and GHS Sub-Committees).

3.12 The Sub-Committee had the following documents for consideration on matters related to SP 964:

- .1 DSC 15/3/2 (Norway), expressing the view that the note to paragraph 2.5.2 of the IMDG Code be considered in the assessment process leading to a possible declassification of certain forms of UN 1486, UN 1498 and UN 1499 and proposing minor amendments to the text of SP 964, for inclusion in amendment 36-12;
- .2 DSC 15/3/10 (Netherlands), proposing to delete SP 964 for the nitrates shipped under UN 1486, UN 1498 and UN 1499 and, if agreed, to decide on the classification of potassium nitrate, sodium nitrate and mixtures thereof; and
- .3 DSC 15/3/19 and DSC 15/INF.9 (Chile), commenting on document DSC 15/3/10, in particular, proposing to retain SP 964, as contained in amendment 35-10 of the IMDG Code.

3.13 In considering the above documents, the Sub-Committee noted the outcome of the thirty-seventh session of the TDG Sub-Committee on matters related to SP 964, as set out in annex 2 to document DSC 15/3/20. In particular, the Sub-Committee noted that, at the nineteenth session of the Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals (GHS Sub-Committee), there was general support for entrusting the work on the improvement of Test 0.1 to the TDG Sub-Committee. To this end, the GHS Sub-Committee, at its nineteen session, agreed that a specific item should be included on its programme of work for the next biennium. The GHS Sub-Committee also agreed that the TDG Sub-Committee should address the question of interpretation of the concept of "known experience" and that an item on this issue should be included in the programme of work of the GHS Sub-Committee for the next biennium (DSC 15/3/20, annex 4).

3.14 The Sub-Committee, after an extensive debate on the issue, recalling the discussions which took place at DSC 14 and noting, in particular, that amendment 35-10, incorporating SP 964, had been adopted by MSC 87 and that no proposals for amending SP 964 had been submitted to that session of the Committee, decided to retain SP 964 in its present form. Furthermore, the Sub-Committee agreed to revisit the issue at a subsequent session when the outcome of the TDG Sub-Committee would be available, taking into account the principle of harmonization with other modes of transport.

Special Provision 274

3.15 The Sub-Committee noted that the group had inserted SP 274 in column 6 of the dangerous goods list against the entry for UN 1707, in amendment 35-10, in order to be

consistent with the criteria for assigning SP 274 to class 6.1 n.o.s. entries and had informed the TDG Sub-Committee accordingly. In this regard, the Sub-Committee was advised that the TDG Sub-Committee, at its thirty-seventh session, decided to include SP 274 in column 6 of UN 1707.

Transport of coolant/condition units

3.16 The Sub-Committee, having agreed with the group that the text in column 17 of the entry against UN 1977 could benefit from improvement, noted the outcome of the discussions of the TDG Sub-Committee, in particular on coolant/conditioning units (DSC 15/3/20, annex 3), and instructed the E&T Group to consider, in the context of amendment 36-12, this issue in relation to the amendments that are envisaged to be adopted by the TDG and GHS Sub-Committees in December 2010.

UN 3485, UN 3486 and UN 3487

3.17 The Sub-Committee, having noted the decision of the group not to assign LP02 to UN 3486, PG III, in amendment 35-10 in order to be consistent with the assignment of packing instruction to UN 2208 in the IMDG Code, noted that the TDG Sub-Committee had been invited to take into account the analysis of the group regarding special packing provision B13 in the UN Recommendations. In this regard, the Sub-Committee was advised that the TDG Sub-Committee, at its thirty-sixth session, had assigned L3 to UN 2208 and UN 3486, mentioning that large packagings are not authorized for those two UN numbers when transported by sea, and that the appropriate corrections had been made to special packing provision B13.

Nickel-metal hydride batteries

3.18 Having noted the decision of the group to assign a new SP 963 to UN 3496, (nickel-metal hydride batteries) in amendment 35-10 and that the TDG Sub-Committee had been informed accordingly, the Sub-Committee considered document DSC 15/3/11 (Japan), proposing that Nickel-metal hydride cells or batteries not be subject to the provisions of this Code if they will not cause ignition or an explosion when the required number of packages, in the condition and form in which they are offered for transport, are maintained at a temperature of not less than $85^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for a period of 48 hours, and invited Japan to submit a revised proposal for consideration at a future session of the Sub-Committee, including information on test protocols, means to differentiate tested batteries from those which have not been tested and information relevant to the self-discharge characteristics.

Assignment of packing provisions

3.19 The Sub-Committee noted the opinion of the group to defer the consideration of assignment of PP 85 and requested the E&T Group to further consider the matter and advise DSC 16 accordingly (DSC 15/3, paragraph 3.15).

Orientation arrows

3.20 Having noted the view of the group that the provisions in paragraphs 5.2.1.7.1(a) to (f) could benefit from improvements as it is unclear from the existing text whether the orientation arrows are not required on outer packagings or not required on the packages containing the outer packagings, the Sub-Committee was advised that the TDG Sub-Committee had decided to amend paragraph 5.2.1.7.2 of the UN Recommendations (DSC 15/3/20, annex 1). In this regard, the Sub-Committee requested the E&T Group to take the new paragraph 5.2.1.7.2 into account when preparing amendment 36-12.

IMDG Code Index

3.21 The Sub-Committee, noting the group's recommendation that the Secretariat should update the Index in the IMDG database in the context of amendment 35-10 and prepare an initial list of amendments to the Index based on the remarks received during the last session of the group, was advised that the Index in the IMDG database had been updated in the context of amendment 35-10 and is included in document DSC 15/INF.4/Add.3 (Secretariat). In this regard, the Sub-Committee also noted that an initial list of amendments to the Index, based on the remarks received after the last session of the group with a view to inclusion in amendment 36-12, is also contained in document DSC 15/INF.10 (Secretariat) and instructed the E&T Group to take into account the above amendments to the Index when preparing amendment 36-12.

Amendments to MARPOL Annex III

3.22 The Sub-Committee, having noted the action taken by the group on harmonizing the text of paragraph 2.9.3 with that of the UN Recommendations (16th revised edition) for incorporation in amendment 36-12, requested the E&T Group to add the proposed text to the aforementioned amendment, pending adoption by MEPC 61 of the revised MARPOL Annex III (DSC 15/3, paragraphs 5.1, 5.2 and annex 5).

Amendments to paragraphs 5.4.3 and 5.4.4 to the IMDG Code

3.23 The Sub-Committee noted that the group had considered the proposal in document DSC 14/3, on the provisions in paragraph 5.4.3 concerning the documentation required on board the ship and in paragraph 5.4.4 on other required information and documentation, and had prepared draft amendments to paragraph 5.4.3 to clarify the intent of the provisions, for further consideration by DSC 15, as set out in annex 6 to document DSC 15/3. In considering matters related to paragraph 5.4.4, the Sub-Committee, having endorsed the group's view that the provisions in paragraph 5.4.4 are clear and that no modifications are necessary, requested the E&T Group to finalize the draft amendments, set out in annex 6 to document DSC 15/3, for consideration at DSC 16.

Provisions which prohibit transport of certain substances by sea (SP 900)

3.24 Having noted the progress made by the group on amending column 17 of the dangerous goods list regarding substances subject to SP 900 which are prohibited for transport by sea, the Sub-Committee instructed the E&T Group to finalize the draft amendments, set out in annex 7 to document DSC 15/3, with the view to improving clarity and user-friendliness of the provisions that prohibit transport of certain substances by sea, so that the appropriate amendments could be incorporated into amendment 36-12.

Guidelines for packing of cargo transport units

3.25 The Sub-Committee decided to deal with matters relating to the IMO/ILO/UNECE Guidelines for packing of cargo transport units under agenda item 9 (Review of the Guidelines for packing of cargo transport units).

Harmonization of future versions of the IMDG Code

3.26 The Sub-Committee considered document DSC 15/3/18 (Secretariat), on the harmonization of future versions of the IMDG Code, and noted that the Secretariat had analysed the best manner to establish a feedback mechanism on a website so that users

could report cases of disparities of an editorial nature in order to ensure that future versions of the IMDG Code are fully harmonized.

3.27 Having appreciated the initiative undertaken by the Secretariat, the Sub-Committee endorsed the proposal to create an IMDG Code Module in the Global Integrated Shipping Information System (GISIS) and noted that the new GISIS Module is tentatively expected to be live by the end of November 2010. The link for the website will be included in the "Foreword" of the published version of the IMDG Code incorporating amendment 35-10, which is expected to be ready as a sales item during the same month. The Sub-Committee noted the brief description of the initial features of the IMDG Code Module in GISIS, as set out in the annex to document DSC 15/3/18.

3.28 Member States and international organizations were invited to submit comments and proposals on the features of the new IMDG Code GISIS module to the next session of the E&T Group, so that changes and/or additions to the new GISIS Module could be considered. In addition, the Secretariat was requested to prepare a presentation on the new GISIS Module for the next session of the E&T Group.

Report of the correspondence group

3.29 The Sub-Committee considered the report of the Correspondence Group on Revision of the Stowage and Segregation Provisions of chapters 7.1 and 7.2 of the IMDG Code (DSC 15/3/8, DSC 15/3/9 and DSC 15/INF.7) together with document DSC 15/3/16 (Belgium), containing comments on the draft revised text of chapters 7.1 and 7.2, and, having approved the report in general and agreed, in principle, to the actions requested, the Sub-Committee took the following actions:

- .1 in respect of the draft Conversion table, instructed the E&T Group to consider the most appropriate means to disseminate the table and to highlight the changes to the chapters once these had been finalized;
- .2 with regard to stowage of goods of class 1, except division 1.4, from living quarters and life-saving appliances, agreed that a distance of 12 metres shall apply;
- .3 decided to delete any provision on the feasibility to jettison cargo transport units on ships, as this is not practical on modern ships;
- .4 concurred with the decision that a flow chart and examples of the segregation process should be included as non-mandatory text as it would facilitate the understanding of associated provisions and training of personnel;
- .5 decided to use the term "Consigning operations" in the title of chapter 7.3;
- .6 with regard to the square brackets in paragraphs 7.3.8.6.2 and 7.3.8.6.3, instructed the E&T Group to consider the above provisions and advise the Sub-Committee accordingly;
- .7 regarding the inclusion of the text in the Guidelines for partially weathertight hatchway covers on board containerships (MSC/Circ.1087), instructed the E&T Group to consider the appropriateness of incorporating it into chapter 7.5 and advise the Sub-Committee accordingly;

- .8 decided to delete the illustrations of segregation of cargo transport units on board container ships and roll-on/roll-off ships and instructed the E&T Group to finalize the draft MSC circular set out in annex 1 to document DSC 15/3/9, for approval by DSC 16;
- .9 agreed that work should continue on the draft guiding principles (DSC 15/INF.7) and invited interested delegations to submit associated proposals for consideration at DSC 16; and
- .10 instructed the E&T Group to prepare a finalized version of Part 7 on the basis of documents DSC 15/3/8, DSC 15/3/9 and DSC 15/3/16 and prepare consequential amendments to other Parts of the Code, as appropriate (see also paragraph 3.31).

Establishment of a drafting group

3.30 The Sub-Committee established the Drafting Group on Revision of the Stowage and Segregation Provisions of chapters 7.1 and 7.2 of the IMDG Code and instructed the group, taking into account the comments made in plenary and decisions taken by the Sub-Committee, using document DSC 15/3/8 as the basic document, to further consider editorial matters and submit a revised version of Part 7 to the E&T Group for finalization with the view to consideration by DSC 16 for incorporation in amendment 36-12.

Report of the drafting group

3.31 Having received the report of the drafting group (DSC 15/WP.6), the Sub-Committee approved it in general and noted the intention of the United Kingdom to submit the revised version of Part 7 containing the editorial changes to the text agreed by the drafting group, to take the next session of the E&T Group.

Amendment 36-12 to the IMDG Code

3.32 In considering matters related to amendment 36-12 to the IMDG Code, the Sub-Committee noted that the Secretariat had prepared the text of the IMDG Code, based on resolution MSC.122(75), as amended by resolutions MSC.157(78), MSC.205(81), MSC.262(84) and MSC.294(87), as set out in document DSC 15/INF.4 and its addenda, in order to facilitate the preparation of amendment 36-12.

Isodecyl Diphenyl Phosphate

3.33 The Sub-Committee considered the proposal by Belgium (DSC 15/3/1) on declassifying Isodecyl Diphenyl Phosphate as a marine pollutant and, having noted that the proposal needed to be substantiated with a corresponding justification, invited the delegation of Belgium to provide scientific data to justify its proposal for consideration at the next session of the E&T Group with the view to advising the Sub-Committee accordingly.

New special provision for the transport of substances UN 2211 and UN 3314

3.34 In considering document DSC 15/3/3 (Germany), proposing to assign a new special provision for the transport of substances UN 2211 and UN 3314, taking into account that a release of flammable vapours will lead to a rise in pressure which can damage the container, and having noted that the safety concerns are not only related to pressure, but also to flammability, the Sub-Committee agreed, in principle, with the proposal and forwarded it to the E&T Group for further consideration and incorporation in amendment 36-12.

The Sub-Committee invited interested delegations and observers to submit proposals on the issue to the next meeting of the E&T Group in order to facilitate the finalization of the special provision, with special emphasis on the need to clarify the use of the term "ventilated", and provisions relating to the marking of cargo transport units carrying the above substances.

Bulk container instructions for UN 1402, UN 1395, UN 1446, UN 1469, UN 2211 and UN 3314

3.35 Having considered document DSC 15/3/4 (Germany), proposing amendments to the bulk container instructions for UN 1402, UN 1395, UN 1446, UN 1469, UN 2211 and UN 3314, in order to harmonize them with the relevant provisions of UN Model Regulations, supporting the concept of revising the assignment of BK 2 to certain UN numbers, the Sub-Committee decided to refer the proposal to the E&T Group for further consideration and, noting the multimodal dimension of the proposed amendments, invited the delegation of Germany to submit a similar proposal to the TDG Sub-Committee for consideration and action, as appropriate.

Minimum safety requirements for the design, installation and use of security devices

3.36 In considering document DSC 15/3/5 (Germany), proposing minimum safety requirements for the design, installation and use of security devices that may have an active power source when attached to cargo transport units, taking into account that such devices may be carried in cargo spaces together with dangerous goods, the Sub-Committee requested the Secretariat to bring the issue to the attention to ISO/TC 104 with the view to requiring RFID devices to be constructed according to a certified-safe type. Furthermore, the Sub-Committee, noting that RFID devices attached to cargo transport units do not fall under the scope of the IMDG Code as these are not transported as cargoes and that RFID devices are not only installed on cargo transport units carrying dangerous goods but on cargo transport units carrying other cargoes as well, agreed that the proposal needed consideration in a wider context. Therefore, the Sub-Committee could not agree on the need for associated amendments to the IMDG Code, as proposed by the delegation of Germany.

Definition for semi-trailers

3.37 The Sub-Committee considered document DSC 15/3/6 (Germany), proposing a definition for semi-trailers in order to clarify placarding requirements, and, having agreed that the highlighted issue could benefit from clarification, forwarded the proposal to the E&T Group for finalization, taking into account definitions which may be found in relevant instruments of other UN bodies. Furthermore, the Sub-Committee instructed the E&T Group to verify the application of placarding requirements to other types of trailers when considering the above proposal.

Deletion of Special Provision 924

3.38 In considering document DSC 15/3/7 (Germany), proposing to delete SP 924 in the entries against UN 3314 and UN 3319, the Sub-Committee, having noted that the text of the provision is already included in SP 272, decided to delete SP 924 and instructed the E&T Group to verify that SP 924 is not assigned to any other UN number(s) and to take the above decision into account when preparing amendment 36-12.

Cargo Transport units containing dangerous goods

3.39 The Sub-Committee considered document DSC 15/3/12 (Belgium), proposing to clarify provisions on the placarding of cargo transport units containing dangerous goods in

limited quantities, and agreed that those provisions could benefit from improvement. The Sub-Committee, therefore, agreed, in principle, to the proposal and instructed the E&T Group to finalize the proposal and incorporate it in amendment 36-12, taking into account the fact that not all dangerous goods require placarding and that the provisions related to the placarding of cargo transport units containing dangerous goods in limited quantities only, also needs to be clarified where appropriate.

Stowage of dangerous goods in relation to foodstuff

3.40 In considering document DSC 15/3/13 (Germany), proposing revised provisions for the stowage of dangerous goods in relation to foodstuff, which is based on a human health risk assessment, the Sub-Committee agreed, in principle, to the proposal and instructed the E&T Group to finalize the proposal and incorporate it in amendment 36-12, taking into account that it will be subsequently incorporated in the revised Part 7. The Sub-Committee instructed the E&T Group to also take into account the view of the Sub-Committee that any reference to competent authority approvals should be avoided when finalizing the text.

Amendments to proper shipping name for UN 1263

3.41 The Sub-Committee considered document DSC 15/3/15 (Republic of Korea), proposing amendments to the proper shipping name for UN 1263 in order to facilitate the preparation of documents and markings on packaging containing paint and paint related material, and agreed that the solution to the concern raised in the above document could be in using only "Paint Related Material" as the proper shipping name.

Instructions to the Editorial and Technical Group

3.42 Having considered the above proposals, the Sub-Committee instructed the E&T Group to further consider the above documents, taking into account the comments and decisions made in plenary, particularly when preparing amendment 36-12 and to advise DSC 16 accordingly.

Amendments to the MFAG Guide

3.43 In considering documents DSC 15/3/14 (Germany) and DSC 15/3/17 (INTERTANKO), regarding the provisions related to the carriage of antidotes in the MFAG Guide, the Sub-Committee, noting that the guide was completely revised in 1998 and that, until DSC 13, no concerns had been raised on the absence of antidotes on board ships, agreed with the proposal by Germany, which was supported by other delegations, not to review, at this stage, the current approach to the carriage of antidotes in the revised MFAG Guide. In this regard, the Sub-Committee invited INTERTANKO to submit information on recent incidents and operational exposure cases on board ships for consideration at DSC 16.

Other Matters

Revision of Model Course 1.10

3.44 The Sub-Committee agreed with the view of the delegation of Sweden that IMO Model Course 1.10 (Dangerous, hazardous and harmful cargoes) required updating every two years, in line with the amendment cycle of the IMDG Code, as it is the only official IMO Course on the training of the IMDG Code. In this context, the Sub-Committee also agreed that the updating of the Model Course was particularly important in light of the mandatory training provisions for shore side personnel, which had taken effect from 1 January 2010. In this regard, the delegation of Sweden highlighted that the Model Course is a very good

tool for training purposes and should be complemented by a power point presentation, which had often been recommended in the reports submitted to the Organization by Swedish Consultants on technical co-operation missions.

3.45 The Sub-Committee requested the Secretariat to take appropriate action and to inform DSC 16 on the progress made in this matter.

Translation of the IMDG Code into Russian Language

3.46 The Sub-Committee noted the intervention by the delegation of the Russian Federation regarding its request for an official translation of the IMDG Code into the Russian language. In this regard, the Sub-Committee advised the delegation of the Russian Federation to consider submitting a proposal, regarding the above, to the Committee for appropriate action.

Terms of reference of the E&T Group

3.47 The Sub-Committee, having considered the submissions under this agenda item, instructed the E&T Group, taking into account the comments and decisions made at DSC 15, to prepare the draft text of amendment 36-12 to the IMDG Code, based on the text, set out in the annex to documents DSC 15/INF.4, DSC 15/INF.4/Add.1, DSC 15/INF.4/Add.2 and DSC 15/INF.4/Add.3, taking into account the documents submitted to the session and the amendments to the sixteenth revised edition to the UN Recommendations; and submit a report to DSC 16.

Dates for the next session of the E&T Group

3.48 The Sub-Committee, having noted that the fifteenth session of the E&T Group is tentatively scheduled to take place from 11 to 15 April 2011, invited MSC 88 to extend the session by three days in order to finalize the work related to chapter 7 of the IMDG Code so that it could be included in draft amendment 36-12, in time for consideration by DSC 16.

3.49 In this context, the Sub-Committee noted the intervention of the delegation of the Bahamas that they could not support the above request for three additional days since it will place an added burden on both the Secretariat and Member Governments and goes against the spirit of the recommendation of C 104 (C 104/D, paragraph 3.3 (xi)) on the need to reduce the duration and frequency of meetings (see also paragraph 2.4).

4 AMENDMENTS TO THE IMSBC CODE, INCLUDING EVALUATION OF PROPERTIES OF SOLID BULK CARGOES

General

4.1 The Sub-Committee recalled that MSC 86, having approved the procedure for the adoption of the future amendments to the IMSBC Code, agreed the next amendment to the IMSBC Code should be finalized at DSC 15 and submitted to MSC 89 for adoption, with a view to the new amendments coming into force on 1 January 2012 on a voluntary basis, and from 1 January 2013 on a mandatory basis.

4.2 The Sub-Committee also recalled that FSI 18, having noted the industry's concerns regarding the absence of a survey and certification scheme within the IMSBC Code, agreed to postpone further consideration of the aforementioned issue pending the relevant outcome of DSC 15 (DSC 15/2/1, paragraphs 2 to 4).

Report of the working group established at DSC 14

4.3 The Sub-Committee, having considered the report of the working group established at DSC 14 (DSC 15/4), approved it in general and took action as outlined in paragraphs 4.4 to 4.11.

Transport of Granular Ferrous Sulphate Monohydrate in bulk

4.4 The Sub-Committee noted the group's view that more information is needed before the decision regarding the inclusion of Granular Ferrous Sulphate Monohydrate in Group C could be taken and its invitation to the delegation of Finland to provide more information, including a draft new schedule, for consideration at DSC 15.

4.5 In this context, the Sub-Committee considered documents DSC 15/4/6, DSC 15/4/6/Corr.1 and DSC 15/4/7 (United Kingdom), proposing the inclusion of new schedules in Group C of the IMSBC Code for Granular Ferrous Sulphate and Ferrous Sulphate Heptahydrate, and agreed, in principle, with the above proposal and referred the documents to the working group to be established for further consideration (refer to paragraph 4.24). In this context, the Sub-Committee instructed the working group, when finalizing the schedules on Granular Ferrous Sulphate and Ferrous Sulphate Heptahydrate, to take into account the toxic and physical properties of the materials and their potential for reaction with oxidizing agents. In addition, the group was instructed to establish whether the materials fall under Group B or Group C.

Carriage of Ammonium Nitrate Based Fertilizer

4.6 The Sub-Committee concurred with the group's view that, in the context of provisions regarding carriage of Ammonium Nitrate Based Fertilizer, there is no need for additional provisions regarding the approval by a competent authority of equivalent arrangements to A-60 standards as such provisions are already contained in SOLAS chapter II-2.

Draft amendments to the IMSBC Code

4.7 The Sub-Committee agreed, in principle, to the draft amendments to the IMSBC Code (herewith called "amendment 01-11"), as prepared by the group (DSC 15/4, annex 1), subject to the further work to be undertaken by the working group on the basis of decisions taken and instructions given by the Sub-Committee.

4.8 In this regard, the Sub-Committee instructed the working group to continue the consideration of observations and consequential amendments to the IMSBC Code, prepared on the basis of amendments to schedules concerning Ammonium Nitrate and Ammonium Nitrate Based Fertilizers, with the view to incorporating them in draft amendment 01-11.

Inclusion of survey and certification provisions in the IMSBC Code

4.9 Having noted the group's invitation to IACS to submit proposals on the development of provisions for the IMSBC Code for a common survey and certification regime, for consideration at DSC 15, taking into account that the Code will become mandatory on 1 January 2011, the Sub-Committee noted that FSI 18, having reaffirmed its view that PSC inspections can only be carried out on the basis of existing certification requirements, did not support the development of a mandatory certification regime and agreed to postpone further consideration of this issue to take into account any relevant outcome of DSC 15.

4.10 In considering the matter, the Sub-Committee had mixed views on the need for incorporating a new regime on survey and certification in the IMSBC Code. Some delegations supported the development of a new regime, while others expressed the view that the need for such a regime should be considered based on the existing relevant provisions in SOLAS regulation II-2/19, which could be extended to include materials hazardous only in bulk, subject to the provisions of the Code.

4.11 The Sub-Committee, noting that this was a complex matter and that it needed detailed consideration, instructed the working group to further consider the issue and to advise the Sub-Committee accordingly.

Amendments to the IMSBC Code

4.12 The Sub-Committee had the following documents for its consideration on matters related to proposed amendments to the IMSBC Code:

- .1 DSC 15/4/2 (United States), providing a detailed analysis of the transport of Dried Distillers Grain with Solubles and proposing the inclusion of a new schedule in Group C;
- .2 DSC 15/4/3 and DSC 15/4/4 (Japan), proposing editorial and other amendments to the individual schedules for solid bulk cargoes in order to avoid any misunderstandings;
- .3 DSC 15/4/5 (Japan), providing precautions on the use of Phosphine as a fumigant and proposing two options, namely, to amend the associated part of the IMSBC Code or to amend the Recommendations on the use of pesticides in ships applicable to the fumigation of cargo holds (MSC.1/Circ.1264);
- .4 DSC 15/4/8 (Netherlands), pointing out that various references to "authorities", when requiring compliance with certain provisions, are not clear in regard to whether these references are applicable to the Administration, port authority or the competent authority of the country of loading or discharging, and proposing amendments to clarify the intent of the relevant provisions;
- .5 DSC 15/4/10 (Italy), proposing to add a new entry for "Fly Ash, Wet", in Group A and amend the existing "Fly Ash" bulk cargo shipping name to read "Fly Ash, Dry";
- .6 DSC 15/4/12 (United Kingdom), proposing, on the basis of the good transport safety record of Magnesium Sulphate Fertilizers, the inclusion of a new schedule in Group C;
- .7 DSC 15/4/15 (Canada), proposing the inclusion of a new schedule in Group C on Granulated Nickel Matte, taking into account the hazards associated with the inhalation of toxic dust and skin irritation;
- .8 DSC 15/4/16 (BIMCO), pointing out that iron ore, in the Group C schedule, does not contain information about whether the cargo can be loaded in lumps, fines and/or small particles and their respective sizes; and proposing that the schedule be amended so that the users of the Code are able to distinguish it from iron ore concentrates; and

- .9 DSC 15/INF.6 (Trinidad and Tobago), providing information on the need for the inclusion of a new schedule, in Group B, on Iron Fines (Blend), which contain fines obtained from the iron and steel manufacturing process such as iron ore pellet fines, direct reduction clarifier slush and dust, DRI (C) (By-product fines) and mill scale.

4.13 In considering the above proposals, the Sub-Committee agreed to forward documents DSC 15/4/2, DSC 15/4/3, DSC 15/4/4, DSC 15/4/5, DSC 15/4/7, DSC 15/4/8, DSC 15/4/10, DSC 15/4/12, DSC 15/4/15 and DSC 15/4/16 (paragraph 9.3 only) to the working group for further consideration in the context of finalization of draft amendment 01-11 to the IMSBC Code. In the course of the discussion, the Sub-Committee noted views expressed that some of the proposed modifications in annex 2 to document DSC 15/4/3 could be considered as more than purely editorial in nature.

4.14 With regard to document DSC 15/4/5, the Sub-Committee instructed the working group to further consider the options contained therein with a view to proposing a way forward and advise the Sub-Committee accordingly.

4.15 The Sub-Committee, having noted the concerns expressed by a number of delegations that the terms contained in paragraph 3 of document DSC 15/4/8 could cause confusion (e.g., not all countries use the term "port authorities"), instructed the working group to advise the Sub-Committee on any pertinent issues, taking into account that the group's priority is to finalize amendment 01-11 at this session.

4.16 The Sub-Committee, in considering matters related to the carriage of iron ore fines, noted that MSC 87, having considered document MSC 87/INF.13 (India), providing information and proposals related to the carriage of iron ore fines from Indian ports that had led to serious casualties, had invited the delegation of India to submit full casualty investigation reports through the report mechanism established under the FSI Sub-Committee and to the DSC Sub-Committee for concomitant consideration and advice to the Committee. In this regard, the Sub-Committee instructed the working group to prepare a draft DSC circular on the carriage of iron ore fines, taking into account document DSC 15/4/16, to bring to the attention of all concerned the hazards associated with the carriage of iron ore fines and to urge Member Governments and the industry to submit, to DSC 16, any relevant information regarding the safe handling and transportation of this cargo, in particular, considering the proposals contained in paragraphs 9.1 and 9.2 of document DSC 15/4/16.

4.17 The Sub-Committee, having noting the information in document DSC 15/INF.6, recalled that DSC 14 had considered the proposals contained in documents DSC 14/4 (Bolivarian Republic of Venezuela and Trinidad and Tobago), DSC 14/INF.3 (Bolivarian Republic of Venezuela) and DSC 14/INF.6 (Trinidad and Tobago) related to DRI fines which had high levels of moisture, up to 12%, relating to DRI fines in the IMSBC Code, and had invited the aforementioned delegations to submit a new proposal, which may be in the form of a draft schedule and/or a circular, concerning the carriage of DRI fines with high-moisture content above 0.3% and up to 12%, for consideration by the Sub-Committee. In the above context, the Sub-Committee instructed the working group, as a low-priority item, to consider the proposal in document DSC 15/INF.6 with a view to providing guidance to interested delegations intending to submit a definitive version of the proposal for consideration at DSC 16.

Classification criteria for solid bulk materials***Classification criteria for materials hazardous only in bulk***

4.18 The Sub-Committee, having considered the following documents related to the criteria for classification of materials hazardous only in bulk:

- .1 DSC 15/4/1 (Netherlands, United States), providing a comprehensive discussion on the development of classification criteria for materials hazardous only in bulk and proposing various options to progress the matter;
- .2 DSC 15/4/9 (Germany), proposing to amend paragraphs 1.7.19 and 9.2.3 of the IMSBC Code in order to define the tests for the criteria for classification of materials hazardous only in bulk; and
- .3 DSC 15/4/14 (BIMCO), providing comments on document DSC 15/4/1 and seeking clarification on issues such as "experience" criteria, "shipper's responsibility" and proposing that a new definition for "hazards" be developed,

instructed the working group to further discuss the aforementioned documents with a view to advising the Sub-Committee on the options for moving forward on the above issue and, if the establishment of a correspondence group was necessary, to prepare terms of reference for consideration by the Sub-Committee.

Classification criteria for all solid bulk cargoes and associated environmental hazards

4.19 The Sub-Committee considered a proposal from Australia (DSC 15/4/11), highlighting a potential issue that not all solid cargoes carried in bulk can be appropriately classified as required by SOLAS regulation VII/7 for the environmental hazards they present and proposing that this matter be brought to the attention of MEPC 61, and noted that the MEPC Correspondence Group for the Review of MARPOL Annex V (MEPC 61/7/2) had included a specific provision on cargo residues, in particular that the above group had recommended a new guideline be developed (in lieu of amending the IMSBC Code) to address the classification of cargo residues which could be harmful to the marine environment.

4.20 Bearing in mind that this is a complex issue that has yet to be resolved by the MEPC, the Sub-Committee agreed to await the outcome of MEPC 61 on the matter and encouraged Member Governments and international organizations to raise their concerns at the above session when the report of the correspondence group is considered, taking into account that the Sub-Committee has not been instructed to take any action on this issue. In this context, the Chairman advised delegations interested in considering this matter further to submit a justification for a new output in accordance with the Guidelines on the organization and method of work, for consideration by MEPC 62.

Review of the lists of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted or for which a fixed gas fire-extinguishing system is ineffective

4.21 The Sub-Committee recalled that, at DSC 13, it had invited the Committee to agree to review the Lists of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted or for which a fixed gas fire-extinguishing system is ineffective (MSC/Circ.1146)

as a consequence of the IMSBC Code becoming mandatory, and that MSC 86, having agreed that the aforementioned Lists could benefit from improvements, instructed the Sub-Committee to review and, where necessary, to amend MSC/Circ.1146 accordingly.

4.22 The Sub-Committee also recalled that, at DSC 14, noting that there might be a need to align certain names of solid bulk cargoes in the circular with those in the recent version of the IMDG Code, it had requested the Secretariat to prepare amendments to MSC/Circ.1146 for consideration at DSC 15 and had invited interested Member Governments and international organizations to submit proposals to the Secretariat for consolidation purposes.

4.23 In considering the draft revisions to tables 1 and 2 on the Lists of solid bulk cargoes prepared by the Secretariat (DSC 15/4/13), the Sub-Committee instructed the working group to finalize the draft MSC circular set out in the annex to document DSC 15/4/13, for consideration by the Sub-Committee, with a view to approval by MSC 89.

Establishment of the working group

4.24 Recalling its relevant decision at DSC 14 regarding a working group, the Sub-Committee established the Working Group on Amendments to the IMSBC Code, and instructed the group, taking into account the comments and decisions made in plenary, to:

- .1 as a high priority, finalize draft amendment 01-11 to the IMSBC Code, taking into account the report of the working group established at DSC 14 (DSC 15/4) and documents DSC 15/4/2, DSC 14/4/3, DSC 15/4/4, DSC 15/4/6 and Corr.1, DSC 15/4/7, DSC 15/4/8, DSC 15/4/10, DSC 15/4/12, DSC 15/4/15 and DSC 15/4/16;
- .2 further consider the options contained in document DSC 15/4/5 with a view to proposing a way forward and advise the Sub-Committee accordingly;
- .3 further consider the industry's concerns regarding the absence of a survey and certification scheme within the IMSBC Code, taking into account the views expressed at FSI 18 (DSC 15/2/1), and advise the Sub-Committee accordingly;
- .4 consider the criteria for classification of materials hazardous only in bulk, taking into account documents DSC 15/4/1, DSC 15/4/9 and DSC 15/4/14, and the need to establish a correspondence group on this issue and, if agreed, prepare the terms of reference for consideration by the Sub-Committee accordingly;
- .5 finalize the draft MSC circular on Lists of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted or for which a fixed gas fire-extinguishing system is ineffective, as contained in the annex to document DSC 15/4/13;
- .6 prepare a draft DSC circular on the carriage of iron ore fines, taking into account document DSC 15/4/16, for consideration by the Sub-Committee; and

- .7 as a low priority and after having prepared amendment 01-11, exhausted the consideration of other terms of reference and finalized its written report, consider document DSC 15/INF.6 with the view to providing guidance to interested delegations planning on submitting a definitive version of the proposal in the document for consideration at DSC 16.

Report of the working group

4.25 Having received the report of the working group (DSC 15/WP.3), the Sub-Committee approved it in general and took action as outlined hereunder.

Carriage of iron ore fines

4.26 The Sub-Committee approved DSC.1/Circ.63 on Carriage of iron ore fines that may liquefy and invited MSC 89 to endorse the course of action taken by the Sub-Committee.

Lists of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted

4.27 The Sub-Committee agreed to the draft MSC circular on Lists of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted or for which a fixed gas fire-extinguishing system is ineffective, as set out in annex 1, for approval by MSC 89.

Precautions on fire safety for fumigants

4.28 The Sub-Committee, with regard to the group's consideration of document DSC 15/4/5, agreed to the draft MSC circular on Amendments to the Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds, as set out in annex 2, for approval by MSC 89.

Survey and certification scheme

4.29 In considering the group's outcome on the industry's concerns regarding the absence of a survey and certification scheme within the IMSBC Code, the Sub-Committee noted that some delegations had indicated that they currently have, or will require, certification on some aspects of the IMSBC Code. However, the Sub-Committee endorsed the majority view of the group that the development of a common survey and certification scheme was not necessary and that the existing system, using a Statement of Compliance, is sufficient. The Sub-Committee requested the Secretariat to inform FSI 19 accordingly of the above outcome.

Technical data in support of proposed schedules

4.30 The Sub-Committee endorsed the group's recommendation to consider the need for the development of guidance on the technical data to be submitted in support of proposed schedules or a standardized procedure on how a schedule should be submitted and invited Member Governments and international organizations to submit proposals to DSC 16.

Amendments to the IMSBC Code

4.31 The Sub-Committee noted that the group, due to time constraints, did not consider, in detail, documents DSC 15/4/3 and DSC 15/4/4 and invited Member Governments and international organizations to submit comments on the above documents to DSC 16.

4.32 Having considered the above matters, the Sub-Committee agreed to the draft amendments (01-11) to the IMSBC Code, as set out in annex 3, and requested the Secretary-General to circulate them in accordance with SOLAS article VIII, for consideration and subsequent adoption by MSC 89. In this regard, the Sub-Committee authorized the Secretariat to make any editorial corrections to the above amendments that may be identified when preparing the final report.

Establishment of an E&T Group dedicated to the IMSBC Code

4.33 The Sub-Committee noted that a considerable amount of time is still needed to discuss, in depth, all the editorial and non-editorial issues raised during the session. In this regard, the Sub-Committee noted that a majority of the group considered the solution adopted for the IMDG Code as an appropriate way to improve and update the mandatory IMSBC Code, that is to say, that the E&T group model represents an excellent way for improving and updating the mandatory IMSBC Code. Therefore, the Sub-Committee invited interested delegations to submit proposals to MSC 89 to establish an E&T Group dedicated to the IMSBC Code. To deal with the backlog of work, the Sub-Committee noted the suggestion that the first meeting, if approved, could be held before, or just after, DSC 17.

New schedule on Iron Ore Fines

4.34 In addition to the above, the Chairman of the working group verbally informed the Sub-Committee that, in accordance with its instructions, the group had considered document DSC 15/INF.6 (Trinidad and Tobago), proposing a draft new schedule on the Iron Ore Fines (Blend) for insertion into the IMSBC Code, and agreed that DRI(C), irrespective of its condition (i.e. mixed or blend) still remains as DRI(C) with its liquefaction evolving hydrogen dangers and, therefore, suggested that there is no need to add a new DRI schedule to the existing schedules of DRI(A), DRI(B) and DRI(C). In considering the above view, the Sub-Committee invited the delegation of Trinidad and Tobago and other interested delegations to submit comments and proposals to DSC 16.

Establishment of the correspondence group

4.35 The Sub-Committee established the Correspondence Group on Classification Criteria for Materials Hazardous only in Bulk (MHB), under the coordination of the United States*, and instructed the group to:

- .1 consider which hazards should be within the scope of the MHB classification criteria, taking into account documents DSC 15/4/1, DSC 15/4/9 and DSC 15/4/14;
- .2 further develop the tests and classification criteria for MHB, taking into account the hazards identified in paragraph 4.34.1 above and the draft tests and criteria contained in document DSC 15/4/1;

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- .3 consider the minimum data information required for classification of MHB cargoes; and
- .4 submit a written report to DSC 16.

5 CASUALTY AND INCIDENT REPORTS AND ANALYSIS

General

5.1 The Sub-Committee noted that there were two issues to consider under this agenda item, namely, the inspection programmes for cargo transport units (CTUs) carrying dangerous goods and consideration of the results of the IMO survey on the inspections of containers and vehicles carrying packaged dangerous goods.

Inspection programmes for Cargo Transport Units (CTUs) carrying dangerous goods

5.2 The Sub-Committee noted the results of container inspection programmes as submitted by means of documents DSC 15/5 (Canada), DSC 15/5/1 (United States), DSC 15/5/2 (Belgium), DSC 15/5/3 (Netherlands), DSC 15/5/4 (Sweden), DSC 15/5/5 (Finland), DSC 15/5/6 (Italy), DSC 15/5/7 (Germany), DSC 15/5/8 (Republic of Korea), DSC 15/5/9 (Chile) and DSC 15/5/10 (Secretariat).

5.3 The Sub-Committee recalled that, according to the 2009 consolidated report on container inspection programmes (DSC 14/6/12), a total of 62,869 CTUs were inspected and, of these, 10,920 CTUs were found with deficiencies, which means 17.4 per cent of CTUs inspected had deficiencies. A total of 14,915 deficiencies were found, which is a rate of 23.7 per cent.

5.4 The Sub-Committee considered the results of the 2010 consolidated report on container inspection programmes (DSC 15/5/10), which was prepared on the basis of the reports referred to in paragraph 5.3 above, whereby a total of 79,196 CTUs were inspected and, of these, 10,482 CTUs were found with deficiencies, which means 13.2 per cent of the CTUs inspected had deficiencies. A total of 14,123 deficiencies were found, which is a deficiency rate of 17.8 per cent.

5.5 The Sub-Committee expressed its appreciation to those Member Governments that had submitted results of container inspection programmes. The Sub-Committee also expressed its concern about the high rate of deficiencies and on the lack of adherence to the provisions of the IMDG Code, especially in the areas of placarding and marking, which is 37 per cent, followed by stowage/securing of cargoes inside units, which is 24.8 per cent.

5.6 In this regard, the Sub-Committee noted the verbal information provided by the observer from ICHCA International that approximately 400 million TEUs were handled in 2009, which equates to approximately 300 million units. Based on a generally accepted figure of 10% of CTUs being used to carry packaged dangerous goods, a total of 30 million units were used in 2009 for this purpose. Thus, the number of units inspected is only a small percentage of the total. Nevertheless, ICHCA International pointed out that the summary of reports does give a snapshot of what deficiencies are to be found and, in this respect, noted that there were over 500 deficiencies with the CSC approval plate and, more importantly, there were 755 examples of serious structural deficiencies found. These were presumably such as to be prevented from travelling in the transportation chain.

5.7 Having endorsed the concerns expressed by ICHCA International, the Sub-Committee requested Member Governments to continue to submit such reports and urged Member Governments which had not yet carried out container inspection programmes to do so and to submit the relevant information to the Sub-Committee in accordance with MSC.1/Circ.1202.

Results of the IMO survey on inspections of containers and vehicles carrying packaged dangerous goods

5.8 The Sub-Committee recalled that MSC 79, on the basis of relevant decisions of DSC 9, approved MSC/Circ.1147 (Questionnaire on inspections of containers/vehicles carrying packaged dangerous goods) and requested Member Governments to provide the information requested in the questionnaire set out in the annex to that circular and to forward completed questionnaires to the Secretariat. In this regard, the Sub-Committee noted that, to date, only 19 Member Governments had submitted the completed questionnaire.

5.9 The Sub-Committee, having noted that no proposals relevant to the completed questionnaire had been submitted to this session, invited Member Governments and international organizations wishing to study the results received to date to do so and submit the outcome to DSC 16.

6 GUIDANCE ON PROTECTIVE CLOTHING

General

6.1 The Sub-Committee recalled that chapter 7 of the 2000 HSC Code requires that chemical protective clothing be carried on board high-speed craft to protect personnel from the hazards associated with the chemicals being transported, based on standards developed by the Organization, and that, on 1 January 2011, SOLAS regulation II-2/19 will also require ships to carry chemical protective clothing, selected according to the standards to be developed by the Organization.

6.2 The Sub-Committee also recalled that DSC 14, noting the outcome of DSC 13 on the matter and having considered a proposal by Sweden (DSC 14/9) to establish a correspondence group to further progress the work in cooperation with ISO, decided to request the Committee to extend the target completion year of the output to 2010 and invited the delegation of Sweden, and other interested delegations, to work closely with ISO/TC 8 and submit comments and proposals to DSC 15.

6.3 In considering document DSC 15/6 (Sweden), proposing two options for progressing this work, in particular, to await the outcome of ISO/TC8/SC1 regarding the development of a relevant ISO standard or to begin development of an IMO standard, the Sub-Committee noted the information provided by the observer from ISO that ISO/TC 94 and ISO/TC 8 were in the process of revising ISO standard 16602:2007 (Protective clothing for protection against chemicals) and that a Publicly Available Specification (PAS) would not be available for at least one year.

6.4 Taking the above information into account, the Sub-Committee decided to await the outcome of ISO in order to avoid a duplication of the work and encouraged Member Governments and international organizations to participate in the work of ISO/TC 94 and ISO/TC 8. In this regard, the Sub-Committee requested the Secretariat to formally convey the above outcome to the ISO Secretariat for action, as appropriate.

Postponement of the work on this output

6.5 The Committee was invited to note that the work on this planned output has been postponed pending the outcome of the work by ISO on the revision of the ISO standard 16602.

7 REVISION OF THE CODE OF SAFE PRACTICE FOR SHIPS CARRYING TIMBER DECK CARGOES

7.1 The Sub-Committee recalled that, following consideration of document MSC 82/21/14 (Sweden), proposing to revise the Code on Safe Practice for Ships Carrying Timber Deck Cargoes (resolution A.715(17)), to replace outdated methods for securing timber deck cargoes with new methods for safe, rational and efficient securing of such cargoes, MSC 82 had agreed to include in the Sub-Committee's work programme a high-priority item on Revision of the Code of Safe Practice for Ships Carrying Timber Deck Cargoes, with a target completion date of 2010.

7.2 The Sub-Committee also recalled that DSC 14, noting the outcome of DSC 13 on this matter and having considered the report of a correspondence group (DSC 14/10), established a working group to progress the revision of the Code and, having considered the group's report, re-established the Correspondence Group on Revision of the Code of Safe Practice for Ships Carrying Timber Deck Cargoes to prepare a draft revised Code for consideration at DSC 15, taking into account the decisions taken at DSC 14 (DSC 14/22, paragraph 10.10.5).

Report of the correspondence group

7.3 The Sub-Committee considered the report of the correspondence group (DSC 15/7) together with document DSC 15/INF.3 (Finland), providing proposals and recommendations based on the outcome of their studies on the effect of lashings on the strength of uprights holding timber deck cargoes, and decided to refer the above documents to a working group with a view towards finalization of the revised Code at this session.

Establishment of the working group

7.4 Recalling its relevant decision at DSC 14 regarding a working group, the Sub-Committee established the Working Group on Revision of the Code of Safe Practice for Ships Carrying Timber Deck Cargoes and instructed the group, taking into account the comments and decisions made in plenary, to finalize the draft revised Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 2011, as set out in the annex to document DSC 15/7, and the associated draft Assembly resolution, taking into account document DSC 15/INF.3.

Report of the working group

7.5 Having received the report of the working group (DSC 15/WP.5), the Sub-Committee approved it in general and took action as outlined hereunder.

Timber load lines

7.6 The Sub-Committee, noting that the requirements of timber load lines may become obsolete due to the more stringent assignment of the enhanced (B-60) summer freeboard for ships, endorsed the group's recommendation to invite SLF 53 to consider the possible revision of the requirements of timber load lines in the 1966 Load Lines Convention and the 1988 Load Lines Protocol and requested the Secretariat to take action accordingly.

Intact stability

7.7 The Sub-Committee, noting that the 2008 IS Code generally addresses the problem of excessive stability, endorsed the group's recommendation to invite SLF 53 to further consider the problem of excessive stability of timber deck carriers when developing the new generation intact stability criteria and requested the Secretariat to take action accordingly.

Related ISO standards

7.8 The Sub-Committee endorsed the group's recommendation to invite ISO to consider the issue of the racking strength of timber deck cargoes when revising ISO 4472:1983 and requested the Secretariat to take action accordingly.

Testing, marking, examination and certification

7.9 The Sub-Committee, having noted the views expressed by the delegation of Canada, which was supported by others, that the text of paragraph 2.2 of the Guidelines for the Preparation of the Cargo Securing Manual (MSC/Circ.745), being different than the draft revised text, will cause some of the meaning to be lost in regard to the specific requirements for timber lashings and components under the Code, agreed to add the following new text at the end of paragraph 5.5:

"... and be specific to the requirements for lashing and components outlined in paragraphs 5.1.2 and 5.1.3."

Future work

7.10 The Sub-Committee noted the group's observation that the footnote to SOLAS regulation VI/1 and other related IMO instruments (e.g., Guidelines on the preparation of the Cargo Securing Manual (MSC/Circ.745), referring to the previous Timber Deck Cargoes Code (resolution A.715(17)), may need to be updated to make reference to the 2011 TDC Code, once adopted, and requested the secretariat to update the footnotes, as appropriate.

Approval of the draft 2011 TDC Code

7.11 Having considered the above matters, the Sub-Committee approved the draft Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 2011 (2011 TDC Code), together with the associated draft Assembly resolution, as set out in annex 4, for submission to MSC 89 for approval and subsequent adoption by A 27.

Completion of the work on this output

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

8 STOWAGE OF WATER-REACTIVE MATERIALS

8.1 The Sub-Committee recalled that DSC 13, having considered document MSC 83/25/6 (Germany), which observed that there were water-reactive substances that could react with carbon dioxide in hot atmospheres which would render the use of conventional fire-fighting mediums ineffective, invited the delegation of Germany to continue its research and urged other interested delegations to also be involved and to submit comments and proposals to DSC 14.

8.2 The Sub-Committee recalled also that DSC 14, having noted that no document had been submitted to that session and that the Formal Safety Assessment (FSA) being conducted by Germany had not yet been completed, requested the Committee to extend the target completion year of this output to 2010 and invited Germany, and other interested delegations, to submit comments and proposals to DSC 15.

8.3 The Sub-Committee considered document DSC 15/8 (Germany), providing information on the ongoing activities for the FSA study on the cargo stowage, segregation and packing requirements for water-reactive substances and/or reacting with carbon dioxide in hot atmosphere, and noted the progress made on the above FSA study, which is related to the substances covered by EmS Fire Schedule Golf. In particular, it was noted that the hazard identification (step 1 of the FSA) had been finalized and that work on the risk analysis (step 2) and risk control options (step 3) is currently underway. The Sub-Committee also noted that the FSA study is scheduled to be finalized by the end of 2010 and that Germany would present the completed study to DSC 16.

Extension of the target completion year

8.4 In view of the above developments, the Sub-Committee invited the Committee to extend the target completion year for this output to 2011. Member Governments and international organizations were invited to submit any comments and proposals to DSC 16, taking into account the expected submission from Germany.

9 REVISED GUIDELINES FOR PACKING OF CARGO TRANSPORT UNITS

General

9.1 The Sub-Committee recalled that DSC 14, having noted the outcomes of DSC 12 and DSC 13 on matters related to the review of the IMO/ILO/UNECE Guidelines for packing of cargo transport units, requested the E&T Group to prepare draft revised Guidelines for consideration at DSC 15 with a view to aligning them with amendment 35-10 to the IMDG Code, taking into account the draft amendments to the Guidelines set out in the annex to document DSC 13/WP.7.

9.2 The Sub-Committee also recalled that DSC 14 had requested the Secretariat to continue to cooperate with the UNECE Working Party on Intermodal Transport and Logistics (WP.24) and the ILO in the exercise of the review of the above Guidelines.

9.3 The Sub-Committee noted that MSC 87, having considered document MSC 87/10/3 (UNECE), proposing that the updating and revision of the IMO/ILO/UNECE Guidelines be undertaken by a joint IMO/ILO/UNECE group of experts, which would build upon the work done by the E&T Group, noted that the E&T Group had prepared draft amendments to the aforementioned Guidelines for consideration by DSC 15 and referred document MSC 87/10/3 to DSC 15 for consideration with a view to advising MSC 88 on how this work should be undertaken.

Consideration of the draft amendments to the IMO/ILO/UNECE Guidelines for packing cargo transport units (CTUs)

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

- .1 DSC 15/9 (Secretariat), reporting on the outcome of E&T 14 on the revision of the IMO/ILO/UNECE Guidelines for packing cargo transport units (CTUs), including the draft amendments to the Guideline prepared by the Group, as set out in annex 8 to document DSC 15/3;

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- .2 DSC 15/3/6 (Germany), proposing that figure 38 of the Guidelines for the packing of cargo transport units be replaced with new illustrations; and
 - .3 MSC 87/10/3 (UNECE), proposing that the updating and revision of the Guidelines be undertaken by a joint IMO/ILO/UNECE group of experts, which will build upon the work done by the E&T group with the support of the IMO, ILO and UNECE Secretariats as well as by consultants, as appropriate.

9.5 The Sub-Committee, having considered the above documents and agreed to the following modifications to annex 8 to document DSC 15/3:

- .1 to replace figure 38 of the Guidelines by the illustrations in annex 2 to document DSC 15/3/6;
- .2 to insert at the following new sentence at the end of paragraph 7.5:

"In assistance to maritime institutes and their technical staff in organizing and introducing new training courses, or in enhancing, updating or supplementing existing training material reference is made to the IMO Model Course 3.18 – Safe Packing of Cargo Transport Units (CTUs).";
- .3 to delete diagram (No.5.2(a)) in paragraph 4.1.7; and
- .4 to delete (b) from diagram (No.5.2(b)) in paragraph 4.1.7,

agreed to the draft amendments to the IMO/ILO/UNECE Guidelines for packing cargo transport units (CTUs), as set out in annex 5, for submission to MSC 89 for approval and for forwarding the above draft amendments to ILO and the UNECE for concurrent approval, as appropriate.

9.6 The Sub-Committee was of the view that the above amendments and any future revisions of the Guidelines should be under the coordination of this Organization and, in lieu of establishing a joint group of experts as proposed in document MSC 87/10/3 (UNECE), the Secretariats of IMO, ILO and UNECE should be invited to work together on the matter and advise DSC 16 accordingly.

Extension of the target completion year

9.7 In view of the above developments, the Sub-Committee invited MSC 88 to endorse the above decision regarding future amendment to the Guidelines (paragraph 9.6) and to extend the target completion year for this output to 2013.

10 REVISION OF THE RECOMMENDATIONS FOR ENTERING ENCLOSED SPACES ABOARD SHIPS

General

10.1 The Sub-Committee recalled that MSC 85, having considered the justification prepared by DSC 13 to review and revise the specific provisions of the Recommendations for entering enclosed spaces aboard ships (resolution A.864(20)), agreed to include a new item in the work programmes of the BLG, DSC, FP and STW Sub-Committees, with a target completion date of 2010, assigning the DSC Sub-Committee as the coordinator.

10.2 The Sub-Committee also recalled that DSC 14 (DSC 15/10/3, paragraph 2), having considered documents DSC 14/16 (Sweden), DSC 14/16/1 (Bahamas) and DSC 14/INF.9 (MAIF), which provided views and proposals on the matter, had:

- .1 identified two issues to be discussed with regard to this work, namely, proposals for amendments to the Recommendations and a proposal for amendments to SOLAS to mandate enclosed space entry and rescue procedure drills, which had been submitted to MSC 87 for consideration;
- .2 noted that MAIF had identified various areas of concern regarding the inadequacies in safety management systems, training and drills related to the procedures for safe entry and safe rescue from enclosed spaces and, having acknowledged the importance of the information provided by MAIF (DSC 14/INF.9), requested the Secretariat to issue it as a DSC 15 document, in time for it to also be available for consideration at STW 41, BLG 15 and FP 54, which had been issued as document DSC 15/10 (MAIF); and
- .3 agreed, in principle, to a proposal from Sweden (DSC 14/16) related to the risks associated with transporting oxygen-depleting cargoes and materials.

10.3 In light of the above, DSC 14 established a correspondence group to progress the work on this issue (DSC 14/22, paragraph 10.14) and instructed it to submit a report to DSC 15.

Outcome of other bodies

Outcome of STW 41

10.4 With regard to the outcome of STW 41, the Sub-Committee noted that STW 41 (DSC 15/10/3, paragraph 3) had requested MSC 87 to decide whether any additional training was necessary for entry into enclosed spaces and, if so, invite the STCW Conference to include additional training measures in the proposed amendments to the STCW Convention and STCW Code. In addition, STW 41 expressed the view that it was premature for it to consider this information and provide its advice without being able to review any details of the draft amendments to resolution A.864(20). In light of the foregoing, STW 41 noted the information provided pending the review of resolution A.864(20) by DSC 15; deferred consideration to STW 42; and invited the Committee to extend the target completion year to 2011 (see also paragraph 10.9).

Outcome of BLG 14

10.5 With regard to the outcome of BLG 14 on this matter (DSC 15/10/3, paragraph 4), the Sub-Committee noted that the BLG Sub-Committee had not proposed any amendments to the Recommendations at that stage. However, recognizing the importance of the issue, BLG 14 welcomed further work on areas where it has special expertise, if such needs were identified by the Committee. BLG 14 also encouraged Member Governments and international organizations to take part in the work of the DSC Correspondence Group established by DSC 14.

Outcome of FP 54

10.6 The Sub-Committee noted that FP 54 (DSC 15/10/3, paragraphs 5 to 11), having had an extensive discussion on the documents submitted to the session and that document

FP 54/17/2 (United States) had also been submitted to the DSC Correspondence Group, noted the areas of general agreement; in particular, that the vast majority of those who spoke on the issue agreed that:

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

10.7 In this context, the Sub-Committee noted that FP 54 had expressed the view that the draft Guidelines annexed to document FP 54/17/1 should be considered by the DSC Sub-Committee in light of the work on the revision of the resolution A.864(20), taking into account its applicability to all tankers. In particular, FP 54 agreed that section 2 (Use of nitrogen) of the aforementioned proposed guidance should be specifically considered by DSC 15, with a view to including relevant provisions in the revised Recommendations, and encouraged Member Governments and international organizations to take part in the DSC Correspondence Group established on the matter.

10.8 The Sub-Committee further noted that FP 54, having recognized that entry into the tanks of chemical tanker needs specific attention and that the expertise on tanker-related issues lies within the BLG Sub-Committee, and that it may be beneficial if the draft guidance contained in the annex to document FP 54/17/1 were also brought to the attention of that Sub-Committee for its expert consideration, taking into account its applicability to all tankers, agreed to refer the aforementioned draft guidance to BLG 15 (see also paragraph 10.10).

Outcome of MSC 87

10.9 The Sub-Committee noted that MSC 87 (DSC 15/10/3, paragraphs 12 to 16), in considering the outcome of STW 41 with regard to the need for additional training requirements relating to entry into enclosed spaces, had agreed that, since the proposed texts in chapters V and VI of the STCW Convention and Code already provide the basic knowledge requirements for entry into enclosed spaces, no additional training was necessary at present. However, Member Governments were free to submit any proposals directly to the Conference to amend the text of amendments to the STCW Convention and Code or a relevant Conference resolution, if they wish to do so.

10.10 In the context of the outcome of FP 54 (DSC 15/10/3), MSC 87, in considering the views expressed by the delegations of the Bahamas and Cook Islands and the Chairman of the DSC Sub-Committee, on whether to refer document FP 54/17/1 to BLG 15, instructed DSC 15 to forward its outcome to STW 42, BLG 15 and FP 55 so that their expert views can be considered at MSC 89 and A 27, as appropriate, so that the work on the revision of the Recommendations could be completed at MSC 89, for subsequent adoption by A 27.

Report of the correspondence group

10.11 The Sub-Committee considered the report of the Correspondence Group on Recommendations for Entering Enclosed Spaces Aboard Ships (DSC 15/10/1) and, having approved it in general, took action as outlined in paragraphs 10.12 to 10.17.

Oxygen content

10.12 The Sub-Committee, having noted that the group could not reach a consensus on the issues related to the oxygen content, including the views expressed in paragraphs 18 to 21 of document DSC 15/10/1, considered the two alternatives in square brackets in paragraph 6.2.1 of the draft Recommendations and noted that the majority of delegations that spoke agreed that the existing provisions related to oxygen content (21%) should be retained. Consequently, the Sub-Committee instructed the working group to maintain the 21% oxygen content in the draft Recommendations and consider whether any additional guidance is needed in regard to national regulations, making any consequential amendments, as appropriate.

Guidelines for tank entry

10.13 With regard to document FP 54/17/1, containing a separate draft Guideline for tank entry on chemical tankers, the Sub-Committee noted that the group had considered two options, namely, to remove the areas of duplication with resolution A.864(20) and insert the remaining provisions into section 9.2 of the draft Recommendations, as appropriate; or to have a separate annex related to tank entry on chemical tankers.

10.14 In considering the above options, the Sub-Committee had an extensive discussion on whether the generic recommendations would properly address the operational hazards associated with entry into cargo tanks on tankers, taking into account the work currently underway regarding the application of inert gas on tankers, and noted the views of a number of delegations on the need to have specific IMO recommendations to deal with the risks associated with cargo spaces protected by inert gas systems.

10.15 Consequently, the Sub-Committee, taking into account the views expressed on the need to finalize the current work, agreed that two sets of guidance should be prepared as follows:

- .1 a generic set of recommendations dealing with hazards associated with entry into enclosed spaces on all ships; and
- .2 a set of guidelines dealing specifically with entry into cargo spaces protected by inert gas systems on tankers.

The Sub-Committee noted that the development of the former set of recommendations (paragraph 10.15.1) fell under the purview of this Sub-Committee, while it would be more appropriate for the BLG Sub-Committee to consider the development of the latter (paragraph 10.15.2).

10.16 The Sub-Committee instructed the working group to be established to extract the draft provisions related to cargo spaces protected by inert gas systems on tankers, as appropriate, from the generic Recommendations set out in the annex to document DSC 15/10/1.

10.17 In the context, the Chairman drew the attention of the Sub-Committee to the fact that the use of Nitrogen as an inerting agent is not only limited to tankers, but is also used on some ships carrying certain solid bulk cargoes and, in this regard, the Sub-Committee agreed that the working group should take the above fact into account.

Linkage between the ISM Code and resolution A.864(20)

10.18 In considering document DSC 15/10/2 (Argentina), proposing amendments to strengthen the linkage between the Recommendations and company's safety culture via the ISM Code and encouraging a closer connection with the operational practices, the Sub-Committee noted that many delegations supported the above proposal, in particular the views expressed on the need for adequate training for seafarers and safety officers, taking into account that many of the fatal incidents were attributed to not following proper procedures, and agreed to refer the document to the working group for further consideration.

Information on a pocket card

10.19 The Sub-Committee noted with appreciation the document submitted by ICHCA International (DSC 15/INF.5), providing information on a series of pocket cards being produced by ICHCA International and the TT Club, two of which cover the safety of entry into freight containers and cargo-related spaces. In this regard, the Sub-Committee noted that the sponsors of the above cards envisaged copies being given to individuals as well as being made the subject of toolbox talks, safety meetings and management meetings, as appropriate.

Establishment of the working group

10.20 Recalling its relevant decision at DSC 14 regarding a working group, the Sub-Committee established the Working Group on Revision of the Recommendations for Entering Enclosed Spaces Aboard Ships and instructed the group, taking into account the comments and decisions made in plenary, to:

- .1 finalize the revision of the Recommendations for entering enclosed spaces aboard ships (resolution A.864(20)) and the associated draft Assembly resolution, based on the report of the correspondence group (DSC 15/10/1), taking into account documents DSC 15/10, DSC 15/10/1, DSC 15/10/2, DSC 15/10/3 and DSC 15/INF.5; and
- .2 identify any sections or matters that need to be considered by other IMO bodies so that they may provide their comments directly to MSC 89.

Report of the working group

10.21 Having received the report of the working group (DSC 15/WP.4), the Sub-Committee approved it in general and took action as outlined hereunder.

Marking of potentially dangerous spaces on board

10.22 The Sub-Committee noted the group's view regarding the issue of signage to highlight the dangers posed by the potentially dangerous spaces on board ships, in particular that too many signs on board a vessel would negate the intended effect of highlighting the above dangers and that the majority of the group agreed that the requirement was not necessary. In this context, the Sub-Committee noted the statements by the delegation of Sweden and the observer of IMarEST that they did not agree with the aforementioned

decision in regard to the labelling of doors and/or hatches, as referred to in paragraph 9 of document DSC 15/WP.4.

Development of guidelines for tank entry on tankers using nitrogen

10.23 The Sub-Committee noted that the group had added a new section 10.4 in the draft revised Recommendations to address concerns associated with the use of nitrogen as an inerting gas on board all ship types. In this context, Sub-Committee, having considered the views expressed on the matter, agreed to refer section 10.4 of the draft revised Recommendations and document FP 54/17/1, containing draft Guidelines for tank entry on chemical tankers, to BLG 15, for its consideration on whether separate guidelines should be developed for cargo space entry on tankers using nitrogen as the inerting medium (see also paragraphs 10.15 to 10.17 and 10.27).

Mandatory provisions on low pressure audible alarm for breathing apparatus

10.24 The Sub-Committee noted the group's views on the need for mandatory provisions on the fitting of a low pressure audible alarm on breathing apparatus and requested the Secretariat to inform FP 55 of the outcome in this regard, for their consideration and action, as appropriate.

Enclosed space entry incidents

10.25 In welcoming the invaluable information contained in the document by MAIIF (DSC 15/10), and recognizing the importance of the work undertaken, the Sub-Committee invited Member Governments and international organizations to keep the Sub-Committee updated on any further enclosed space casualties that are reported to them.

Revision of the Recommendations for entering enclosed spaces aboard ships

10.26 In light of the above decisions, the Sub-Committee agreed to the draft Revised Recommendations for entering enclosed spaces aboard ships and the associated draft Assembly resolution, as set out in annex 6, for submission to MSC 89 for approval, with a view to subsequent adoption by the Assembly.

10.27 As instructed by MSC 87, the Sub-Committee requested the Secretariat to forward the above outcome to STW 42, BLG 15 and FP 55 so that they could consider the draft Revised Recommendations for matters under their purview (see also paragraph 10.23).

Completion of work on this output

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

10.29 Notwithstanding the above, the Committee was also invited to decide whether further consideration of the draft Revised Recommendations by the Sub-Committee was necessary, taking into account any recommendations that may be made by STW 41, BLG 15 and FP 55, and, if so, to reinstate the output on the agenda for DSC 16 with a view to the Sub-Committee directly advising A 27, as appropriate.

11 CONSIDERATION FOR THE EFFICACY OF CONTAINER INSPECTION PROGRAMME

General

11.1 The Sub-Committee recalled that MSC 84, having considered a proposal by the Republic of Korea (MSC 84/22/15) to consider the efficacy of the Container Inspection Programme (CIP) in order to encourage Member Governments to submit CIP reports and to develop strategies on how best to utilize the information submitted in accordance with MSC.1/Circ.1202 on Inspection programmes carried out on cargo transport units (CTUs) carrying dangerous goods, included an item in the work programme of the Sub-Committee on Consideration for the efficacy of Container Inspection Programme, with a target completion year of 2010.

11.2 The Sub-Committee also recalled that DSC 14 considered documents DSC 14/17 and DSC 14/17/1 (Republic of Korea), addressing the results of the container inspection programme implemented in the Republic of Korea, and invited the Republic of Korea, and other interested delegations, to submit comments and proposals to DSC 15.

Proposals on the efficacy of container inspection programmes

11.3 The Sub-Committee had for its consideration the following documents, which all proposed amendments to the draft Guidelines for the inspection of cargo transport units carrying dangerous goods contained in the annex to document DSC 14/17/1:

- .1 DSC 15/11 (United States), proposing that several new comprehensive sections be added to the draft guidelines on the topics of container inspection conduct and safety, container control actions and container targeting, in order to further enhance container inspection programmes;
- .2 DSC 15/11/1 (Germany), providing comments and proposals on section 3 (Procedures for the inspection programme) of the draft Guidelines to improve the implementation of container inspection programmes;
- .3 DSC 15/11/2 (Spain), proposing amendments to the draft Guidelines with regard to checking the suitability of tanks (portable tanks and road tank vehicles (inappropriate or damaged)), with a view to improving the application of paragraph 4.5 of MSC.1/Circ.1202;
- .4 DSC 15/11/3 (Republic of Korea), proposing several amendments to the draft Guidelines, in particular modifications to paragraphs 3.2, 3.6, 3.7, 3.8 and 3.9 on the procedures for the inspection programme; and
- .5 DSC 15/11/4 (Russian Federation), proposing amendments to section 3 (Procedures for the inspection programme) of the draft Guidelines and expressing support for the development of unified procedures for the inspection of cargo transport units, taking into account that the current draft Guidelines are primarily focused on freight and tank containers.

11.4 In considering the above documents, the Sub-Committee agreed, in principle, that guidance for the inspection of cargo transport units (CTUs) carrying dangerous goods should be developed and, in this regard, decided that draft Guidelines, set out in the annex to document DSC 14/17/1, could serve as a base text, to be further enhanced by the proposals contained in documents DSC 15/11, DSC 15/11/1, DSC 15/11/2, DSC 15/11/3 and

DSC 15/11/4. In this regard, the Sub-Committee agreed that the new sections contained in document DSC 15/11 should be incorporated into the draft guidelines to be developed.

11.5 The Sub-Committee endorsed the views expressed by the delegation of South Africa on the need to ensure that training is also addressed in the guidelines, in particular, to assist developing countries for carrying out such programmes. In this context, the Sub-Committee agreed to draw the attention of the Committee on the need for taking necessary measures, in particular to consider inviting the Technical Co-operation Committee to include such training as a part of its Integrated Technical Co-operation Programme.

Establishment of the correspondence group

11.6 In order to progress this work on this matter, the Sub-Committee established a Correspondence Group on Consideration for the Efficacy of Container Inspection Programme, under the coordination of the United States,* and instructed the group, taking into account the comments and decision in plenary, to:

- .1 consider the options of drafting a new MSC circular on guidelines for the inspection of cargo transport units carrying dangerous goods or to revise the existing Guidelines on Inspection programmes for cargo transport units (CTUs) carrying dangerous goods (MSC.1/Circ.1202);
- .2 prepare a draft Guideline and an associated draft MSC circular, taking into account documents DSC 14/17/1, DSC 15/11, DSC 15/11/1, DSC 15/11/2, DSC 15/11/3 and DSC 15/11/4 and MSC.1/Circ.1202; and
- .3 submit a report to DSC 16.

Extension of the target completion year

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

12 INSTALLATION OF EQUIPMENT FOR DETECTION OF RADIOACTIVE CONTAMINATED OBJECTS IN PORT

12.1 The Sub-Committee recalled that MSC 86, having considered document MSC 86/23/8 (Islamic Republic of Iran), proposing to develop provisions for the installation of equipment for detection of radioactive sources and radioactive contaminated objects in ports, agreed to include, in the Sub-Committee's work programme, a high-priority item on Installation of equipment for detection of radioactive sources or radioactive contaminated objects in ports, with a target completion year of 2011.

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12.2 The Sub-Committee also recalled that, at DSC 14, it had considered a proposal by the Islamic Republic of Iran (DSC 14/18), concerning principles and guidelines relating to the installation of radiation detection devices to identify radioactive and contaminated materials in ports, and, having noted the intervention made by the representative of the IAEA, agreed that, rather than developing parallel guidance, IMO should work in close cooperation with the IAEA for the development of appropriate IAEA standards and other relevant guidance documents, which could be endorsed by reference in an MSC circular. Consequently, DSC 14 invited IAEA to report back to the Sub-Committee on this matter, when appropriate.

12.3 The Sub-Committee had the following documents for consideration:

- .1 DSC 15/12 (Islamic Republic of Iran), proposing that IMO develop requirements for the installation of equipment for detection of radioactive sources and radioactive contaminated objects in ports, which would support the work of IAEA, taking into account that the IAEA Code of Conduct on the Safety and Security of Radioactive Sources does not fully address radioactive contamination and threats emanating from the contamination of people by radioactive materials; and
- .2 DSC 15/INF.8 (IAEA), providing information on the activities by IAEA regarding the development of safety and security guidance on the detection of radioactive contaminated objects, in particular, reporting that the IAEA Nuclear Security Plan for 2011-2013 foresees the completion of a comprehensive set of guidance documents for the prevention, detection and response to nuclear security events and that similar response guidance is also already available for cases of detection of radioactive materials.

12.4 The Sub-Committee, having noted the verbal information provided by the Secretariat on the IAEA draft Nuclear Security Recommendations on Nuclear and other Radioactive Material out of Regulatory Control, and Nuclear Security Glossary, invited the Secretariat to submit these documents to DSC 16 for its consideration. In the context, the Sub-Committee noted that IAEA had invited the Organization to jointly sponsor the draft Nuclear Security Recommendations.

12.5 Subsequently, the Sub-Committee requested the Secretariat to inform IAEA of the outcome on this agenda item.

13 AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR SAFE CONTAINERS, 1972 AND ASSOCIATED CIRCULARS

General

13.1 The Sub-Committee recalled that DSC 14, in considering how best to make the list of the records of approved continuous examination programmes maintained by the Administrations publicly available, agreed that Administrations should maintain the aforementioned lists and make them publicly available and invited Member Governments to submit comments and proposals to DSC 15.

13.2 The Sub-Committee also recalled that DSC 14 considered matters related to the placing of containers with limited stacking and/or racking capacity in stacks on ships and agreed that the aforementioned issue should be brought to the attention of the ship masters so safe stowage and securing of such containers can be arranged, but decided to further consider the matter at this session.

Records of approved continuous examination programmes

13.3 In considering document DSC 15/13 (France), discussing the practical problems involved in making publicly available the list of approved continuous examination programmes containers (ACEP), as provided in paragraph 9.1 of CSC.1/Circ.138, the Sub-Committee decided to first clarify what information should be contained in the lists of records of ACEP with a view towards harmonization and then, subsequently, consider the best way to make such lists publicly available.

13.4 Consequently, the Sub-Committee, having noted that the majority of the delegations who spoke were in favour of continuing work on this issue, invited Member Governments and international organizations to submit comments and proposals to DSC 16.

Placing and marking of containers with limited stacking and/or racking capacity

13.5 In considering the placing and marking of containers, the Sub-Committee recalled that DSC 14 had endorsed the CSC Working Group's recommendation (DSC 14/WP.7, paragraph 11.2) to invite ISO to develop and/or include within the appropriate standard, specific marking criteria to denote containers with limited racking and stacking capacities and inform the Sub-Committee on its outcome on this matter.

13.6 In regard to the specific marking criteria to denote containers with limited racking and stacking capacities, the Sub-Committee, having noted the information provided by the observer from ISO that TC 104 was meeting in January 2011 to consider ISO 6346:1995, decided to hold the matter in abeyance pending the outcome of the above work being reported to the Sub-Committee. In addition, the Sub-Committee invited ISO to advise DSC 16 on the progress made during the course of the year. Member Governments and other international organizations were also invited to submit comments and proposals to DSC 16.

Entry into force of the 1993 CSC Amendments

13.7 Noting the continued delay in their entry into force of the 1993 CSC Amendments, the Chairman recalled the words of the Secretary-General that only nine acceptances had been received so far and reiterated his plea to CSC Parties that have not yet accepted the amendments to consider doing so at the earliest possible time.

13.8 In this context, the Sub-Committee noted that, at the request of MSC 87 (DSC 15/2), the Secretariat had issued Circular letter No.3075 to seek the views of Contracting Parties, through completion of a questionnaire, on whether a Conference of Parties to the CSC Convention should be convened to introduce the tacit acceptance procedure for the expeditious entry into force of future amendments to the treaty.

13.9 In view of the above, the Sub-Committee urged Parties to the CSC Convention to complete the above questionnaire and return it to the Secretariat by 1 October 2010, so that the Secretariat can report the outcome of the survey to MSC 88.

Extension of the target completion year

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

14 WORK PROGRAMME AND PROVISIONAL AGENDA FOR DSC 16

General

14.1 Having noted the adoption of the High-level Action Plan of the Organization and priorities for the 2010-2011 biennium (resolution A.1012(26)), the Sub-Committee further noted that the Assembly, recognizing the need for a uniform basis for the application of the Strategic Plan and the High-level Action Plan throughout the Organization, and for the strengthening of existing working practices through the provision of enhanced planning and management procedures, adopted Guidelines on the application of the Strategic Plan and the High-level Action Plan (resolution A.1013(26)). In particular, the Sub-Committee noted that the Assembly requested the Committees to review and revise, during the 2010-2011 biennium, the Committee's Guidelines on the organization and method of work (MSC-MEPC.1/Circ.2) with a view to bringing them in line with the Guidelines on the application of the Strategic Plan and the High-level Action Plan.

14.2 In pursuance of the above request, the Sub-Committee noted that MSC 87 had prepared draft revisions to the Committee's Guidelines (MSC 87/26/Add.3, annex 36), for consideration at MEPC 61, with a view to approval at MSC 88, taking into account the provisions of the Migration Plan prepared by the Council. To facilitate the transition, the Committee had decided to implement the use of the new reporting formats and agreed that the subsidiary bodies should prepare their respective biennial agendas for the next biennium at their forthcoming sessions, in accordance with the draft revised Guidelines, taking into account that:

- .1 outputs selected for the biennial agenda should be phrased in SMART terms (Specific, Measurable, Achievable, Realistic and Time-bound); and
- .2 where the target completion year for a specific output goes beyond that 2012-2013 biennium, an interim output should be placed in the biennial agenda with a target completion year of 2012 or 2013, as appropriate, and a related output should be placed in the Committee's post-biennial agenda with the anticipated completion year.

Biennial agenda and provisional agenda for DSC 16

14.3 Taking into account the progress made during this session, the decisions of A 26 and MSC 87, the Sub-Committee prepared the draft revised biennial agenda of the Sub-Committee and the provisional agenda for DSC 16 (DSC 15/WP.2), based on the biennial agenda approved by MSC 87 (DSC 15/2, annex), as set out in annexes 7 and 8, respectively, for consideration and action, as appropriate, by MSC 88.

Report on the status of planned outputs

14.4 The Sub-Committee prepared the report of the status of the planned outputs of the High-level Action Plan of the Organization and priorities for the 2010-2011 biennium relevant to the Sub-Committee (DSC 15/WP.2), as set out in annex 9, which the Committee was invited to note.

Proposed planned outputs for the 2012-2013 biennium in SMART terms

14.5 As instructed by MSC 87, the Sub-Committee prepared the proposed planned outputs for the 2012-2013 biennium in SMART terms (DSC 15/WP.2, annex 5), as set out in annex 10, for consideration and action, as appropriate, by the Committee.

Arrangements for the next session

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

- .1 amendments to the IMSBC Code, including evaluation of properties of solid bulk cargoes;
- .2 amendment to SOLAS to mandate enclosed space entry and rescue drills; and
- .3 consideration for the efficacy of Container Inspection Programme.

14.7 The Sub-Committee established correspondence groups on the following subjects, due to report to DSC 16:

- .1 Amendments to the IMSBC Code on criteria for classification of materials hazardous only in bulk; and
- .2 Consideration for the efficacy of Container Inspection Programme.

Intersessional meetings

14.8 The Sub-Committee, having recalled its respective decision under agenda item 3 (see paragraphs 3.47 to 3.49), invited MSC 88 to consider adding an additional three days to the next session of the E&T Group (11 to 15 April 2011).

Date of the next session

14.9 The Sub-Committee noted that its sixteenth session had been tentatively scheduled to take place from 19 to 23 September 2011.

15 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2011

15.1 In accordance with the Rules of Procedure of the Maritime Safety Committee, the Sub-Committee unanimously re-elected Mrs. Olga Lefèvre Pestel (France) as Chairman and Mr. Arsenio A. Domínguez (Panama) as Vice-Chairman, both for 2011.

16 ANY OTHER BUSINESS

General

16.1 The Sub-Committee noted that the delegation of Germany had decided to withdraw their document DSC 15/16.

Joint industrial research project Lashing@Sea

16.2 The Sub-Committee noted with appreciation the documents submitted by the Netherlands (DSC 15/16/1 and DSC 15/INF.2), providing information on the joint industry research project Lashing@Sea, which aims to prevent lashing systems from failing and to increase safety and lashing efficiency where possible.

16.3 In this regard, the Sub-Committee, having agreed that there is a need to consider ways and means to ensure that the correct weight of the containers is declared to the carrier and communicated to the master, in the interest of safety, invited Member Governments and international organizations to submit further information, including a justification in accordance with the Committee's Guidelines for an unplanned output, if needed, to the Committee for appropriate action.

International Vessel Operators Dangerous Goods Association

16.4 The Sub-Committee noted with appreciation the document submitted by VOHMA (DSC 15/16/2), advising the Sub-Committee that the name of the Organization has officially changed to the International Vessel Operators Dangerous Goods Association (IVODGA).

International Seminar on Transport of Dangerous Goods

16.5 The Sub-Committee noted with appreciation the document submitted by the Republic of Korea (DSC 15/16/3), providing information on the outcome of the International Seminar to Develop Safety Measures on Transport of Dangerous Goods, which was held in July 2010 in Seoul, and jointly organized by the Ministry of Land, Transport, and Maritime Affairs (MLTM) and the Korea Maritime Dangerous Goods Inspection Center (KOMDIC), in cooperation with the International Maritime Organization.

Waste reception facilities for goods subject to MARPOL Annex III

16.6 The Sub-Committee noted that MEPC 60, having considered document MEPC 60/6/5 (Islamic Republic of Iran), regarding the need to provide waste reception facilities for goods subject to MARPOL Annex III, had instructed DSC 15 to further consider the above document and to report the outcome to MEPC 62. The Sub-Committee also noted that MEPC 60 had invited the sponsors to submit further information on the matter to DSC 15, including concrete wording concerning the proposed amendment to MARPOL Annex III.

16.7 In considering document MEPC 60/6/5, the Sub-Committee noted the views expressed by many delegations that when packaged cargoes are damaged, they no longer fall within the definition of packaged cargo and, therefore, could be treated as residues or wastes, which is covered under MARPOL Annex V. Consequently, the Sub-Committee agreed that amendments to MARPOL Annex III are not necessary. In this regard, the Sub-Committee also noted that the IMDG Code has provisions on the use of salvage packaging into which damaged, defective, leaking or non-conforming packages, or dangerous goods that have spilled or leaked, are placed for purposes of transport for recovery or disposal and requested the Secretariat to inform MEPC 62 accordingly.

16.8 The Sub-Committee, taking into account that the MEPC is currently revising MARPOL Annex V, invited Member Governments and international organizations to raise their comments and concerns at MEPC 61.

Expression of appreciation

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

- Capt. Raja Datuk Malik Saripulazan (Malaysia) (on return home); and
- Mr. Alexander Petrov (Secretariat) (on retirement).

17 AMENDMENTS TO SOLAS TO MANDATE ENCLOSED SPACE ENTRY AND RESCUE DRILLS

General

17.1 The Sub-Committee recalled that MSC 87, following consideration of documents MSC 87/24/3 (Bahamas, Vanuatu, OCIMF and IACS) and MSC 87/24/15 (Chile, Cyprus, Islamic Republic of Iran, Italy, Netherlands, Panama and IPTA), proposing amendments to SOLAS to mandate enclosed space entry and rescue drills to ensure that seafarers who enter such spaces are familiar with the precautions to be taken prior to entry and in the event of an accident, agreed to include, in the BLG and DSC Sub-Committees' biennial agendas and the provisional agendas for BLG 15 and DSC 15, an unplanned output on "Amendments to SOLAS to mandate enclosed space entry and rescue drills", with a target completion year of 2012, assigning the DSC Sub-Committee as the coordinating organ.

17.2 In considering document DSC 15/17 (Bahamas, Chile, the Islamic Republic of Iran, Vanuatu, IACS and OCIMF), proposing amendments to SOLAS for mandatory drills, at regular intervals, in enclosed space entry and rescue procedures, the Sub-Committee noted that the objective of such drills is to ensure that seafarers who may be expected to, or decide to, enter enclosed spaces are familiarized with the precautions to be taken prior to entry, and to ensure that effective rescue strategies are available in the event of an accident.

17.3 In particular, the Sub-Committee noted that the proposed mandatory drills would cover the following:

- .1 identification of all spaces where there may be an oxygen deficient, flammable and/or toxic atmosphere, including any risks associated with the particular ship, cargo or trade;
- .2 entry permit procedures;
- .3 checking of communication procedures;
- .4 ventilation and practising the atmosphere testing procedures;
- .5 practising the procedures to be followed to effect the rescue of an incapacitated person from the enclosed space; and
- .6 first aid and resuscitation techniques.

17.4 The Sub-Committee, in considering the above proposal, noted that the majority of delegations who spoke were of the view that the issuance of guidance (e.g., resolution A.864(20), company policies, etc.) had not achieved the desired effect with regard to ensuring the proper knowledge, training and understanding of the dangers of entering enclosed spaces and, therefore, the only practical approach to reduce the number of fatalities was to have SOLAS mandated drills so that seafarers who may be expected to, or decide to, enter enclosed spaces are familiarized with the precautions to be taken prior to entry and the effective rescue strategies in the event of an accident.

17.5 Other delegations expressed the view that the SOLAS Convention was not the appropriate instrument to address this important issue, bearing in mind that such fatalities are a failure of the safety management system, and proposed that this matter would be better addressed in the context of the STCW Convention and/or the ISM Code, as appropriate.

17.6 In light of the above, the Sub-Committee decided to instruct the Working Group on Revision of the Recommendations for Entering Enclosed Spaces Aboard Ships, established under agenda item 10 (see paragraph 10.20), to consider the proposed amendments to SOLAS chapters III and XI, based on annexes 1 and 2 to document DSC 15/17, and advise the Sub-Committee accordingly.

Report of the working group

17.7 Having considered the part of the report of the working group (DSC 15/WP.4) related to this item, the Sub-Committee took action as outlined hereunder.

17.8 The Sub-Committee noted that the group, after an extensive discussion, had agreed that the accidents associated with entry into enclosed spaces were due to a lack of a properly functioning safety culture on board some ships. In considering how best to proceed, some delegations expressed the opinion that this issue should be addressed through the mandating of enclosed space entry drills, while others expressed the view that procedures incorporated through the ISM Code would be more appropriate.

17.9 Having noted that consensus on a way forward could not be reached due to time constraints, the Sub-Committee invited Member Governments and international organizations to submit comments and proposals on this issue to DSC 16.

17.10 The Secretariat was requested to inform BLG 15 of the above outcome for their consideration and action, as appropriate, with regard to this agenda item. In addition, the Sub-Committee, having considered that document DSC 15/17 contained important issues that also fall within the purview of BLG Sub-Committee, invited BLG 15 to consider the above document and advise DSC 16, as appropriate.

18 ACTION REQUESTED OF THE COMMITTEES

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

- .1 consider extending by three days the next meeting of the E&T Group, which is tentatively scheduled to be held from 11 to 15 April 2011, in order to finalize the work related to chapter 7 of the IMDG Code so that it can be included in the draft text of amendment 36-12, in time for consideration by DSC 16 (paragraphs 3.47 to 3.49 and 14.8);
- .2 endorse the course of action taken by the Sub-Committee, which was to approve DSC.1/Circ.63 on Carriage of iron ore fines that may liquefy (paragraph 4.26);
- .3 note that the draft amendments (01-11) to the IMSBC Code were completed and that the Secretary-General was requested to circulate them in accordance with SOLAS article VIII, for adoption by MSC 89 (paragraph 4.32 and annex 3);
- .4 note that SLF 53 has been invited to consider the need for revising the requirements of timber load lines in the 1966 Load Lines Convention and the 1988 Load Lines Protocol (paragraph 7.6);
- .5 note that SLF 53 has been invited to consider the problems associated with excessive stability of timber deck carriers when developing the new generation intact stability criteria (paragraph 7.7);

- .6 endorse the Sub-Committee's decision that future revisions of the IMO/ILO/UNECE Guidelines for packing cargo transport units (CTUs) should be under the coordination of this Organization and that the Secretariats of IMO, ILO and UNECE be invited to work together on these matters and advise DSC 16 accordingly (paragraph 9.6);
 - .7 note the Sub-Committee's view that matters related to the use of inert gas systems on tankers should be included in a separate set of guidance, which is under the purview of the BLG Sub-Committee, and that BLG 15 has been invited to consider this issue, taking into account document FP 54/17/1, and advise MSC 89 accordingly (paragraph 10.23);
 - .8 note that the Sub-Committee has completed its work on the draft Revised Recommendations for entering enclosed spaces aboard ships, for approval by MSC 89, and forwarded them to STW 42, BLG 15 and FP 55, as instructed by MSC 87 (paragraphs 10.26 to 10.29);
 - .9 approve the proposed revisions to the Sub-Committee's biennial agenda (paragraph 14.3 and annex 7);
 - .10 approve the Sub-Committee's provisional agenda for DSC 16 (paragraph 14.3 and annex 8);
 - .11 note the report of the status of the planned outputs of the High-level Action Plan of the Organization and priorities for the 2010-2011 biennium relevant to the Sub-Committee (paragraph 14.4 and annex 9); and
 - .12 note the list of proposed outputs for the 2012-2013 biennium in SMART terms and take action as appropriate (paragraph 14.5 and annex 10).
- 18.2 The Maritime Safety Committee, at its eighty-ninth session, is invited to:
- .1 approve the draft MSC circular on Lists of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted or for which a fixed gas fire-extinguishing system is ineffective (paragraph 4.27 and annex 1);
 - .2 approve the draft MSC circular on Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds (paragraph 4.28 and annex 2);
 - .3 endorse the Sub-Committee's action to request ISO to consider the issue of the racking strength of timber deck cargoes when revising ISO 4472:1983 (paragraph 7.8);
 - .4 approve the draft Assembly resolution on Adoption of the Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 2011 (2011 TDC Code), for submission to the twenty-seventh session of the Assembly for adoption (paragraph 7.11 and annex 4);
 - .5 approve the draft amendments to the IMO/ILO/UNECE Guidelines for packing cargo transport units (CTUs) and request the Secretariat to forward them to ILO and the UNECE for concurrent approval, as appropriate (paragraph 9.5 and annex 5);

- .6 note that Sub-Committee's views on the need for mandatory provisions on the fitting of a low pressure audible alarm on breathing apparatus has been forwarded to FP 55 (paragraph 10.24);
- .7 approve the draft Assembly resolution on Adoption of the Revised Recommendations for entering enclosed spaces aboard ships, for submission to the twenty-seventh session of the Assembly for adoption (paragraph 10.26 and annex 6);
- .8 note the views expressed on the need for training related to container inspection programmes to assist developing countries for carrying out such programmes and consider inviting the Technical Co-operation Committee to include such training in its Integrated Technical Co-operation Programme (paragraph 11.5);
- .9 note the actions taken in regard to the installation of equipment for detection of radioactive sources and radioactive contaminated objects in ports (paragraphs 12.4 and 12.5);
- .10 note the actions taken regarding the amendments to SOLAS to mandate enclosed space entry and rescue drills (paragraphs 17.9 and 17.10); and
- .11 approve the report in general.

18.3 The Marine Environment Protection Committee, at its sixty-second session, is invited to note the outcome of the Sub-Committee consideration of matters related to waste reception facilities for goods subject to MARPOL Annex III, in particular, the view that amendments to MARPOL Annex III were not considered necessary, taking into account that when packaged cargoes are damaged, they no longer fall within the definition of packaged cargo and, therefore, could be treated as residues or wastes, which is covered under MARPOL Annex V (paragraphs 16.6 to 16.8).

ANNEX 1

DRAFT MSC CIRCULAR

LISTS OF SOLID BULK CARGOES FOR WHICH A FIXED GAS FIRE-EXTINGUISHING SYSTEM MAY BE EXEMPTED OR FOR WHICH A FIXED GAS FIRE-EXTINGUISHING SYSTEM IS INEFFECTIVE

1 The Maritime Safety Committee, at its sixty-fourth session (5 to 9 December 1994), agreed that there was a need to provide Administrations with guidelines regarding the provisions of SOLAS regulation II-2/10 concerning exemptions from the requirements for fire-extinguishing systems.

2 Consequently, the Committee approved MSC/Circ.671 whereby it agreed to:

- .1 a list of solid bulk cargoes, for which a fixed gas fire-extinguishing system may be exempted (table 1) and recommended Member Governments to take into account the information contained in table 1 when granting exemptions under the provisions of SOLAS regulation II-2/10.7.1.4; and
- .2 a list of solid bulk cargoes for which a fixed gas fire-extinguishing system is ineffective (table 2), and recommended that cargo spaces in a ship engaged in the carriage of cargoes listed in table 2 be provided with a fire-extinguishing system which provides equivalent protection. The Committee also agreed that Administrations should take account of the provisions of SOLAS regulation II-2/19.3.1 when determining suitable requirements for an equivalent fire-extinguishing system.

3 The Maritime Safety Committee, at its seventy-ninth session (1 to 10 December 2004), reviewed the above-mentioned tables and approved MSC/Circ.1146. The Committee decided that the annexed tables should be periodically reviewed and invited Member Governments to provide the Organization, when granting exemptions to ships for the carriage of cargoes not included in table 1, with data on the non-combustibility or fire risk properties of such cargoes. Member Governments were also requested to provide the Organization, when equivalent fire-extinguishing systems are required for the agreed carriage of cargoes not included in table 2, with data on the inefficiency of fixed gas fire-extinguishing systems for such cargoes.

4 The Maritime Safety Committee, at its [eighty-ninth session (11 to 20 May 2011)], noting the mandatory status of the IMSBC Code, reviewed the aforementioned lists of solid bulk cargoes to align certain names in the lists with those in the recent version of the IMDG Code, and approved them, as set out in tables 1 and 2 of the annex.

5 The purpose of this circular is to provide guidance to Administrations. It should not, however, be considered as precluding Administrations from their right to grant exemptions for cargoes not included in table 1 or to impose any conditions when granting such exemptions under the provisions of SOLAS regulation II-2/10.7.1.4.

6 This circular supersedes MSC/Circ.1146.

ANNEX

TABLE 1

LIST OF SOLID BULK CARGOES FOR WHICH A FIXED GAS FIRE-EXTINGUISHING SYSTEM MAY BE EXEMPTED

Cargoes including, but not limited to, those listed in regulation II-2/10

Ore
Coal (COAL and BROWN COAL BRIQUETTES)
Grain
Unseasoned timber

Cargoes listed in the International Maritime Solid Bulk Cargoes (IMSBC) Code, which are not combustible or constitute a low fire risk.

All cargoes not categorized into Group B in the IMSBC Code

The following cargoes categorized into Group B in the IMSBC Code:

ALUMINIUM SMELTING BY-PRODUCTS, UN 3170
(Both the names ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIUM REMELTING BY-PRODUCTS are in use as proper shipping name)
ALUMINIUM FERROSILICON POWDER, UN 1395
ALUMINIUM SILICON POWDER, UNCOATED, UN 1398
CALCINED PYRITES (Pyritic ash)
DIRECT REDUCED IRON (A) Briquettes, hot moulded
FERROPHOSPHORUS (including briquettes)
FERROSILICON, with more than 30% but less than 90% silicon, UN 1408
FERROSILICON, with 25% to 30% silicon, or 90% or more silicon
FLUORSPAR (calcium fluoride)
LIME (UNSLAKED)
LOGS
MAGNESIA (UNSLAKED)
PEAT MOSS
PETROLEUM COKE*
PITCH PRILL
PULP WOOD
RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY MATERIAL (LSA-1), UN 2912 (non fissile or fissile – excepted)
RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECT(S) (SCO-I or SCO-II), UN 2913 (non fissile or fissile – excepted)
ROUNDWOOD
SAW LOGS
SILICOMANGANESE
SULPHUR, UN 1350
TIMBER
VANADIUM ORE
WOODCHIPS, with moisture content of 15% or more
ZINC ASHES, UN 1435

* When loaded and transported under the provisions of the IMSBC Code.

TABLE 2

LIST OF SOLID BULK CARGOES FOR WHICH A FIXED GAS FIRE-EXTINGUISHING SYSTEM IS INEFFECTIVE AND FOR WHICH A FIRE-EXTINGUISHING SYSTEM GIVING EQUIVALENT PROTECTION SHALL BE AVAILABLE

The following cargoes categorized into Group B of the IMSBC Code:

ALUMINIUM NITRATE, UN 1438
AMMONIUM NITRATE, UN 1942 (with not more than 0.2% total combustible material, including any organic substance, calculated as carbon to the exclusion of any other added substance)
AMMONIUM NITRATE BASED FERTILIZER, UN 2067
AMMONIUM NITRATE BASED FERTILIZER, UN 2071
BARIUM NITRATE, UN 1446
CALCIUM NITRATE, UN 1454
LEAD NITRATE, UN 1469
MAGNESIUM NITRATE, UN 1474
POTASSIUM NITRATE, UN 1486
SODIUM NITRATE, UN 1498
SODIUM NITRATE AND POTASSIUM NITRATE, MIXTURE, UN 1499

ANNEX 2

DRAFT MSC CIRCULAR

AMENDMENT TO THE RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS APPLICABLE TO THE FUMIGATION OF CARGO HOLDS (MSC.1/CIRC.1264)

1 The Maritime Safety Committee, at its eighty-fourth session (7 to 16 May 2008), approved the Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds (MSC.1/Circ.1264), which apply to the carriage of solid bulk cargoes, including grain, in pursuance of the requirement of SOLAS regulation VI/4.

2 The Maritime Safety Committee, at its [eighty-ninth session (11 to 20 May 2011)], approved the following amendment to section 5 (Safety Precautions – General) of the aforementioned Recommendations, as prepared by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers at its fifteenth session:

"5.3 Fire risk

5.3.1 When Phosphine generating formulations are used to fumigate, any collected residue may ignite."

3 Member Governments are invited to bring the above amendment to the Recommendations to the attention of competent authorities, seafarers, fumigators, fumigant and pesticide manufacturers and others concerned.

ANNEX 3

**DRAFT AMENDMENTS (01-11) TO THE INTERNATIONAL MARITIME
SOLID BULK CARGOES (IMSBC) CODE**

APPENDIX 1

INDIVIDUAL SCHEDULES OF SOLID BULK CARGOES

ALUMINIUM FERROSILICON POWDER, UN 1395

PRECAUTIONS

1 In the second sentence, replace the words "competent authority" with "Administration".

ALUMINIUM NITRATE, UN 1438

PRECAUTIONS

2 At the end of the paragraph, add the following sentence:

"The master and officers are to note that the ship's fixed gas fire-fighting installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

ALUMINIUM SILICON POWDER, UNCOATED UN 1398

PRECAUTIONS

3 In the second sentence, replace "competent authority" with "Administration".

AMMONIUM NITRATE UN 1942

with not more than 0.2% total combustible substances including any organic substance calculated as carbon, to the exclusion of any other added substance

DESCRIPTION

4 Delete "Supporter of combustion. Hygroscopic."

5 Add a new note after Description, as follows:

"Note:

This schedule should only be used for substances that do not exhibit properties of class 1 when tested in accordance to Test Series 1 and 2 of class 1 (see UN Manual of Tests and Criteria, part 1)."

HAZARD

- 6 At the beginning of the first paragraph, add "Oxidizer, supports combustion."
7 In the existing first sentence, replace "these materials" with "this cargo".

STOWAGE & SEGREGATION

- 8 In the first sentence, replace "should" with "shall".

LOADING

- 9 In the first sentence, replace "4 and 5" with "4, 5 and 6".

During loading, the following provisions shall be complied with:

- 10 Delete the first bullet related to smoking.

PRECAUTIONS

- 11 In the first paragraph, replace the existing third sentence with the following:
"The master and officers are to note that the ship's fixed gas fire-extinguishing installation will be ineffective on the fire involving this cargo and that applying water may be necessary."
12 In the first paragraph, delete the last sentence.

CARRIAGE

- 13 Add a new second sentence as follows:
"The temperature of this cargo shall be monitored and recorded daily during the voyage to detect decomposition, which may result in heating and oxygen depletion."

DISCHARGE

- 14 Replace the second sentence with the following new text:
"Bunkering of fuel oil shall not be allowed. Pumping of fuel oil in spaces adjacent to the cargo spaces for this cargo, other than the engine-room, shall not be allowed."

EMERGENCY PROCEDURES

- 15 In the provisions regarding Fire in cargo space containing this material, after the words "Ship's fixed gas fire-extinguishing", insert the word "installation".
16 In the provisions regarding Fire in cargo space containing this material, replace "Use copious quantities of water" with "Use copious quantities of water and isolate the source of heat, if any".

AMMONIUM NITRATE BASED FERTILIZER UN 2067

DESCRIPTION

17 In subparagraph .2, after "dolomite", insert the words "and/or mineral calcium sulphate".

NOTES:

18 In note 3, delete the word "explosive".

STOWAGE & SEGREGATION

19 In the fourth sentence, replace "any tank or double bottom" with "any tank, double bottom or pipe".

LOADING

20 In the first sentence, replace "4 and 5" with "4, 5 and 6".

PRECAUTIONS

21 After the first sentence, add the following new sentence:

"The master and officers are to note that the ship's fixed gas fire-extinguishing installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

CARRIAGE

22 In the second sentence, replace "resulting in spontaneous" with "which may result in".

DISCHARGE

23 Replace the first sentence with the following:

"Bunkering of fuel oil shall not be allowed. Pumping of fuel oil in spaces adjacent to the cargo spaces for this cargo, other than the engine-room, shall not be allowed."

24 After the second new sentence, add:

"Ammonium nitrate based fertilizers are hygroscopic and may cake in overhangs, impairing safety during discharge."

EMERGENCY PROCEDURES

25 In the provisions regarding Fire in cargo space containing this material, replace "Ship's fixed fire-fighting installation" with "Ship's fixed gas fire-extinguishing installation".

26 In the provisions regarding Fire in cargo space containing this material, in the third sentence, after the word "water", insert the words "and isolate the source of heat, if any".

AMMONIUM NITRATE BASED FERTILIZER UN 2071

DESCRIPTION

27 In the second paragraph, insert a footnote associated with "(see UN Manual of Tests and Criteria, part III, subsection 38.2)", as follows:

"* See also section 5 of Appendix 2 to this Code."

HAZARD

28 In the first paragraph, replace the word "mixtures" with "cargoes" in the first sentence, and in the last sentence replace the words "mixtures is subject to the" with "cargoes are subject to an".

STOWAGE & SEGREGATION

29 In the last sentence, after the word "standard", insert "this cargo shall be stowed".

LOADING

30 In the first paragraph, first sentence, replace "4 and 5" with 4, 5 and 6".

During loading, the following provisions shall be complied with:

31 Add a new bullet as follows:

- "• As far as reasonably practicable, combustible securing and protecting materials shall not be used. When wooden dunnage is necessary, only a minimum amount shall be used."

PRECAUTIONS

32 After the first sentence, add the following:

"The master and officers are to note that the ship's fixed gas fire-fighting installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

DISCHARGE

33 Replace the first sentence with the text:

"Bunkering of fuel oil shall not be allowed. Pumping of fuel oil in spaces adjacent to the cargo spaces for this cargo, other than the engine-room, shall not be allowed."

34 After the second new sentence, add:

"Ammonium nitrate based fertilizers are hygroscopic and may cake in overhangs, impairing safety during discharge."

EMERGENCY PROCEDURES

35 In the provisions regarding Fire in cargo space containing this material, replace "Ship's fixed fire-fighting installation" with "Ship's fixed gas fire-extinguishing installation".

AMMONIUM NITRATE BASED FERTILIZER (non-hazardous)

DESCRIPTION

36 In subparagraph .2, after the word "dolomite", insert "and/or mineral calcium sulphate".

37 In subparagraph .4, insert a footnote associated with "(see UN Manual of Tests and Criteria, part III, subsection 38.2)", as follows:

"* See also section 5 of Appendix 2 to this Code."

HAZARD

38 Replace the entire text under this heading with the following new text:

"This cargo is non combustible or has a low fire risk. Even though this cargo is classified as non-hazardous, some of the properties of the ammonium nitrate based fertilizer classified in class 9 under UN 2071 are exhibited when heated strongly. When this cargo is heated strongly, it will decompose and give off toxic gases with the risk of toxic fumes in the cargo space, adjacent spaces and on deck. Monitoring of the cargo temperature may give an early indication of decomposition. Fertilizer dust might be irritating to skin and mucous membranes. This cargo is hygroscopic and will cake if wet."

STOWAGE & SEGREGATION

39 In the third sentence, replace the words "any tank or double bottom" with "any tank, double bottom or pipe".

40 In the fourth sentence, after the words "this type" replace "should" with "shall".

41 In the fifth sentence, replace the words "barrier" with "arrangement".

42 In the last paragraph, replace the last sentence with the following:

"This requirement need not apply to short international voyages." with "This requirement need not apply if the bulkhead is class A-60 or to short international voyages."

LOADING

43 In the first paragraph, first sentence, replace "4 and 5" with 4, 5 and 6".

PRECAUTIONS

44 After the first sentence, add the following new text:

"The master and officers are to note that the ship's fixed gas fire-fighting installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

CARRIAGE

45 The second paragraph is deleted.

DISCHARGE

46 Replace the first sentence with the following new text:

"Bunkering of fuel oil shall not be allowed. Pumping of fuel oil in spaces adjacent to the cargo spaces for this cargo, other than the engine-room, shall not be allowed. Ammonium nitrate based fertilizers are hygroscopic and may cake in overhangs, impairing safety during discharge."

EMERGENCY PROCEDURES

47 In the provisions regarding Fire in cargo space containing this material, replace "Ship's fixed fire-fighting installation" with "Ship's fixed gas fire-extinguishing installation".

48 In the provisions regarding Fire in cargo space containing this material, in the third sentence, after "water", insert "and isolate the source of heat, if any".

AMMONIUM SULPHATE

HAZARD

49 At the end of the paragraph, add the following new text:

"This cargo is hygroscopic and will cake if wet."

LOADING

50 In the last sentence, replace "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

DISCHARGE

51 At the beginning of the paragraph, add the following new text:

"Ammonium sulphate is hygroscopic and may cake in overhangs, impairing safety during discharge."

BARIUM NITRATE, UN 1446

PRECAUTIONS

52 At the end of the paragraph, add the following new text:

"The master and officers are to note that the ship's fixed gas fire-fighting installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

BORAX (PENTAHYDRATE CRUDE)

DISCHARGE

53 At the beginning of the paragraph, add the following new text:

"Borax (pentahydrate crude) is hygroscopic and may cake in overhangs, impairing safety during discharge."

BORAX, ANHYDROUS (crude or refined)

LOADING

54 Replace "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

DISCHARGE

55 At the beginning of the paragraph, add the following new text:

"Borax anhydrous (crude or refined) is hygroscopic and may cake in overhangs, impairing safety during discharge."

BROWN COAL BRIQUETTES

HAZARD

56 Replace the text with the following:

"This cargo is easily ignited, is liable to heat spontaneously, may ignite spontaneously and may deplete oxygen in the cargo space."

APPENDIX

57 In paragraph 1.1, in the section for Precautions, delete the words "and opening cargo space enclosures".

CALCIUM NITRATE, UN 1454

PRECAUTIONS

58 At the end of the paragraph, add the following new text:

"The master and officers are to note that the ship's fixed gas fire-fighting installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

DISCHARGE

59 At the beginning of the paragraph, add the following new text:

"Calcium nitrate is hygroscopic and may cake in overhangs, impairing safety during discharge."

CALCIUM NITRATE FERTILIZER

LOADING

60 Replace the text "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

CLAY

CLEAN-UP

61 Replace the text with "After discharge of this cargo, particular attention shall be given to the bilge wells of the cargo spaces".

DIAMMONIUM PHOSPHATE (D.A.P.)

LOADING

62 Replace the text "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

DISCHARGE

63 At the beginning of the paragraph, add the following new text:

"Diammonium phosphate is hygroscopic and may cake in overhangs, impairing safety during discharge."

DISTILLERS DRIED GRAINS WITH SOLUBLES

64 After existing schedule on DIRECT REDUCED IRON (C), add new schedule on DISTILLERS DRIED GRAINS WITH SOLUBLES, as follows:

"DISTILLERS DRIED GRAINS WITH SOLUBLES

DESCRIPTION

A dried blend of coarse grains and condensed distillers solubles that remain after the fermentation of the starch fraction of corn with yeasts and enzymes to produce ethanol and carbon dioxide. Yellowish brown in colour with a cooked corn odour. Moisture content not more than 13% and oil content not more than 11%. This schedule is not applicable to wet distillers grain (WDG) and distillers dried grain (DDG), which are not transported in bulk.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	450 to 520	1.92 to 2.22
SIZE	CLASS	GROUP
Not applicable	Not applicable	C

HAZARD

No special hazards.

This cargo is non-combustible or has a low fire risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD AND CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded shall be closed.

LOADING

Load in open unconfined areas. Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

No special requirements.

VENTILATION

No special requirements.

CARRIAGE

Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhanging faces, as necessary.

CLEAN-UP

No special requirements."

FERROPHOSPHORUS (including briquettes)

CARRIAGE

65 Replace the text with the following new text:

"For quantitative measurement of flammable and toxic gases such as Phosphine, which may be evolved from this cargo in accordance with the cargo information, suitable detectors for each gas or combination of gases shall be on board while this cargo is carried. The detectors shall be of certified safe type for use in explosive atmosphere. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during the voyage, and the results of the measurements shall be recorded and kept on board."

FERROSILICON UN 1408

APPENDIX – DETAILED REQUIREMENTS

66 In the first sentence, replace "competent authority" with "Administration", in all cases.

FERROSILICON with 25% to 30% silicon, or 90% or more silicon

LOADING

67 Replace the second sentence with the following new text:

"As the density of the cargo is extremely high, the tanktop may be overstressed unless the cargo is evenly spread across the tanktop to equalize the weight distribution. Due consideration shall be paid to ensure that the tanktop is not overstressed during voyage and during loading by a pile of the cargo. Refer to the appendix to this schedule."

APPENDIX – DETAILED REQUIREMENTS

68 In the first and second sentences, replace "competent authority" with "Administration".

FERROUS SULPHATE HEPTAHYDRATE

69 After existing schedule on FERROUS METAL BORINGS, SHAVINGS, TURNINGS or CUTTINGS UN 2793, add a new schedule on FERROUS SULPHATE HEPTAHYDRATE, as follows:

"FERROUS SULPHATE HEPTAHYDRATE

DESCRIPTION

Pale green crystals. Highly soluble in water. Product commonly referred to as "Copperas".

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	750 to 1250	0.8 to 1.3
SIZE	CLASS	GROUP
Crystals	Not applicable	C

HAZARD

Harmful if swallowed. Causes serious eye irritation. Causes skin irritation.
This cargo is non-combustible or has a low fire-risk.
Tends to caking when damp.
This cargo is highly soluble and will be acidic when wet.
Excessive levels spilt into water systems may result in oxygen depletion from the water.

STOWAGE & SEGREGATION

"Separated from" Oxidizing substances.

HOLD AND CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Avoid contact with eyes and skin. Persons who may be in contact with the product shall wear protective clothing, gloves and eye protection. Typically, this is a non-dusty product, however, in particularly dry conditions, if dust is generated a filter mask shall also be worn. Bilge wells shall be clean, dry and covered, as appropriate, to prevent ingress of the cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Hatches of the cargo spaces shall be weathertight to prevent water ingress.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN-UP

After discharge of this cargo, the cargo spaces and the bilge wells shall be swept clean and then thoroughly washed out."

FERTILIZERS WITHOUT NITRATES (non-hazardous)

DISCHARGE

70 At the beginning of the paragraph, add the following new text:

"Fertilizers without nitrates are hygroscopic and may cake in overhangs, impairing safety during discharge."

FLY ASH

71 In the title of the schedule of FLY ASH, add the word ", DRY".

FLY ASH, WET

72 After existing schedule on FLY ASH, add a new schedule on FLY ASH, WET, as follows:

"FLY ASH, WET

DESCRIPTION

Greyish powder. This cargo is a mixture of the light, finely divided dusty fine powder residue from coal and oil fired power stations and water (not less than 10% of water). Ammonia odour.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
Not applicable	900 to 1300	0.77 – 1.11
SIZE	CLASS	GROUP
Under 1 mm	Not applicable	A

HAZARD

Wet fly ash is liable to flow if it has sufficiently high moisture content.
This cargo is non-combustible or has a low fire-risk.

STOWAGE & SEGREGATION

"Separated from" foodstuffs.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

When a cargo is carried in a ship other than specially constructed or fitted cargo ship complying with the requirements in subsection 7.3.2 of this Code, the following provisions shall be complied with:

- .1 The moisture content of the cargo shall be kept less than its TML during voyage.
- .2 Unless expressly provided otherwise in this individual schedule, the cargo shall not be handled during precipitation.

- .3 Unless expressly provided otherwise in this individual schedule, during handling of the cargo, all non-working hatches of the cargo spaces into which the cargo is loaded or to be loaded shall be closed.
- .4 The cargo may be handled during precipitation provided that the actual moisture content of the cargo is sufficiently less than its TML so that the actual moisture content is not liable to be increased beyond the TML by the precipitation.
- .5 The cargo in a cargo space may be discharged during precipitation provided that the total amount of the cargo in the cargo space is to be discharged in the port.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

The appearance of the surface of this cargo shall be checked regularly during voyage. If free water above the cargo or fluid state of the cargo is observed during voyage, the master shall take appropriate actions to prevent cargo shifting and potential capsize of the ship, and give consideration to seeking emergency entry into a place of refuge.

DISCHARGE

No special requirements.

CLEAN-UP

After discharge of this cargo, the bilge wells and the scuppers of the cargo spaces shall be checked and any blockage in the bilge wells and the scuppers shall be removed."

GRANULAR FERROUS SULPHATE

73 After the new schedule on FLY ASH, WET, add a new schedule on GRANULAR FERROUS SULPHATE, as follows:

"GRANULAR FERROUS SULPHATE

DESCRIPTION

Grey to brown granules. Absorbs moisture and is highly soluble in water.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m³)	STOWAGE FACTOR (m³/t)
30° to 45°	1100 to 1600	0.63 – 0.9
SIZE	CLASS	GROUP
Up to 15 mm	Not applicable	C

HAZARD

Harmful if swallowed. Causes serious eye irritation. Causes skin irritation.
This cargo is non-combustible or has a low fire-risk.
Tends to caking when damp.
This cargo is highly soluble and will be acidic when wet.
Excessive levels spilt into water systems may result in oxygen depletion from the water.

STOWAGE & SEGREGATION

"Separated from" oxidizing substances

HOLD AND CLEANLINESS

Clean and dry as relevant to the hazards of the cargo

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4, 5 and 6 of the Code.

PRECAUTIONS

Avoid contact with eyes and skin. Persons who may be in contact with the product shall wear protective clothing, gloves and eye protection. Minimize dust generation when loading. If dust is generated a filter mask shall also be worn.
Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Hatches of the cargo spaces shall be weathertight to prevent water ingress.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN-UP

After discharge of this cargo, the cargo spaces and the bilge wells shall be swept clean and then thoroughly washed out."

GYPSUM

WEATHER PRECAUTIONS

74 In the second and third sentences, replace the words "handled" and "handling" with "loaded" and "loading", respectively.

LEAD NITRATE, UN 1469

PRECAUTIONS

75 At the end of the paragraph, add the following text:

"The master and officers are to note that the ship's fixed gas fire-fighting installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

MAGNESIUM NITRATE, UN 1474

PRECAUTIONS

76 Replace the sentence with the following new text:

"The master and officers are to note that the ship's fixed gas fire-fighting installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

DISCHARGE

77 At the beginning of the paragraph, add:

"Magnesium nitrate is hygroscopic and may cake in overhangs, impairing safety during discharge."

MAGNESIUM SULPHATE FERTILIZERS

78 After existing schedule on MAGNESIUM NITRATE, UN 1474, add a new schedule on MAGNESIUM SULPHATE FERTILIZERS, as follows:

"MAGNESIUM SULPHATE FERTILIZERS

DESCRIPTION

Powdered fertilizers or fertilizer components containing magnesium sulphate.
Grey to brown powder. Partially soluble in water and may be dusty.

CHARACTERISTICS

ANGLE OF REPOSE	BULK DENSITY (kg/m ³)	STOWAGE FACTOR (m ³ /t)
30° to 35°	850 to 1150	0.87 – 1.18
SIZE	CLASS	GROUP
Powder	Not applicable	C

HAZARD

May be harmful if swallowed. May cause skin or eye irritation.
This cargo is non-combustible or has a low fire-risk.
This cargo is partially soluble.
Dusty but may cake if wetted.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

Clean and dry as relevant to the hazards of the cargo.

WEATHER PRECAUTIONS

This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo all non-working hatches of the cargo spaces into which this cargo is loaded shall be closed.

LOADING

Trim in accordance with the relevant provisions required under sections 4, 5 and 6 of the Code.

PRECAUTIONS

Avoid contact with eyes and skin. Minimize dust generation when loading. Persons who may be exposed to the dust of the cargo shall wear goggles or other equivalent dust eye protection and dust filter mask. Those persons shall wear protective clothing, as necessary. Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

VENTILATION

The cargo spaces carrying this cargo shall not be ventilated during voyage.

CARRIAGE

Hatches of the cargo spaces shall be weathertight to prevent water ingress.

DISCHARGE

If this cargo has hardened, it shall be trimmed to avoid the formation of overhangs, as necessary.

CLEAN-UP

After discharge of this cargo, the cargo spaces and the bilge wells shall be swept clean and then thoroughly washed out."

METAL SULPHIDE CONCENTRATES

LOADING

79 Delete the text ", in particular on smaller ships, i.e. 100 m long or less."

MINERAL CONCENTRATES

BULK CARGO SHIPPING NAMES

80 Delete the sentence "All known Bulk Cargo Shipping Names (BCSN) of mineral concentrates are listed above but the list is not exhaustive" after the list of Bulk Cargo Shipping Names.

LOADING

81 Delete the text ", in particular on smaller ships, i.e. 100 m long or less".

MONOAMMONIUM PHOSPHATE (M.A.P.)

LOADING

82 Replace the text "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

DISCHARGE

83 At the beginning of the paragraph, add:

"Monoammonium phosphate is hygroscopic and may cake in overhangs, impairing safety during discharge."

PHOSPHATE ROCK (calcined)

DISCHARGE

84 At the beginning of the paragraph, add:

"Phosphate rock (calcined) is hygroscopic and may cake in overhangs, impairing safety during discharge."

POTASH

LOADING

85 Replace the text "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

DISCHARGE

86 At the beginning of the paragraph, add:

"Potash is hygroscopic and may cake in overhangs, impairing safety during discharge."

POTASSIUM CHLORIDE

LOADING

87 Replace the text "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

DISCHARGE

88 At the beginning of the paragraph, add the following new text:

"Potassium chloride is hygroscopic and may cake in overhangs, impairing safety during discharge."

POTASSIUM NITRATE UN 1486

LOADING

89 Replace the text "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

PRECAUTIONS

90 At the end of the paragraph, add:

"The master and officers are to note that the ship's fixed gas fire-fighting installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

DISCHARGE

91 At the beginning of the paragraph, add:

"Potassium nitrate is hygroscopic and may cake in overhangs, impairing safety during discharge."

POTASSIUM SULPHATE

LOADING

92 Replace the text "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

PYRITES, CALCINED (Calcined Pyrites)

PRECAUTIONS

93 In the second sentence, replace the words "lime before loading" with "protective coating such as lime-wash before loading to avoid any potential corrosive reaction between the cargo, water and steel."

RASORITE (ANHYDROUS)

DISCHARGE

94 At the beginning of the paragraph, add:

"Rasorite (anhydrous) is hygroscopic and may cake in overhangs, impairing safety during discharge."

SALT

WEATHER PRECAUTIONS

95 In the second and third sentences, replace the words "handled" and "handling" with "loaded" and "loading", respectively.

SEED CAKE, containing vegetable oil UN 1386 (b)

DESCRIPTION

96 In the last paragraph after the first sentence, add the following new text:

"The provisions of this schedule should also not apply to mechanically expelled citrus pulp pellets containing not more than 2.5% oil and 14% oil and moisture combined."

PRECAUTIONS

97 In the fifth sentence replace "it becomes apparent that fire is not liable to take place in the cargo space, to avoid the possibility of ignition of solvent vapours" with "fire is apparent".

REMARKS

98 Delete the first sentence.

SEED CAKE UN 2217

PRECAUTIONS

99 In the existing fourth sentence, replace the text "it becomes apparent that fire is not liable to take place in the cargo space, to avoid the possibility of ignition of solvent vapours" with "fire is apparent".

REMARKS

100 Delete the first sentence.

SEED CAKE (non-hazardous)

DESCRIPTION

101 At the end of the first paragraph, add a new sentence as follows:

"The provisions of this schedule also apply to mechanically expelled citrus pulp pellets containing not more than 2.5% oil and 14% oil and moisture combined."

SODIUM NITRATE, UN 1498

PRECAUTIONS

102 At the end of the paragraph, add:

"The master and officers are to note that the ship's fixed gas fire-fighting installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

DISCHARGE

103 At the beginning of the paragraph, add:

"Sodium nitrate is hygroscopic and may cake in overhangs, impairing safety during discharge."

SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE UN 1499

LOADING

104 Replace the text "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

PRECAUTIONS

105 At the end of the paragraph, add the following new text:

"The master and officers are to note that the ship's fixed gas fire-fighting installation will be ineffective on fires involving this cargo and that applying copious amounts of water may be necessary."

DISCHARGE

106 At the beginning of the paragraph, add the following new text:

"Sodium nitrate and potassium nitrate mixture is hygroscopic and may cake in overhangs, impairing safety during discharge."

SULPHUR (formed, solid)

PRECAUTIONS

107 Replace the third sentence "Holds including trimming plates and tanktops shall be treated with effective, commercially available protective coating or lime-washed to avoid any potential corrosive reaction between sulphur, water and steel" with "Holds including trimming plates and tanktops shall be treated with protective coating such as lime-wash to avoid any potential corrosive reaction between sulphur, water and steel."

SUPERPHOSPHATE

LOADING

108 Replace the text "under sections 4 and 5 of the Code" with "under sections 4, 5 and 6 of the Code".

DISCHARGE

109 At the beginning of the paragraph, add the following new text:

"Superphosphate is hygroscopic and may cake in overhangs, impairing safety during discharge."

HAZARD

These cargoes are liable to cause oxygen depletion and increase of carbon dioxide in the cargo space and adjacent spaces.

These cargoes are non-combustible or have a low fire-risk.

STOWAGE & SEGREGATION

No special requirements.

HOLD CLEANLINESS

No special requirements.

WEATHER PRECAUTIONS

No special requirements.

LOADING

Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code.

PRECAUTIONS

Entry of personnel into cargo and adjacent confined spaces shall not be permitted until tests have been carried out and it has been established that the oxygen level is 21%. If this condition is not met, additional ventilation shall be applied to the cargo hold or adjacent enclosed spaces and remeasuring shall be conducted after a suitable interval.

An oxygen meter shall be worn and activated by all crew when entering cargo and adjacent enclosed spaces.

VENTILATION

Ventilation of enclosed spaces adjacent to a cargo hold before entry may be necessary even if these spaces are apparently sealed from the cargo hold.

CARRIAGE

No special requirements.

DISCHARGE

No special requirements.

CLEAN-UP

No special requirements.

EMERGENCY PROCEDURES

SPECIAL EMERGENCY EQUIPMENT TO BE CARRIED

Self-contained breathing apparatus and an oxygen meter should be available.

EMERGENCY PROCEDURES

Nil

EMERGENCY ACTION IN THE EVENT OF FIRE

Batten down; use ship's fixed fire-fighting installation if fitted. Exclusion of air may be sufficient to control fire.

MEDICAL FIRST AID

Refer to Medical First Aid Guide (MFAG), as amended.

WOOD PULP PELLETS

115 The existing schedule on WOOD PULP PELLETS is deleted in its entirety.

APPENDIX 3

Properties of solid bulk cargoes

116 In subsection 1.1, delete the following bulk cargo shipping names:

CASTOR BEANS
SODIUM NITRATE

117 In subsection 1.1, add the following bulk cargo shipping names:

GRANULAR FERROUS SULPHATE
MAGNESIUM SULPHATE FERTILIZERS
TAPIOCA
WOOD PELLETS

APPENDIX 4

Index

118 Replace the BCSN "FLY ASH" with "FLY ASH, DRY".

119 Add the following rows in the table:

MATERIAL	GROUP	REFERENCES
DISTILLERS DRIED GRAINS WITH SOLUBLES	C	
FERROUS SULPHATE HEPTAHYDRATE	C	
FLY ASH, WET	A	
GRANULAR FERROUS SULPHATE	C	
LOGS	B	see Wood Products – General schedule
MAGNESIUM SULPHATE FERTILIZERS	C	
PULP WOOD	B	see Wood Products – General schedule
ROUNDWOOD	B	see Wood Products – General schedule
SAW LOGS	B	see Wood Products – General schedule
TIMBER	B	see Wood Products – General schedule
Wood Products – General	B	

120 Delete "WOOD PULP PELLETS" and "Pellets, wood pulp".

ANNEX 4

DRAFT ASSEMBLY RESOLUTION

**CODE OF SAFE PRACTICE FOR SHIPS
CARRYING TIMBER DECK CARGOES, 2011 (2011 TDC CODE)**

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING further that, by resolution A.715(17), it had adopted the Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 1991,

RECOGNIZING the need to improve the provisions contained in the Code in the light of experience gained,

HAVING CONSIDERED the recommendations made by the Maritime Safety Committee at its [eighty-ninth] session,

1. ADOPTS the Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 2011 (2011 TDC Code), set out in the Annex to the present resolution;
2. RECOMMENDS Governments to use the provisions of the 2011 TDC Code as a basis for relevant safety standards;
3. AUTHORIZES the Maritime Safety Committee to amend the Code as necessary in the light of further studies and experience gained from the implementation of the provisions contained therein;
4. REVOKES resolution A.715(17).

ANNEX

**DRAFT REVISED CODE OF SAFE PRACTICE FOR SHIPS CARRYING TIMBER DECK
CARGOES, 2011 (2011 TDC CODE)**

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PREFACE

The Code of Safe Practice for Ships Carrying Timber Deck Cargoes was first circulated by the Organization in 1972 and subsequently amended in 1978.

The Code was revised by IMO resolution A.715(17) – Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 1991, which was adopted on 6 November 1991.

This Code is based on the previous Code, which has been revised and amended in order to reflect the capability of today's ships and the equipment available on board and also taking expected future innovations in mind.

This Code is designed to assist:

- .1 shipowners, charterers, operating companies and ship's staff;
- .2 port industries, shippers and pre-packaging organizations, which are involved in preparation, loading, and stowing of timber deck cargoes; and
- .3 Administrations, manufacturers and designers of ships and equipment associated with the carriage of timber deck cargoes and those developing cargo securing manuals,

in the carriage of timber deck cargoes.

This Code is directed primarily at providing recommendations for the safe carriage of timber deck cargoes.

Status of references

The references given in this consolidated text do not form part of the Code but are inserted for ease of reference.

CHAPTER 1 – GENERAL

1.1 Purpose

1.1.1 The purpose of the Code is to ensure that timber deck cargoes are loaded, stowed and secured to prevent, as far as practicable, throughout the voyage, damage or hazard to the ship and persons on board as well as loss of cargo overboard^[1].

1.1.2 The Code provides:

- .1 practices for safe transportation;
- .2 methodologies for safe stowage and securing;
- .3 design principles for securing systems;
- .4 guidance for developing procedures and instructions to be included in ships' cargo securing manuals on safe stowage and securing; and
- .5 sample checklists for safe stowage and securing.

1.2 Application

1.2.1 The provisions of this Code apply to all ships of 24 metres or more in length, carrying a timber deck cargo. This Code will be effective from [*to be decided*].

1.2.2 Cargo securing of timber deck cargoes should be made in accordance with the requirements in the ship's Cargo Securing Manual (CSM) based on the principles either in chapter 5 or chapter 6 of Part B of this Code.

1.2.3 The Master should note that national requirements may exist which may restrict the application of either chapter 5 or chapter 6, and these may also require third party inspections to ensure that the cargo has been properly secured according to the ship's cargo securing manual.

1.2.4 Cargo securing manuals for timber deck cargoes, approved following the implementation date of this Code, should meet the contents of this Code. Existing cargo securing manuals approved under the previous Timber Deck Cargo Code (resolution A.715(17)) may remain valid.

1.3 Definitions

1.3.1 The following *definitions* apply to this Code:

General expressions

- .1 *Administration* means the Government of the State whose flag the ship is entitled to fly.
- .2 *Company* means the Owner of the ship or any other organization or person such as the Manager, or the Bareboat Charterer, who has assumed the responsibility for operation of the ship from the Ship owner and who, on assuming such responsibility, has agreed to take over all duties and responsibilities imposed by SOLAS^[2].

- .3 *Load Lines Convention* means the International Convention on Load Lines, 1966, or the 1988 Protocol relating thereto, as applicable.
- .4 *Organization* means the International Maritime Organization (IMO).
- .5 *Port industries* means the port facilities and/or stevedoring companies serving ships engaged in the stowage of timber deck cargoes.
- .6 *Shipper* means any person, organization or Government which prepares or provides a consignment for transport^[3].
- .7 *SOLAS* means the International Convention for the Safety of Life at Sea, 1974, as amended.
- .8 *2008 IS Code* means the International Code on Intact Stability, 2008.

Cargo related expressions

- .9 *Cant* means a log which is "slab-cut", i.e. ripped lengthwise so that the resulting thick pieces have two opposing, parallel flat sides and in some cases a third side which is sawn flat.
- .10 *Non-rigid cargo* means sawn wood or lumber, cants, logs, poles, pulpwood and all other types of loose timber or timber in packaged forms not fulfilling specified strength requirement, as defined in section 4.7.
- .11 *Rigid cargo package* means sawn wood or lumber, cants, logs, poles, pulpwood and all other types of timber in packaged forms, fulfilling specified strength requirement, as defined in section 4.7.
- .12 *Round wood* means parts of trees that have not been sawn on more than one long side. The term includes, among others, logs, poles and pulpwood in loose or packed form.
- .13 *Sawn wood* means parts of trees that have been sawn so that they have at least two parallel flat long sides. The term includes, among others, lumber and cants in loose or packed form.
- .14 *Timber* is used as a collective expression used for all types of wooden material covered by this Code, including both round and sawn wood but excluding wood pulp and similar cargo.

Technically related expressions

- .15 *Blocking device* means physical measures to prevent sliding and/or tipping of cargoes and/or collapse of stow.
- .16 *Lashing plan* means a sketch or drawing showing the required number and strength of securing items for the timber deck cargo to obtain safe stowage and securing of timber deck cargoes.
- .17 *Timber deck cargo* means a cargo of timber carried on an uncovered part of a freeboard or superstructure deck.

- .18 *Timber load line* means a special load line assigned to ships complying with certain conditions set out in the International Convention on Load Lines.
- .19 *Stowage Factor (SF)* means the volume occupied by one tonne of a cargo when stowed and separated in the accepted manner.
- .20 *Weather deck* means the uppermost complete deck exposed to weather and sea.
- .21 *Reeving* means the process where a rope, chain or any other type of lashing can freely move through a sheave or over a fulcrum such as a rounded angle piece, in such a manner so as to minimize the frictional effect of such movement.
- .22 *Height of cargo* means the distance from the base of the deck cargo stow to the highest part of the cargo.

PART A – OPERATIONAL REQUIREMENTS

CHAPTER 2 – GENERAL RECOMMENDATIONS ON STOWAGE AND SECURING OF TIMBER DECK CARGOES

2.1 Goals

2.1.1 The stowage and cargo securing arrangements for timber deck cargoes should enable a safe yet rational securing of the cargo so that it is satisfactorily prevented from shifting by collapsing, sliding or tipping in any direction, taking into account the acceleration forces the cargo may be subjected to throughout the voyage in the worst sea and weather conditions which may be expected.

2.1.2 This chapter lists measures and factors that should be taken under consideration in order to achieve such level of cargo securing.

2.1.3 Procedures should be established for the preparation of plans and instructions, including checklists as appropriate, for key shipboard operations^[5]. Guidance is provided in Annex A to assist the development of such checklists.

2.2 Pre-loading operation

2.2.1 Prior to loading the vessel, relevant cargo information,^[4] as defined in chapter 4 of this Code, should be provided by the shipper, according to the custom of the trade.

2.2.2 The master of the vessel should study the relevant cargo information and take the precautions necessary for proper stowage, securing and safe carriage of the cargo as defined in this Code and as prescribed in the vessel's Cargo Securing Manual.

2.2.3 Prior to loading, the stevedoring company should be made aware of specific requirements according to the ship's Cargo Securing Manual regarding stowage and securing of timber deck cargoes.

2.2.4 During loading of deck cargo the master should ensure that all tanks are maintained in such a condition that free surface effects are minimized. Ballast tanks should as far as

practicable be either full or empty and ballast movement during loading operations should be avoided.

2.2.5 Before timber deck cargo is loaded on any area of the weather deck:

- .1 hatch covers and other openings to spaces below that area should be secured closed and battened down;
- .2 air pipes and ventilators should be effectively protected and check-valves or similar devices should be examined to ascertain their effectiveness against the entry of water;
- .3 objects which might obstruct cargo stowage on deck should be removed and safely secured in places appropriate for storage;
- .4 the condition of friction enhancing arrangements, where fitted, should be checked;
- .5 accumulations of ice and snow on such area should be removed;
- .6 it is normally preferable to have all deck lashings, uprights, etc., readily available before loading on that specific area. This will be necessary should a preloading examination of securing equipment be required in the loading port; and
- .7 all sounding pipes on the deck should be reviewed and arrangements made that access to these remain as far as practicable.

2.2.6 Further aspects to be considered during pre-loading operations are given in Annex A, chapter A.1.

2.3 Permitted Loading Weights on decks and hatch covers

2.3.1 The hatch cover securing and support arrangements, chocks, etc., as well as coamings should be designed and reinforced as necessary for carriage of timber deck cargoes. Potential weight increase of timber deck cargoes due to water absorption, icing, etc., should be taken under consideration.

2.3.2 Care should be taken not to exceed the designed maximum permissible loads on weather deck and hatch covers during any stage of the voyage^[6].

2.4 Stability

2.4.1 The master should ensure that the ship condition complies with the ship's stability booklet at all times.

2.4.2 A ship carrying timber deck cargo must comply with applicable parts of the damage stability requirements as well as the 2008 Intact Stability Code (IS Code)^[11], particularly the timber deck cargo requirements. Since excessive GM values induce large accelerations, GM should preferably not exceed 3% of the breadth of the vessel, as indicated in 3.7.5 of the IS Code.

2.4.3 Ballast water exchange operations should be carried out in accordance with instructions in the Ballast Water Management Plan, if available^[12]. The ballast water exchange operation, if required, should be considered when planning the amount of cargo to be loaded on deck.

2.4.4 According to the 2008 Intact Stability Code^[11], account may be taken of the buoyancy of timber deck cargo when calculating stability curves, assuming that such cargo has a permeability up to 25%. Permeability is defined as the percentage of empty space of the volume occupied by the deck cargo. Additional curves of stability may be required if the Administration considers it necessary to investigate the influence of different permeabilities and/or assumed effective height of the deck cargo. 25% permeability corresponds to sawn wood cargo and 40%-60% permeability corresponds to round wood cargo with increasing permeability with increasing log diameters.

2.5 Load line

2.5.1 Ships assigned and making use of their timber load line should follow relevant regulations of the applicable Load Lines Convention^[13] for stowage and securing of timber as prescribed in the ship's Cargo Securing Manual.

2.6 Timber freeboard

2.6.1 The timber freeboard, if applicable, will be found in the vessel's Load Line Certificate.

2.6.2 Instructions on computation of the timber freeboard are given in the applicable Load Lines Convention^[14].

2.7 Visibility

2.7.1 Timber deck cargo should be loaded in such a manner as to ensure that the ship complies with the visibility requirements contained in SOLAS chapter V. National deviations may exist and should be taken into consideration as required dependent on the intended voyage.

2.7.2 The SOLAS requirements on visibility as well as instructions on how to calculate the visibility range are given in chapter 3.

2.8 Work Safety and Work Environment Aspects

2.8.1 The Company should establish procedures by which the ship's personnel receive relevant information on the Safety Management System^[16] in a working language or languages understood by them.

2.8.2 When deck cargo is being lashed and secured, special measures may be needed to ensure safe access to the top of, and across, the cargo so that the risk of falling is minimized. Safety helmets, proper footwear and non-obstructive high visibility garments should be worn during work on deck.

2.8.3 The risk of slipping should especially be considered during winter time when loading timber packages covered by plastic wrapping or tarpaulins. Plastic wrapping on packages with lumber of uneven length should be avoided otherwise clearly identified.

2.8.4 Lighting during loading and discharge operations should be reasonably constant and arranged to minimize glare and dazzle, the formation of deep shadows and sharp contrasts in the level of illumination between one area and another.

2.8.5 Any obstruction such as lashings or securing points in the access way of escape routes and spaces essential to operation of the vessel, such as machinery spaces and crew's quarters, as well as obstructions to safety equipment, fire-fighting equipment and sounding pipes, should be clearly marked. In no case should an obstruction prevent safe access or egress of escape arrangements and spaces referred to above.

2.8.6 During the course of the voyage, if there is no convenient passage for the crew on or below the deck of the ship^[18] giving safe means of access from the accommodation to all parts used in the necessary working of the ship, guard lines or rails, not more than 330 mm apart vertically, should be provided on each side of the deck cargo to a height of at least 1 m above the cargo. In addition, a lifeline, preferably wire rope, set up taut with a tightening device should be provided as near as practicable to the centreline of the ship. The stanchion supports to all guardrails or lifelines should be spaced so as to prevent undue sagging. Where the cargo is uneven, a safe walking surface of not less than 600 mm in width should be fitted over the cargo and effectively secured beneath, or adjacent to, the lifeline.

2.8.7 Fencing or means of closing should be provided for all openings in the stow such as at masthouses, winches, etc.

2.8.8 Where uprights are not fitted or where alternative to the provisions of 2.8.6 are permitted, a walkway of substantial construction should be provided having an even walking surface and consisting of two fore and aft sets of guardlines or rails about 1 m apart, each having a minimum of three courses of guardlines or rails to a height of not less than 1 m above the walking surface. Such guardlines or rails should be supported by rigid stanchions spaced not more than 3 m apart and lines should be set up taut by tightening devices.

2.8.9 As an alternative to 2.8.6, 2.8.7 and 2.8.8, a lifeline, preferably wire rope, may be erected above the timber deck cargo such that a crew member equipped with a fall protection system can hook on to it and work about the timber deck cargo. The lifeline should be:

- .1 erected about 2 m above the timber deck cargo as near as practicable to the centreline of the ship;
- .2 stretched sufficiently taut with a tightening device to support a fallen crew member without collapse or failure.

2.8.10 Properly constructed ladders, steps or ramps fitted with guard lines or handrails should be provided from the top of the cargo to the deck, and in other cases where the cargo is stepped, in order to provide reasonable access.

2.8.11 Personnel safety equipment referred to in this chapter should be kept in an easily accessible place.

2.8.12 When lashings need to be checked and/or retightened during voyage, the Master should take appropriate actions to reduce the motion of the vessel during such operation.

2.8.13 Additional guidance regarding work safety and work environment aspects can be found in the relevant International Labour Organization (ILO) Conventions^[17].

2.9 Stowage

2.9.1 The basic principle for the safe carriage of timber deck cargo is to make the stow as solid, compact and stable as practicable. The purpose of this is to:

- .1 prevent movement in the stow which could cause the lashings to slacken;
- .2 produce a binding effect within the stow; and
- .3 reduce to a minimum the permeability of the stow.

2.9.2 Openings in the deck exposed to weather over which cargo is stowed should be securely closed and battened down. The ventilators and air pipes should be effectively protected^[19].

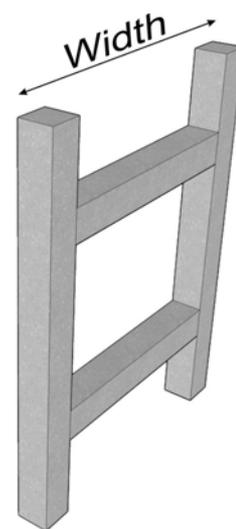
2.9.3 Deck cargo should be stowed so that access is provided to and from designated escape routes and spaces essential to operation of the vessel, such as machinery spaces and crew's quarters, as well as to safety equipment, fire-fighting equipment and sounding pipes^[18]. It should not interfere in any way with the navigation and necessary work of the ship^[19].

2.9.4 When cargo is loaded voids may occur in the stow between packages as well as between bulwarks or gantry crane rails, etc., and other fixed constructions such as the hatch coaming.

2.9.5 Care should be taken to avoid the creation of voids or open spaces when loading cargo. Voids, where created, should be filled with loose timber or blocked by vertical H-frames with required strength to avoid cargo from shifting. The MSL for double H-frames of different widths and dimensions are given in the table below. The values apply to H-frames made of sound softwood timber without knots.

Table 2.1. MSL (maximum secure load) of H-frames for different dimensions

Dimensions of battens mm	MSL in kN of double H-frames with different widths			
	0.5 m	1.0 m	1.5 m	2.0 m
50 x 50	75	53	30	17
50 x 75	113	79	46	26
50 x 100	151	106	61	34
50 x 150	226	159	91	51
75 x 75	186	153	119	85
75 x 100	248	203	159	114
75 x 150		305	238	171
75 x 200			317	227
100 x 100		301	256	212



2.9.6 Timber deck cargo which substantially overhangs (one-third of the package length) hatch coamings or other structures in the longitudinal direction, should be supported at the outer end by other cargo stowed on deck or railing or equivalent structure of sufficient strength to support it.

2.9.7 For ships assigned and making use of a timber load line, additional practices apply in accordance with the applicable Load Lines Convention.^[19]

2.10 Securing

2.10.1 One or more of the following principal methods may be used to secure timber deck cargoes, by themselves or in combination with each other:

- .1 different types of lashing arrangements; and
- .2 bottom blocking of the base tier in combination with lashing arrangements;
- .3 blocking over the full height of the cargo by, e.g., uprights alternatively complemented by lashing arrangements;
- .4 frictional securing, taking into account scientific research and appropriate weather and voyage criteria; and
- .5 other practical securing enhancement, (taking into account appropriate weather and voyage criteria), such as:
 - .1 non slip paints on hatch covers;
 - .2 liberal use of dunnage in the stow to shore and bridge gaps;
 - .3 double lashing in exposed areas; and
 - .4 consideration given to the use of locking tiers.

2.10.2 Securing arrangements used should be designed in accordance with Part B and documented in accordance with section 2.13 of this Code.

Lashings

2.10.3 Different lashing arrangements are described in Part B of this Code.

2.10.4 The following three types of lashing equipment with different strength and elongation characteristics are most frequently used for securing timber deck cargoes. Individual suitability should be determined by such factors as vessel type, size and area of operation, and as described in this code and as prescribed in the cargo securing manual:

- .1 chain lashings;
- .2 wire lashings; and
- .3 fabricated web lashings.



Chain lashing



Wire lashing



Fabricated Web lashing

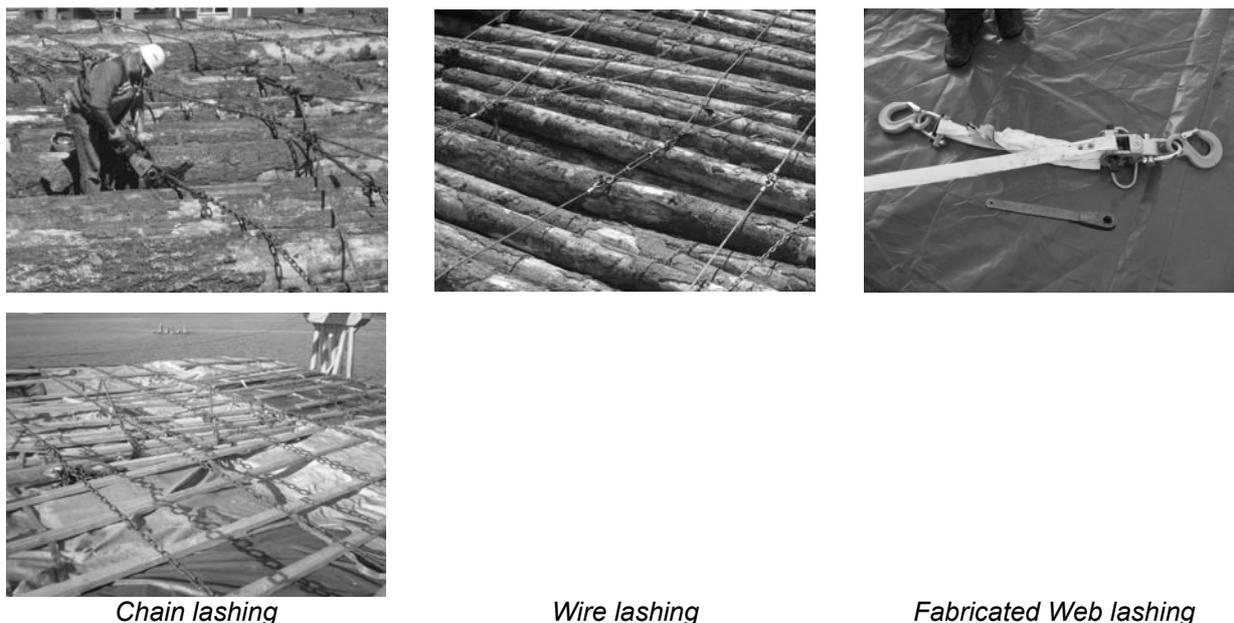


Figure 2.1. *Examples of different types of lashing equipment*

Open hooks, which may loosen if the lashing becomes slack, should not be used in securing arrangements for timber deck cargoes.

Web lashing should not be used in combination with chain or wire lashings.

2.10.5 The appropriate safety factors for the different types of equipment are described in Annex 13 to the CSS Code.

2.10.6 All lashing equipment should be visually examined according to the instruction in the cargo securing manual before use and only equipment fit for purpose should be used for securing of timber deck cargoes.

2.10.7 The necessary pre-tension in the lashings used should be maintained throughout the voyage. It is of paramount importance that all lashings be carefully examined and tightened at the beginning of the voyage as the vibration and working of the ship will cause the cargo to settle and compact. They should be further examined at regular intervals during the voyage and tightened as necessary.

2.10.8 Entries of all examinations and adjustments to lashings should be made in the ship's log-book.

2.10.9 Slip hooks or other appropriate methods may be used for quick and safe adjustment of lashings. Pelican hooks, when used, should be moused.

2.10.10 Corner protectors should be used to prevent lashings from cutting into the cargo and to protect lashings from sharp corners. The latter especially applies to fabricated web lashings.

2.10.11 Every lashing should be provided with a tightening device or system so placed that it can safely and efficiently operate when required.

Uprights

2.10.12 Uprights should be fitted when required by this code and as prescribed in the ship's cargo securing manual in accordance with the nature, height or character of the timber deck cargo. They should be designed in accordance with the criteria in chapter 7 of this Code and fitted in accordance with the vessel's cargo securing manual. If there is an operational limit of the uprights (in terms of wave heights) this should be indicated in the vessel cargo securing manual.

2.10.13 The uprights should be well fastened to the deck, hatches or coamings of the vessel (where adequate strength exists) and restrained from falling inwards during loading and discharging operations.

Lashing arrangements

2.10.14 In order to achieve a more secure stowage of logs when stowed on deck hog wires may be utilized. Such hog wire should be installed in the following manner:

- .1 At approximately three quarters of the height of the stow, the hog wire should be rove through a padeye attached to the uprights at this level so as to run transversely, connecting the respective port and starboard uprights. The hog lashing wire should not be too tight when laid so that it becomes taut when overstowed with other logs.
- .2 A second hog wire may be applied in a similar manner if the height of the hatch cover is less than 2 m. Such second hog wire should be installed approximately 1 m above the hatch covers.
- .3 The aim of having the hog wires applied in this manner is to assist in obtaining as even a tension wires as possible throughout, thus producing an inboard pull on the respective uprights.

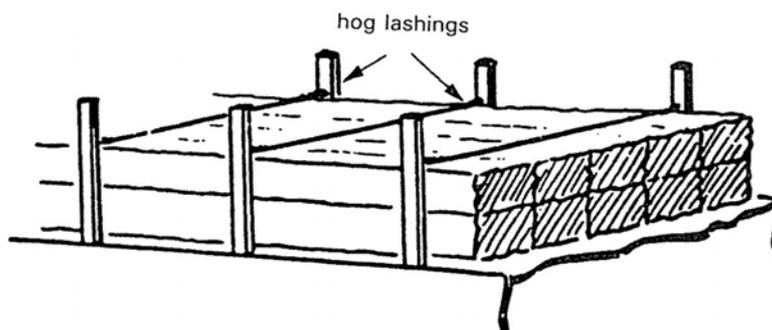


Figure 2.2. Example of hog lashings

2.10.15 In addition to uprights and hog lashings, an arrangement with top-over and continuous wiggle lashings (wiggle wires), as shown in the following figures, may be utilized at each hatch meeting the specifications of chapter 5.

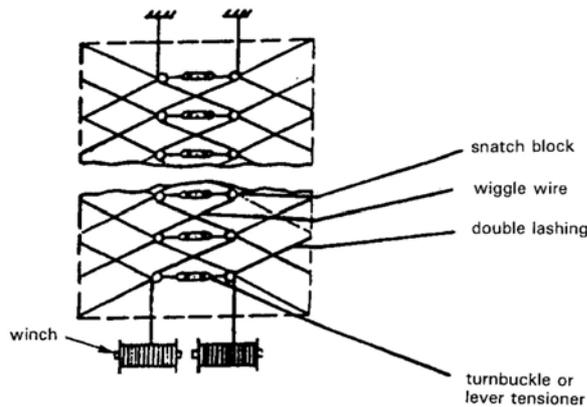
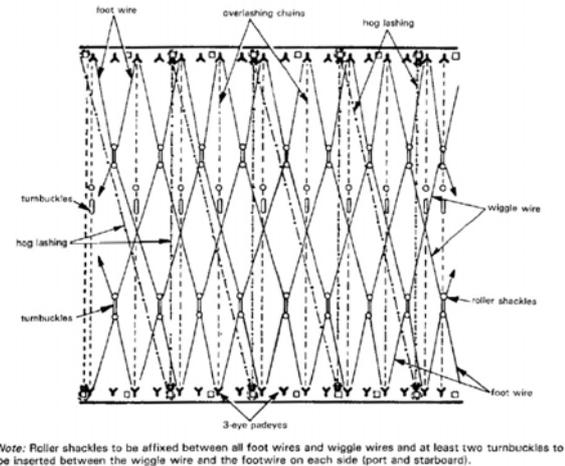


Figure 2.3. Example of wiggie lashings



Note: Roller shackles to be affixed between all foot wires and wiggie wires and at least two turnbuckles to be inserted between the wiggie wire and the footwire on each side (port and starboard).

Figure 2.4. Arrangement of wiggie and top-over lashings

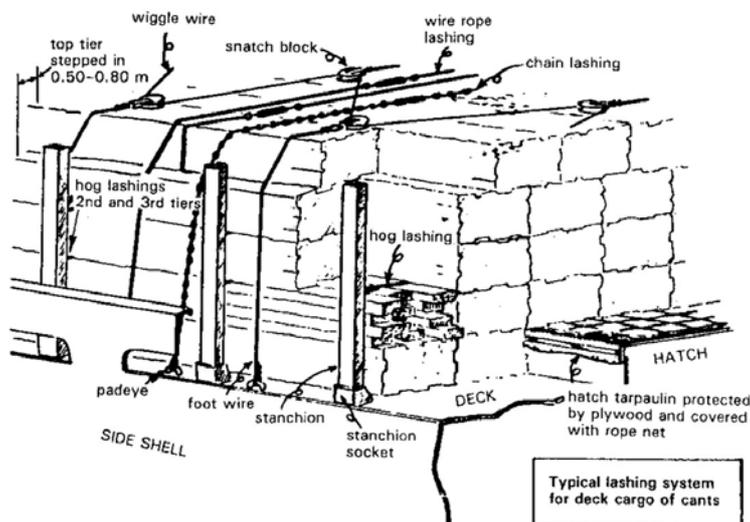


Figure 2.5. Example of an arrangement with hog, top-over and wiggie lashings

2.10.16. If a wiggie wire is not fitted, then extra chain or chain/wire combination overlashings should be fitted instead, as described in 5.4.1.

2.11 Post-loading operation

2.11.1 The Company should establish procedures for the preparation of plans and instructions, including checklists as appropriate, for key post loading operations.^[5]

2.12 Voyage planning

2.12.1 Prior to proceeding to sea, the master should ensure that the intended voyage has been planned using the appropriate nautical charts and nautical publications for the area concerned, taking into account the guidelines and recommendations developed by the Organization^[23].

2.12.2 In order to reduce excessive accelerations, the master should plan the voyage so as to avoid potential severe weather and sea conditions. To this effect, weather reports, weather facsimiles or where available weather routing may be consulted and the latest available weather information should always be used.^[24]

2.12.3 If deviation from the intended voyage plan is considered during the voyage, the same procedure as described in paragraphs 2.12.1 and 2.12.2 should be followed.

2.12.4 In cases where severe weather and sea conditions are unavoidable, the Master should be conscious of the need to reduce speed and/or alter course at an early stage in order to minimize the forces imposed on the cargo, structure and lashings. The lashings are not designed to provide a means of securing against imprudent ship handling in severe weather and sea conditions. There can be no substitute for good seamanship. The following precautions should be observed:

- .1 in the case of marked roll resonance with amplitudes above 30° to either side, the cargo securing arrangements could be overstressed. Effective measures should be taken to avoid this condition;
- .2 in the case of heading into the seas at high speed with marked slamming shocks, excessive longitudinal and vertical acceleration may occur. An appropriate reduction of speed should be considered; and
- .3 in the case of running before large stern or quartering seas with a stability which does not amply exceed the accepted minimum requirements, large roll amplitudes should be expected with great transverse accelerations as a result. An appropriate change of heading should be considered.

Foreseeable risks

2.12.5 During voyage planning, all foreseeable risks, which could lead to either excessive accelerations causing cargo to shift or conditions leading to water absorption and ice aggregation, should be considered. The following list comprises the most significant situations that should be taken under consideration to that effect:

- .1 extreme weather conditions predicted by weather forecasts;
- .2 severe wave conditions that have been known to appear in certain navigational areas;
- .3 unfavourable directions of encountered waves^[25]; and
- .4 swell caused by recent weather phenomena in the vicinity of the area of the intended voyage.

2.13 Cargo Securing Manual

2.13.1 Timber deck cargoes should be loaded, stowed and secured, throughout the voyage, in accordance with the Cargo Securing Manual as required by SOLAS chapter VI.

2.13.2 The Cargo Securing Manual should be based on the guidelines in this code and drawn up to a standard at least equivalent to the guidelines developed by the Organization^[26],^[27] and approved by the Administration.^[26]

2.13.3 Each cargo securing arrangement for timber deck cargoes should be documented in the ship's Cargo Securing Manual in accordance with the instructions in MSC/Circ.745.

2.13.4 According to CSS and MSC/Circ.745, among others, the following parameters should be taken into account at the design stage of cargo securing systems:

- .1 Duration of the voyage;
- .2 Geographical area of the voyage;
- .3 Sea conditions which may be expected;
- .4 Dimensions, design and characteristics of the ship;
- .5 Expected static and dynamic forces during the voyage;
- .6 Type and packaging of cargo units;
- .7 Intended stowage pattern of the cargo units; and
- .8 Mass and dimensions of the cargo units.

2.13.5 In the Cargo Securing Manual each stowage and securing arrangements should additionally be documented by a Lashing Plan showing at least the following:

- .1 Maximum cargo weight for which the arrangement is designed;
- .2 Maximum stowage height;
- .3 Required number and strength of blocking devices and lashings as applicable;
- .4 Required pretension in lashings;
- .5 Other cargo properties of importance for the securing arrangement such as friction, rigidity of timber packages, etc.;
- .6 Illustrations of all securing items that might be used;
- .7 Any restriction regarding maximum accelerations, weather criteria, for non-winter conditions only, restricted sea areas, etc.

CHAPTER 3 – VISIBILITY

3.1 According to SOLAS chapter V, the view of the sea surface from the conning position should not be obscured by more than two ship lengths, or 500 m, whichever is the less, forward of the bow to 10° on either side under all conditions of draught, trim and deck cargo. National deviations may exist and should be taken into consideration as required dependent on the intended voyage.

3.2 No blind sector, caused by cargo, cargo gear or other obstructions outside of the wheelhouse forward of the beam which obstructs the view of the sea surface as seen from the conning position, should exceed 10°. The total arc of blind sectors should not exceed 20°. The clear sectors between blind sectors should be at least 5°. However, in the view described in 3.1, each individual blind sector should not exceed 5°.

3.3 The following formula can be used for calculating the bridge visibility:

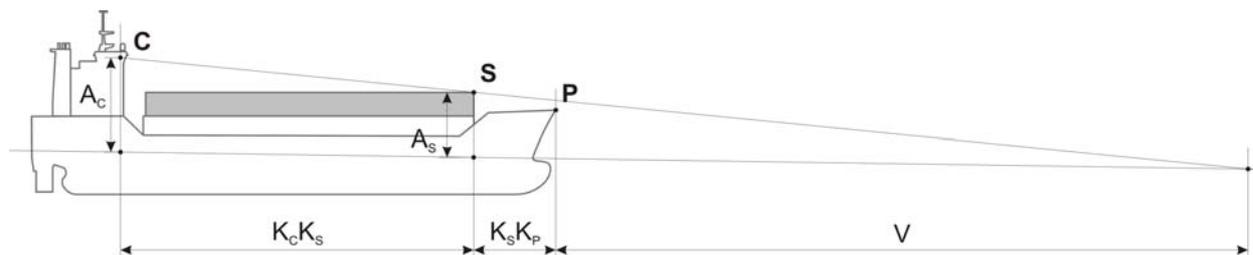


Figure 3.1. Distances used for calculating the bridge visibility

$$V = \frac{K_C K_S \cdot A_S}{A_C - A_S} - K_S K_P$$

Where:

$K_C K_S$ Horizontal distance from conning position to position 'S'
 $K_S K_P$ Horizontal distance from position 'S' to position 'P'
 A_C Airdraft of conning position
 A_S Airdraft of position 'S'

CHAPTER 4 – PHYSICAL PROPERTIES OF TIMBER CARGOES

4.1 Stowage factors

4.1.1 Typical values for density and stowage factors are given in the table below for different types of timber deck cargoes.

Table 4.1. Typical values for density and stowage factors

Type of timber cargo	Density [ton / m ³]	Volume factor [m ³ hold space / m ³ cargo]	Stowage factor [m ³ hold space / ton of cargo]
Sawn wood			
Packages of sawn wood with even ends	0.5 – 0.8	1.4 - 1.7	1.8 – 3.4
Packages of sawn wood with uneven ends	0.5 – 0.8	1.6 – 1.9	2.0 - 3.8
Packages of planed wood with even ends	0.5	1.2 – 1.4	2.4 - 2.8
Round wood			
Coniferous round wood, fresh (bark on)	0.9 – 1.1	1.5 - 2.0	1.4 - 2.2
Broad-leaf round wood, fresh (bark on)	0.9 – 1.5	2.0 - 2.5	1.3 - 2.8
Round wood, dried (bark on)	0.65	1.5 - 2.0	2.3 - 3.1
Debarked coniferous round wood, fresh	0.85 – 1.2	1.5 – 2.0	1.2 – 2.4
Debarked broad-leaf round wood, fresh	0.9 – 1.0	1.5 – 2.5	1.5 – 2.8
Debarked round wood, dried	0.6 – 0.75	1.2 – 2.0	1.6 – 3.3

4.1.2 The densities and stowage factors in the table above are presented for information purpose only to aid preplanning operations. The corresponding values for actual loads may vary significantly from those presented in the table depending on the timber type and condition. During actual loading more accurate values of the cargo weight are obtained by repeated checks of the vessel's displacement. The weights of sawn wooden packages are normally more accurate.

4.1.3 The weight of uncovered timber cargo may change during a voyage due to loss or absorption of water (but wrapped bundled cargoes do not). Timber cargo stowed under deck may lose weight whereas timber stowed on deck may gain weight by absorption of water, see special instruction in Annex C. Particular attention should be given to the impact that these and other changing conditions have on stability throughout a voyage.

4.2 Friction factors

4.2.1 Cargo at rest is prevented from sliding by static friction. When movement has been initiated the resistance of the material contact is reduced and sliding is counteracted by dynamic friction, see 4.2.6, instead.

4.2.2 The static friction may be determined by an inclination test. The angle ρ is measured when the timber cargo starts to slide. The static friction is calculated as:

$$\mu = \tan (\rho).$$

4.2.3 Five inclination tests should be performed with the same combination of materials. The highest and the lowest values should be disregarded and the friction factor is taken as the average of the three middle values. This average figure should be rounded down to the nearest fraction of 0.05.

4.2.4 If the values are intended to be used for non-winter conditions, the coefficient of friction for both dry and wet contact surfaces should be measured in separate series of tests and the lower of the two values are to be the used when designing cargo securing arrangements.

4.2.5 If the values are intended to be used for winter conditions when exposed surfaces are covered by snow and ice, the lowest coefficient of friction found for either dry, wet or snowy and icy contact surfaces should be used when designing cargo securing arrangements.

4.2.6 If not specially measured the dynamic friction factor may be taken as 70% of the static values.

4.2.7 The following values of static friction for the mentioned conditions may be used when designing securing arrangements for timber deck cargoes unless the actual coefficient of friction is measured and documented as described above.

Table 4.2. Typical values of static friction for different material combinations

Contact surface	Non winter conditions <i>Dry or wet</i>	Winter conditions
Sawn wooden package		
<i>against</i> painted steel	0.45	0.05
<i>against</i> sawn wood	0.50	0.30
<i>against</i> plastic cover or webbing slings	0.30	0.25
Round wood		
coniferous round wood (bark on) <i>against</i> painted steel	0.35	
coniferous round wood (bark on) <i>between layers</i>	0.75	

4.2.8 Static friction may be used for tight block stowage arrangements as well as for the design of frictional lashing systems such as top-over lashing systems.

4.2.9 Dynamic friction should be used for non rigid lashing systems, which due to elasticity of securing equipment allow for minor dislocation of the cargo before full capacity of the securing arrangement is reached.

4.3 Plastic Covers

4.3.1 Plastic sheeting is often used on packages of sawn wood to protect the cargo. High friction coatings (friction coefficient 0.5 and above) can be incorporated into plastic sheeting as an important means of improving the safe transport of these cargoes.

4.3.2 Special precautions should be taken to prevent slippery plastic hoods with low friction coefficients, from being used as a sawn wood package cargo covering on deck.

4.4 Package Marking

4.4.1 All sawn wooden packages should be clearly marked with the volume of the package. The marking should be clearly visible on the top of the package as well as both long sides. The approximate weight should also be shown^[29].

4.5 Water Absorption

4.5.1 Sea spray may increase the weight of the timber deck cargo and thus influence the stability. The weight increase of the timber varies with time, exposure and type of timber. The value of increased weight of timber deck cargo due to water absorption should be considered in accordance with the Intact Stability Code and special instructions in Annex C.

4.6 Weight of Ice

4.6.1 During cold weather conditions ice may form from sea spray and the stability may be affected as the ice can add weight rapidly. Increasing of the weight due to icing should be considered in accordance with the Intact Stability Code.

4.7 Rigidity of Sawn Wood Packages

4.7.1 The Racking Strength, RS, of a sawn wood package is defined as the horizontal force that a package can withstand per metre package length without collapsing or deforming more than 10% of its width, B, or a maximum of 100 mm as shown in figure 4.1.

4.7.2 The racking strength of timber packages can be measured by a test setup as shown in figure 4.2. The angle α should not be greater than 30°.

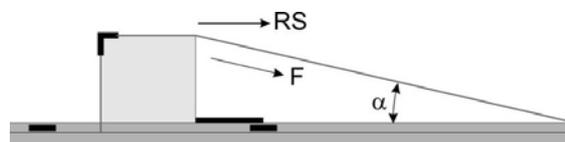
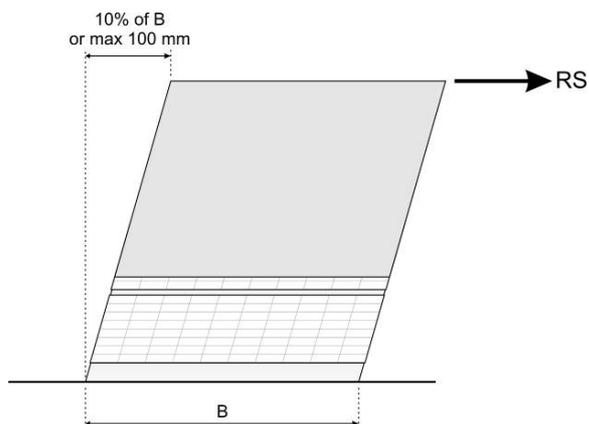


Figure 4.1. Racking strength of timber packages **Figure 4.2.** Test setup for racking strength

4.7.3 The Racking Strength, RS, is taken as the applied force $F \cdot \cos \alpha$ (see figure above) when the package collapses or when the deflection in the top is 10% of the package width, B, or maximum 100 mm.

4.7.4 Racking strength measurements will have to be carried out by the shipper and the information should be provided to the master as part of the required cargo information mentioned in SOLAS chapter VI.

PART B – DESIGN OF CARGO SECURING ARRANGEMENTS

To accommodate proven designs and practices but to also embrace advances in technology and materials, part B has been split into two chapters, each providing different design principles.

"Chapter 5: Design Principles" incorporates **prescriptive** requirements .

"Chapter 6: Alternative Design Principles" provides for alternative designs and equipment to be developed and includes **functional** requirements.

CHAPTER 5 – DESIGN PRINCIPLES

This chapter applies primarily, but is not limited to, ships of 24 metres in beam and above engaged in international deep-sea trade and incorporates experience based prescriptive requirements on the securing of timber deck cargoes. It primarily applies the use of steel components for lashings but is not limited to their sole use. Consideration may be given to allowing chapter 5 vessels to make use of proven alternative technologies in cargo securing design, which provide at least the level of safety as specified in this chapter.

5.1 General

5.1.1 Every lashing should pass over the timber deck cargo and be secured to suitable eyeplates, lashing bollards or other devices adequate for the intended purpose which are efficiently attached to the deck stringer plate or other strengthened points. They should be installed in such a manner as to be, as far as practicable, in contact with the timber deck cargo throughout its full height.

5.1.2 All lashings and components used for securing should:

- .1 possess a breaking strength of not less than 133 kN;
- .2 after initial stressing, show an elongation of not more than 5% at 80% of their breaking strength; and
- .3 show no permanent deformation after having been subjected to a proof load of not less than 40% of their original breaking strength.

5.1.3 Every lashing should be provided with a tightening device or system so placed that it can safely and efficiently operate when required. The load to be produced by the tightening device or system should not be less than:

- .1 27 kN in the horizontal part; and
- .2 16 kN in the vertical part.

5.1.4 Upon completion and after the initial securing, the tightening device or system should be left with not less than half the threaded length of screw or of tightening capacity available for future use.

5.1.5 Every lashing should be provided with a device or an installation to permit the length of the lashing to be adjusted.

5.1.6 The spacing of the lashings should be such that the two lashings at each end of each length of continuous deck stow are positioned as close as practicable to the extreme end of the timber deck cargo.

5.1.7 If wire rope clips are used to make a joint in a wire lashing, the following conditions should be observed to avoid a significant reduction in strength:

- .1 the number and size of rope clips utilized should be in proportion to the diameter of the wire rope and should not be less than three, each spaced at intervals of not less than 150 mm;
- .2 the saddle portion of the clip should be applied to the live load segment and the U-bolt to the dead or shortened end segment; and
- .3 rope clips should be initially tightened so that they visibly compress the wire rope and subsequently be re-tightened after the lashing has been stressed.

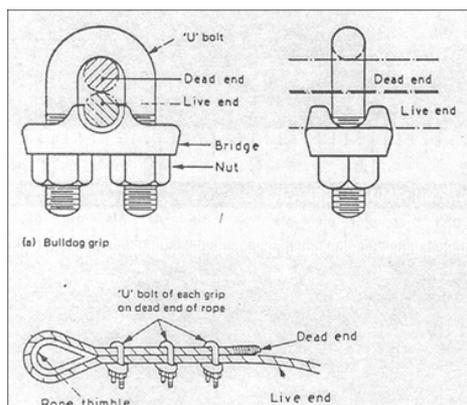


Figure 5.1. Wire rope clips

5.1.8 Greasing the threads of grips, clips, shackles and turnbuckles increases their holding capacity and prevents corrosion.

5.1.9 Bulldog grips are only suitable for a standard wire rope of right-hand lay having six strands. Left-hand lay or different construction should not be used with such grips.

5.2 Uprights

5.2.1 Uprights, designed in accordance with chapter 7, should be used when required by the nature, height or character of the timber deck cargo as outlined in this code.

5.2.2 When uprights are used, they should:

- .1 be made of material of adequate strength, taking into account relevant parameters such as; the breadth of the deck cargo, the weight and height of the cargo, the type of timber cargo, friction factors, additional lashings, etc.;
- .2 be spaced at intervals between the centrelines of two uprights not exceeding 3 m so that preferably all sections of the stow are supported by at least two uprights; and
- .3 be fixed to the deck and/or hatch cover by angles, sockets or equally efficient means and be secured in position as required by the CSM.

5.3 Loose or packaged sawn wood

5.3.1 Uprights should be used for loose sawn wood. Uprights or stoppers (low uprights) should also be used to prevent packaged sawn wood loaded on top of the hatch covers only from sliding. The timber deck cargo should in addition be secured throughout its length by independent lashings.

5.3.2 Subject to paragraph 5.3.3, the maximum spacing of the lashings referred to above should be determined by the maximum height of the timber deck cargo in the vicinity of the lashings:

- .1 for a height of 2.5 m and below, the maximum spacing should be 3 m;
- .2 for heights of above 2.5 m, the maximum spacing should be 1.5 m; and

- .3 on the foremost and aft most sections of the deck cargo the distance between the lashings according to above should be halved.

5.3.3 As far as practicable, long and sturdy packages should be stowed in the outer rows of the stow and the packages stowed at the upper outboard edge should be secured by at least two lashings each.

5.3.4 When the outboard packages of the timber deck cargo are in lengths of less than 3.6 m, the spacing of the lashings should be reduced as necessary or other suitable provisions made to suit the length of timber.

5.3.5 Rounded angle pieces of suitable material and design should be used along the upper outboard edge of the stow to bear the stress and permit free reeving of the lashings.

5.3.6 Timber packages may alternatively be secured by a chain or wire loop lashing system, based on the design principles contained in chapter 6.

5.4 Logs, poles, cants or similar cargo

5.4.1 The round wood deck cargo should be supported by uprights and secured throughout its length by independent lashings spaced not more than 1.5 m apart.

5.4.2 If the round wood deck cargo is stowed over the hatches and higher, it should, in addition to being secured by the lashings recommended in 5.4.1, be further secured by a system of athwartship lashings (hog lashings as described in section 2.10.14) joining each port and starboard pair of uprights.

5.4.3 If winches or other adequate tensioning systems are available on board, every other of the lashings mentioned in 5.4.1 may be connected to a wiggle wire system as described in section 2.10.15.

5.4.4 The recommendation of paragraph 5.3.5 should apply to a timber deck cargo of cants.

5.5 Testing, marking, examination and certification

5.5.1 All lashings and components used for the securing of the timber deck cargo should be tested, marked, examined and certified, as per the guidelines in MSC/Circ.745^[27], and be specific to the requirements for lashing and components outlined in 5.1.2 and 5.1.3.

5.6 Lashing plans

5.6.1 One or more generic lashing plans complying with the recommendations of this Code should be provided and maintained on board a ship carrying timber deck cargo. Lashing plans should be incorporated in the cargo securing manual and the most relevant lashing plan should be consulted when stowing and securing timber deck cargoes.

CHAPTER 6 – ALTERNATIVE DESIGN PRINCIPLES

This chapter permits the development (and use) of new designs and securing arrangements, by providing functional based requirements on the securing of timber deck cargoes, which may be used as an alternative to the requirements in chapter 5 for ships of less than 24 metres in beam and for designers considering alternative technologies in cargo securing.

When chapter 6 is applied, operational procedures based on design risk assessment should be included within the vessel's safety management system.

6.1 General considerations

6.1.1 The construction of deck, bulwarks, uprights, hatches and coamings should be of a design that allows a load of timber deck cargo to be carried in a satisfactory manner.

6.1.2 The goal is to prevent cargo shifting as far as practicable and the securing system should be designed according to the principles laid down in this chapter.

6.1.3 Loose sawn or round wood should as a general rule be longitudinally stowed and supported on the sides by uprights to the full height of the stow.

6.1.4 Packaged sawn wood deck cargoes may be secured without uprights if the racking strength of the packages has been tested and found sufficient and sliding is prevented by bottom blocking, friction or lashing.

6.1.5 If the friction is sufficient and the expected transverse accelerations are limited, unpackaged sawn wood cargo may be transversely stowed.

6.1.6 All denotations used in the formulae in this chapter are listed in section 6.7 of this Code.

6.2 Accelerations and forces acting on the cargo

6.2.1 The cargo securing arrangement should in the transverse direction be designed for accelerations generated as well as forces by wind and sea according to the Code of Safe Practice for Cargo Stowage and Securing (CSS), Annex 13.

6.2.2 Special securing of timber deck cargoes in the longitudinal direction may be dispensed with only if great care is taken to avoid excessive acceleration forces in heavy head seas.

6.2.3 To take account of the factors mentioned in 2.13.4, the acceleration data calculated according to Annex 13 of the CSS code may be multiplied by a reduction factor ranging from 0 to 1, depending on expected maximum significant wave height during the intended voyage. The reduction factor is obtained by the following formula:

$$f_R = \sqrt[3]{\frac{H_M}{19.6}}$$

Where the variable H_M means the maximum expected significant wave height in metres.

(The value 19.6 is the assumed twenty year wave that will occur in the Northern Atlantic Ocean. Relevant significant wave heights for different sea areas and seasons can be obtained from "Ocean Wave Statistics".)

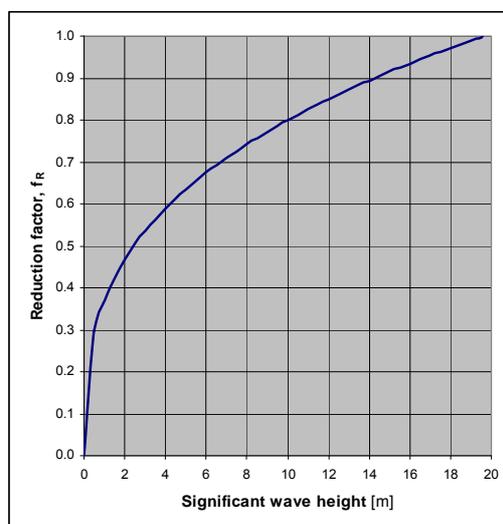


Figure 6.1. Plot of the reduction factor as a function of the expected significant wave height

6.2.4 Reduced acceleration may be used for the design of securing arrangements for timber deck cargoes in any of the following ways:

- .1 Required securing arrangements are designed for different wave heights and the securing arrangement is selected according to the maximum expected wave height for each voyage.
- .2 The maximum wave height that a particular securing arrangement can withstand is calculated and the vessel is limited to operate in wave heights up to the maximum calculated. Examples on such arrangements are unsecured transversely stowed timber deck cargoes in restricted sea areas.
- .3 The required securing arrangement is calculated for the maximum expected twenty year wave in a particular restricted area and the cargo is always secured according to the designed arrangement when operating in that area.

6.2.5 If one of the two first mentioned methods in paragraph 6.2.4 are used for decision on securing arrangements, it is important that procedures for forecasting the maximum expected wave height on intended voyages is developed and followed and documented in the ship's approved Cargo Securing Manual.

6.3 Physical Properties of Timber Deck Cargoes

6.3.1 Prior to loading of timber deck cargoes, all relevant cargo information, as described in this section and in chapter 4, should be provided to the master of the vessel.

Friction

6.3.2 Friction is one of the most important factors preventing cargo from shifting. Deck cargo may shift due to a lack of internal friction. Snow, ice, frost, rain, and other slippery

surface conditions drastically affect friction. Special consideration should be given to package materials, contact surfaces, and weather conditions.

6.3.3 Static friction may be used for tight block stowage arrangements as well as for the design of frictional lashing systems such as top-over lashing systems.

6.3.4 Dynamic friction should be used for non rigid lashing systems, e.g., loop lashings, which due to elasticity of securing equipment allow for minor dislocation, see paragraph 6.5.16, of the cargo before full capacity of the securing arrangement is reached.

6.3.5 Test procedures for determining coefficients of friction as well as generic friction values for material contacts common for timber deck cargoes are given in chapter 4.

Rigidity of Timber Packages

6.3.6 The rigidity of timber packages is of great importance for the stability of the deck cargo and the racking strength of the timber packages should be taken into consideration when securing systems are designed.



Figure 6.2. Example of poor rigidity

6.3.7 The definition of the Rigidity of timber packages for the purpose of this code as well as methods for determining it are presented in chapter 4. The racking strength should not be less than 3.5 kN/m of package length.

6.4 Safety Factors

6.4.1 Safety factors are to be used when:

- .1 calculating the Maximum Securing Load (MSL) of the lashings from the Minimum Breaking Load (MBL); and
- .2 calculating the maximum allowed Calculated Strength (CS) in the lashings as function of MSL.

6.4.2 MSL as function of the MBL should be taken according to Annex 13 of the CSS Code, provided inspection and maintenance of the equipment have been carried out in accordance with the vessels cargo securing manual.

6.4.3 The maximum allowed Calculated Strength (CS) in lashings and uprights used in the calculations should be taken from the following formula:

$$CS \leq \frac{MSL}{1.35}$$

6.5 Design criteria for different securing arrangements

6.5.1 Securing arrangements for timber deck cargoes should be based on accelerations, physical properties and safety factors as described in 6.4 above.

6.5.2 Design criteria for some different securing arrangements are given below. Other securing arrangements may also be used as long as the system is designed according to the principles given in this code.

6.5.3 In Annex B detailed descriptions and example design calculations are given for some stowage and securing arrangements.

6.5.4 The denotations used in the formulas in this chapter are listed in chapter 8.

Top-Over Lashed Longitudinally Stowed Timber Packages

6.5.5 Top-over lashing alone is a frictional lashing method and the effect of the lashing is to apply vertical pressure increasing the friction force between the outer stows of deck cargo and the ship's deck/hatch cover.

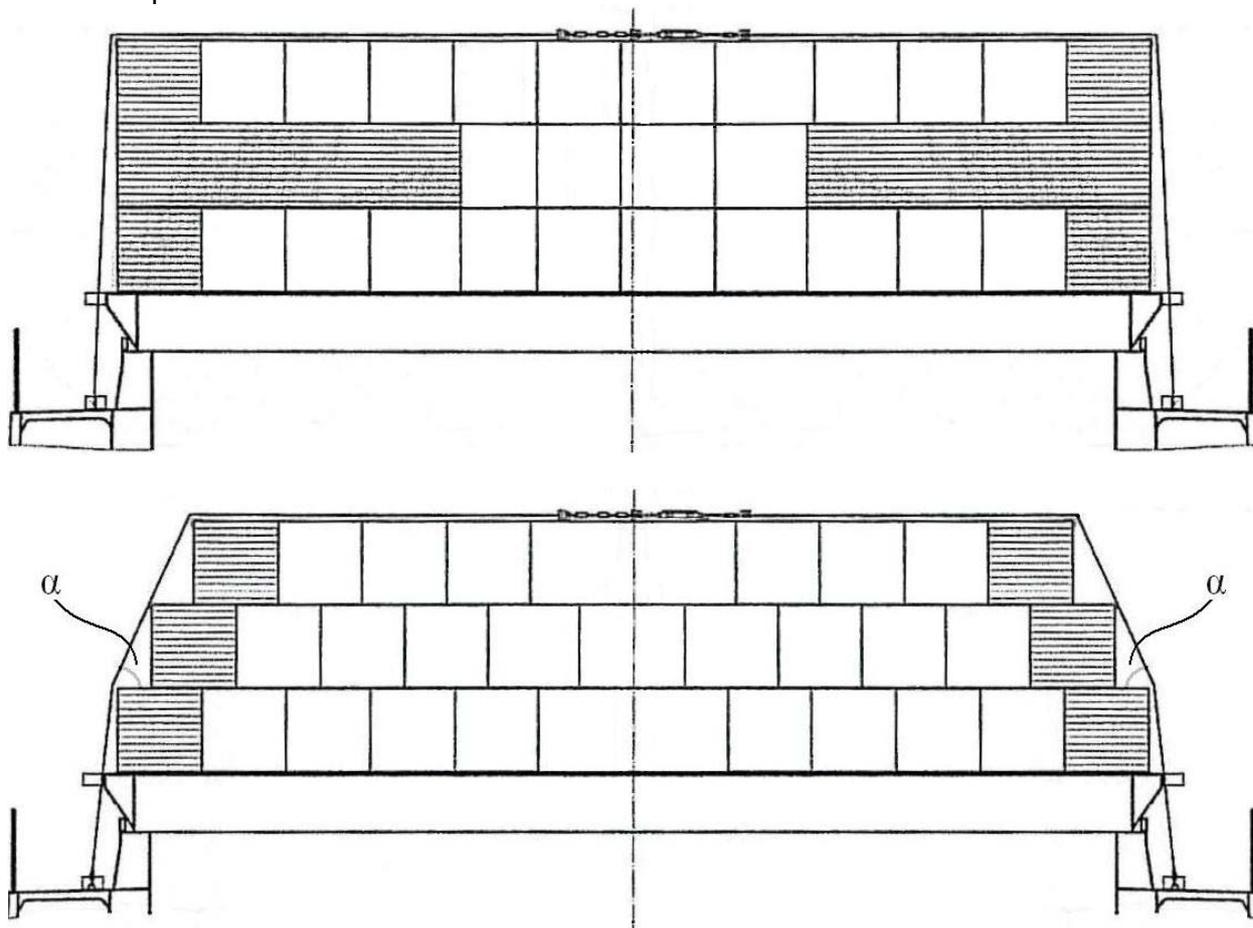


Figure 6.3. Principles for top-over lashing

6.5.6 For pure top-over lashing arrangements the friction alone will have to counteract the transverse forces so that the following equilibrium of forces is satisfied:

$$(m \cdot g_0 + 2 \cdot n \cdot PT_V \cdot \sin \alpha) \cdot \mu_{static} \geq m \cdot a_t + PW + PS$$

6.5.7 In practice, sliding between the layers is often prevented due to slightly different heights of the timber packages. Alternatively it may be prevented by inserting vertical sturdy battens of proper dimensions between the columns.

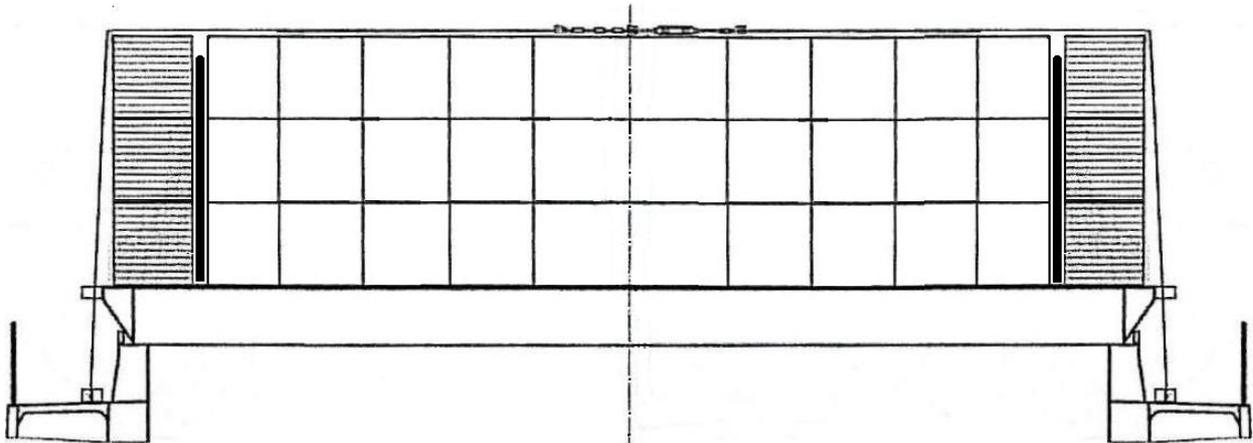


Figure 6.4. Sliding of upper layer prevented by vertical sturdy battens

6.5.8 If sliding between layers is not prevented, sliding between each individual layer should be considered by the following equilibrium of forces:

$$(m_a \cdot g_0 + 2 \cdot n \cdot PT_V \cdot \sin \alpha) \cdot \mu_{static\ a} \geq m_a \cdot a_t + PW_a + PS_a$$

Units denoted with _a consider cargo units above the sliding level only.

6.5.9 To prevent the packages in the bottom layer from collapsing due to racking, the weight of the cargo stowed on top of the bottom layer should be limited so that the following equilibrium of forces is satisfied:

$$n_p \cdot L \cdot RS \geq m_a \cdot (a_t - 0.5g_o) + PW_a + PS_a$$

Units denoted with _a consider cargo units above the bottom layer only

6.5.10 Lashings used should comply with 6.5.20 and 6.5.21. It is extremely important to keep the lashings tight when a top-over lashing arrangement is used as the arrangement is based on the vertical pressure from the lashings.

6.5.11 When top-over lashings are used as the only means of securing longitudinally stowed packages of sawn wood, adequate friction against the hatch covers should be sought and/or the transverse accelerations should if possible be limited.

Loop Lashed Longitudinally Stowed Timber Packages

6.5.12 Loop lashings are always applied in pairs as shown in the figure below. The lashings are drawn from one side of the cargo, under the cargo to the other side, up over the cargo and back to the same side. Alternatively, the lower part of the lashing may be fastened to a securing point on top of the hatch cover underneath the cargo.

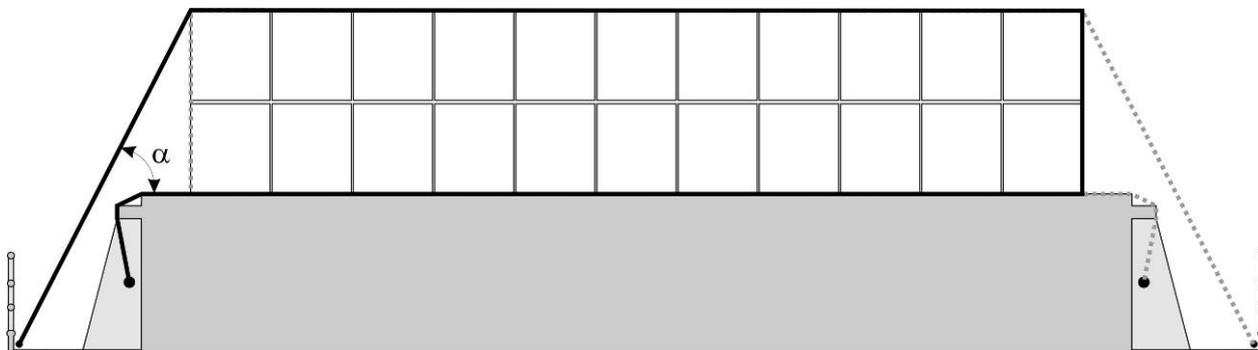


Figure 6.5. Principles of loop lashing alternative 1 (be aware of chafing where lashings are lead around ship's structure as shown in the above figure, see section 2.10.10)

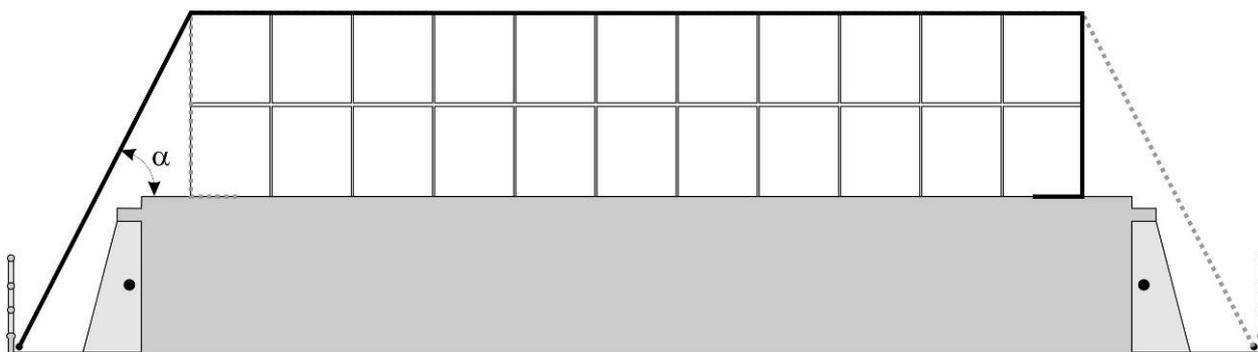


Figure 6.6. Principles for loop lashing alternative 2. The shorter length of the lashing compared to alternative 1 reduces the movement of the cargo due to elongation of the lashing

6.5.13 The number and strength of the lashings are to be chosen so that the following equilibrium is satisfied:

$$(m \cdot g_0 + n \cdot CS \cdot \sin \alpha) \cdot \mu_{dynamic} + n \cdot CS + n \cdot CS \cdot \cos \alpha \geq m \cdot a_t + PW + PS$$

6.5.14 Sliding between the layers should be prevented (see 6.5.7).

6.5.15 To prevent the packages in the bottom layer from racking, the weight of the cargo stowed on top of the bottom layer should be limited so that the following equilibrium is satisfied:

$$n_p \cdot L \cdot RS + n \cdot CS \cdot \cos \alpha \geq m_a \cdot (a_t - 0.5g_0) + PW_a + PS_a$$

Units denoted with _a consider cargo units above the bottom layer only.

6.5.16 The transverse movement of the deck cargo due to elongation of the lashings is calculated according to the following formula:

$$\delta = L_L \cdot \frac{(CS - PT_V)}{MSL} \cdot \varepsilon$$

The elongation factor ε should be taken as 2% for chain and wire lashings and 7% for web lashings unless otherwise specified by certificate from the manufacturer.

The maximum heeling angle of the vessel due to a small transverse movement of the cargo should in no case be more than 5 degrees based on the full timber deck load condition of the vessel calculated according to the following formula:

$$HA = \arctan\left(\frac{HM}{G'M \cdot \Delta}\right)$$

Where:

- HA = Heeling angle in degrees
- HM = Heeling moment due to transverse movement of the deck cargo in tonmetres
- $G'M$ = Metacentric height corrected for free surface moments in metres
- Δ = Vessels actual displacement in tons

Bottom Blocked and Top-Over Lashed Longitudinally Stowed Timber Packages

6.5.17 Blocking means that the cargo is stowed against a blocking structure or fixture on the vessel. If the cargo consists of packages with large racking capacity, bottom blocking should be sufficient in combination with top-over lashings.



Figure 6.7. Example of uprights for bottom blocking

6.5.18 The required strength, MSL, of the bottom blocking devices is calculated by satisfying the following equilibrium:

$$(m \cdot g_0 + 2 \cdot n \cdot PT_V \cdot \sin \alpha) \cdot \mu_{static} + n_b \cdot \frac{MSL}{1.35} \geq m \cdot a_t + PW + PS$$

6.5.19 The spacing between top-over lashings in a longitudinal direction should be maximum 3 m for stowage heights below 2.5 m and maximum 1.5 m for stowage heights above 2.5 m.

6.5.20 The pretension PT_V in the vertical part of the lashings should be not less than 16 kN and the pretension PT_H in the horizontal part of the lashing should be not less than 27 kN.

6.5.21 All lashings and components used for securing in combination with bottom blocking should:

- .1 possess a breaking strength MBL of not less than 133 kN
- .2 after initial stressing, show an elongation of not more than 5% at 80% of their breaking strength; and
- .3 show no permanent deformation after having been subjected to a proof load of not less than 40% of their original breaking strength.

6.5.22 The bottom blocking devices are to be placed on both sides of the deck cargo equally spaced. Two blocking device per side should be used per cargo section and the height should extend to a height of at least 200 mm.

6.5.23 Sliding between the layers should be prevented (see 6.5.7). If no such measures are taken, sliding between layers should be checked by the calculation for equilibrium of forces in 6.5.8.

6.5.24 To prevent the packages in the bottom layer from racking, the weight of the cargo stowed on top of the bottom layer should be limited so that the following equilibrium of forces is satisfied:

$$n_p \cdot L \cdot RS \geq m_a \cdot (a_t - 0.5g_0) + PW_a + PS_a$$

Units denoted with $_a$ consider cargo units above the bottom layer only.

Uprights Blocked and Top-Over Lashed Longitudinally Stowed Sawn wood Packages and Round Wood

6.5.25 Longitudinally stowed sawn wood packages, loose sawn wood or round wood may be supported by uprights in combination depending on trading pattern with or without top-over lashings or hog-wires.

6.5.26 The uprights should be designed in accordance with chapter 7.

6.5.27 The uprights should be placed on both sides of the cargo, equally spaced. Each cargo block of the stow should be supported by at least two uprights per side.

6.5.28 The spacing of top-over lashings should for packaged sawn wood be a maximum of 3 m for stowage heights below 2.5 m and maximum 1.5 m for stowage heights above 2.5 m for round wood the spacing should be 1.5 m irrespective of the height.

6.5.29 The pretension PT_V in the vertical part of the lashings should be not less than 16 kN and the pretension PT_H in the horizontal part of the lashing should be not less than 27 kN.

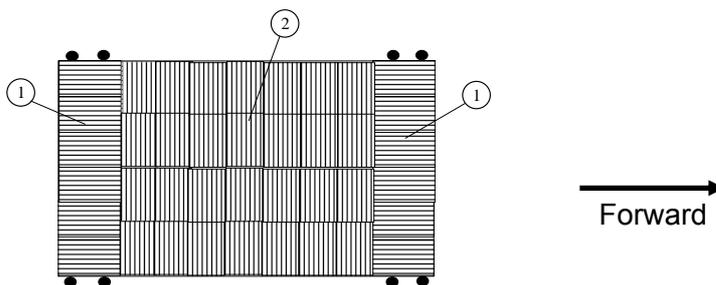
6.5.30 All lashings and components used for securing in combination with bottom blocking should:

- .1 possess a breaking strength MBL of not less than 133 kN;

- .2 after initial stressing, show an elongation of not more than 5% at 80% of their breaking strength; and
- .3 show no permanent deformation after having been subjected to a proof load of not less than 40% of their original breaking strength.

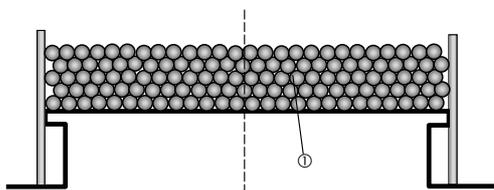
Frictional Securing

6.5.31 In restricted sea areas round wood may be transversely stowed and secured by bottom blocking and/or friction between tiers only. This may be done only if the friction between layers is sufficient and the expected transverse accelerations are limited. When the friction is sufficient between bottom layers and deck/hatch, then the bottom blocking may not be required.

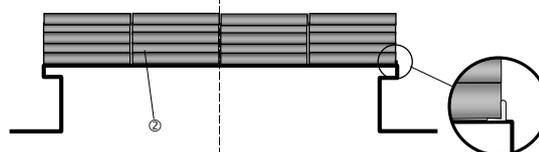


Example of round wood stowage pattern for restricted sea areas.

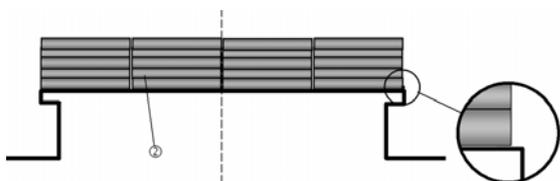
Sections marked 1 are longitudinally stowed round wood secured by uprights. Section marked 2 are transversely stowed round wood secured by friction in combination with or without bottom blocking.



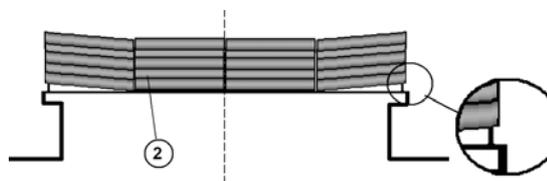
Section with longitudinally stowed round wood secured by uprights.



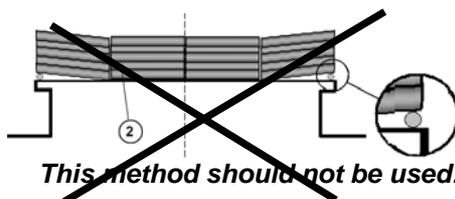
Section with transversely stowed timber cargo secured by friction in combination with bottom blocking.



Section with transversely stowed round wood secured by friction only (Alternative 1). Non-slip paint on hatch cover or non-slip material between hatch cover and round wood should be used.



Section with transversely stowed round wood secured by friction only (Alternative 2). Non-slip paint on hatch cover or non-slip material between hatch cover and round wood should be used.



This method should not be used!

Section with transversely stowed round wood secured by friction only (Alternative 3).

Figure 6.8. Principles for friction securing of round wood in restricted sea areas

6.5.32 The required strength, MSL, of the bottom blocking devices is calculated by satisfying the following equilibrium:

$$m \cdot g_0 \cdot \mu_{static} + n_b \cdot \frac{MSL}{1.35} \geq m \cdot a_t + PW + PS$$

6.5.33 The required friction between the layers can be calculated by satisfying the following equilibrium:

$$m \cdot g_0 \cdot \mu_{static} \geq m \cdot a_t + PW + PS$$

CHAPTER 7 – UPRIGHTS

7.1 Longitudinally stowed round wood, loose sawn wood and sawn wood packages with limited racking strength should be supported by uprights at least as high as the stow.

7.2 Uprights should be designed for the forces they have to take up according to the formulas in this section. Especially the design of high uprights should be such that the deflection is limited. Uprights may be complemented by different lashing arrangements.



Figure 6.9. Uprights for blocking over the entire height of the stow

7.3 For vessels carrying loose sawn wood and round timber, the design bending moment per upright is calculated as the greater of the two moments given by the following formulas:

$$CM_{bending1} = 0.1 \cdot \frac{H^2}{k \cdot B \cdot N} \cdot m \cdot g_0$$

$$CM_{bending2} = \frac{H}{3 \cdot k \cdot N} \cdot (m \cdot (a_t - 0.6 \cdot \mu_{static} \cdot g_0) + PW + PS)$$

$$M_{bending} \geq 1.35 \cdot \max(CM_{bending1}, CM_{bending2})$$

In the table below the required bending resistance for uprights supporting loose sawn wood or round wood have been calculated based on the formulae above and by using typical cargo properties and configurations.

Height [m]	Transverse Acceleration [m/s ²]							
	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
2	107	150	193	235	278	321	363	406
3	330	474	618	762	906	1050	1194	1338
4	756	1097	1438	1780	2121	2462	2803	3144
5	1452	2118	2785	3451	4118	4784	5451	6117
6	2486	3638	4790	5941	7093	8245	9396	10548
7	3926	5755	7584	9413	11242	13070	14899	
8	5840	8570	11300	14030	16759			

Table 7.1. Required bending resistance in cm³ on uprights supporting round wood.

If **top-over lashings** are applied in accordance with sections 5.4 or 6.5.28 – 6.5.30, the bending moment of the uprights may be reduced by 12%.

7.4 The design bending moment per upright supporting timber packages is to be taken as the greatest of the three moments given by the following formulas:

$$CM_{bending1} = \frac{m}{n_p \cdot k \cdot N} \cdot \left(a_t \cdot \frac{H}{2} - g_0 \cdot \frac{b}{2} \right) \cdot \frac{1 - (1 - f_i)^n}{f_i} \quad (\text{Moment required to prevent tipping})$$

where: $f_i = \mu_{internal} \cdot \frac{2b}{H}$ (f_i = Factor for considering internal moment)

$$CM_{bending2} = \frac{H}{2 \cdot k \cdot N} \cdot m \cdot (a_t - \mu_{internal} \cdot g_0) \cdot \frac{q-1}{2q} \quad (\text{Moment required to prevent sliding})$$

$$CM_{bending3} = \frac{H}{k \cdot N} \cdot (m \cdot a_t - (n_p - 4)(q - 2) \cdot L \cdot RS) \cdot \frac{q-1}{2q} \quad (\text{Moment required to prevent racking})$$

$$M_{bending} \geq 1.35 \cdot \max(CM_{bending1}, CM_{bending2}, CM_{bending3})$$

In the tables below the required bending resistance for uprights supporting timber packages have been calculated based on the formulae above and by using typical cargo properties and configurations for **sturdy** timber packages with a racking strength of 7 kN/m and for weaker packages with a racking strength of 3.5 kN/m.

Height [m]	Transverse Acceleration [m/s ²]							
	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
2					26	70	115	
3		22	70	118	165	213	378	
4	124	237	350	463	576	689	953	
5	458	679	900	1120	1341	1562	1927	
6	1040	1421	1803	2184	2565	2946	3405	
7	1934	2539	3144	3748	4353	4958	5563	
8	3202	4104	5007	5909	6812	7714	8617	
9	4907	6192	7477	8761	10046	11331	12615	

Table 7.2. Required bending resistance in cm³ on uprights supporting **sturdy** packages of sawn wood.

Height [m]	Transverse Acceleration [m/s ²]						
	3.0	3.5	4.0	4.5	5.0	5.5	6.0
2	3	32	61	90	118	147	176
3	524	660	797	934	1071	1207	1344
4	724	1095	1466	1837	2208	2579	2950
5	725	1304	2084	2864	3644	4423	5203
6	1645	2248	2982	4393	5804	7215	8626
7	3055	4011	4966	7200	9512	11824	14136

Table 7.3. Required bending resistance in cm³
on uprights supporting **weaker** packages of sawn wood.

7.5 If hog lashings are used, the required MSL of each hog lashing is calculated by the following formula:

$$MSL \geq \frac{M_{bending}}{2 \cdot h}$$

7.6 The design bending moment should not produce greater stress than 50% of the ultimate stress for the material in any part of the uprights.

CHAPTER 8 – DENOTATIONS USED

The denotations used in the formulas in the design criteria this code are listed below:

- a_t = Largest transverse acceleration at the centre of gravity of the deck cargo in the forward or aft end of the stow in m/s²
- B = Width of deck cargo in metres
- b = Width of each individual stack of packages
- CS = Calculated strength of lashing in kN, see section 6.4
- f_R = Reduction factor for accelerations due to expected sea state
- g_0 = Gravity acceleration 9.81 m/s²
- H = Height of deck cargo in metres
- H_M = Maximum significant wave height
- h = Height above deck at which hoglashings are attached to the uprights in metres
- k = Factor for considering hog lashings:
 $k = 1$ if no hog lashings are used
 $k = 1.8$ if hog lashings are used
- L = Length of the deck cargo or section to be secured in metres
- L_L = Length of each lashing in metres
- $M_{bending}$ = Design bending moment on uprights in kNm
- MSL = Maximum Securing Load in kN of cargo securing devices
- m = Mass of the deck cargo or section to be secured in tonnes, including absorbed water and possible icing
- N = Number of uprights supporting the considered section on each side
- n = Number of lashings
- n_b = Number of bottom blocking devices per side of the deck cargo
- n_p = Number of stacks of packages abreast in each row
- PS = Pressure from unavoidable sea sloshing in kN based on 1 kN per m² exposed area, see CSS Annex 13

PT_V	= Pretension in the vertical part of the lashings in kN
PT_H	= Pretension in the horizontal part of the lashings in kN
PW	= Wind pressure in kN based on 1 kN per m ² wind exposed area, see CSS Annex 13
q	= Number of layers of timber packages
RS	= Racking Strength per metre of timber package in kN/m, see section 4.7.
α	= Angle between the hatch cover top plating and the lashings in degrees
δ	= Small transverse movement of deck cargo in metres due to elasticity of lashing arrangement
ε	= Elasticity factor for lashing equipment, taken as fraction of elongation experienced at the load of MSL for the lashing
$\mu_{dynamic}$	= Dynamic coefficient of friction between the timber deck cargo and the ship's deck/hatch cover and considered to be 70% of the static friction value
$\mu_{internal}$	= Coefficient of dynamic friction found internally between the packages of sawn wood
μ_{static}	= Static coefficient of friction between the timber deck cargo and the ship's deck/hatch cover

ANNEX A – GUIDANCE IN DEVELOPING PROCEDURES AND CHECKLISTS

Items in A.1 to A.5 should be taken into account when developing the checklists for timber deck cargo operations.

A.1 Preparations before Loading of Timber Deck Cargoes

General preparations

A.1.1 The following information as applicable for each parcel of cargo should be provided by the shipper and collected by the master or his representative:

- Total amount of cargo intended as deck cargo
- Typical dimensions of the cargo
- Number of bundles
- Density of the cargo
- Stowage factor of the cargo
- Racking strength for packaged cargo
- Type of cover of packages and whether non-slip type
- Relevant coefficients of friction including covers of sawn wooden packages if applicable.

A.1.2 A confirmation on when the deck cargo will be ready for loading should be received.

A.1.3 A pre-loading plan according to the vessel's Trim and Stability Book should be done and the following should be calculated and checked:

- Stowage height
- Weight per m²
- Required amount of water ballast
- Displacement, draft, trim and stability at departure and arrival.

A.1.4 The stability should be within required limits during the entire voyage.

A.1.5 When undertaking stability calculations, variation in displacement, centre of gravity and free surface moments due to the following factors should be considered:

- Absorption of water in timber carried as timber deck cargo according to Special Instruction, see Annex C
- Ice accretion, if applicable
- Variations in consumables
- Ballast water exchange operations, in accordance with approved procedures.

A.1.6 Proper instructions for ballast water exchange operations, if applicable for the intended voyage, should be available in the Ballast Water Management Plan.

A.1.7 A lashing plan according to the vessel's Cargo Securing Manual (CSM) should be prepared and the following calculated:

- Weight and height of stows per hatch
- Number of sections in longitudinal direction per hatch
- Required number of pieces of lashing equipment
- Required number of uprights, if applicable.

A.1.8 The certificates for the lashing equipment should be available in the vessel's Cargo Securing Manual.

A.1.9 When the initial stability calculations and lashing plan have been satisfactorily completed, the maximum cargo intake should be confirmed.

A.1.10 Pre-load, loading and pre-lashing plans should be distributed to all involved parties (i.e. supercargo, stevedores, agent, etc.).

A.1.11 Weather report for loading period and forecasted weather for the sea voyage should be checked.

A.1.12 It should be confirmed that the stevedoring company is aware of the ship's specific requirements regarding stowage and securing of timber deck cargoes.

Vessel readiness

A.1.13 All ballast tanks required for the voyage and included in the stability calculations should be filled before the commencement of loading on deck and it should be ensured that free surfaces are eliminated in all tanks intended to be completely full or empty.

A.1.14 Hatch covers and other openings to spaces below deck should be closed, secured and battened down.

A.1.15 Air pipes, ventilators, etc., should be protected and examined to ascertain their effectiveness against entry of water.

A.1.16 Objects which might obstruct cargo stowage on deck should be removed and secured safely in places appropriate for storage.

A.1.17 Accumulation of ice and snow on areas to be loaded and on packaged timber should be removed.

A.1.18 All sounding pipes on the deck should be reviewed and necessary precautions should be taken that safe access to these remains.

A.1.19 Cargo securing equipment should be examined in preparation for use in securing of timber deck cargoes and any defective equipment found should be removed from service, tagged for repair and replaced.

A.1.20 It should be confirmed that uprights utilized are in compliance with the requirements in the ship's Cargo Securing Manual.

A.1.21 A firm and level stowage surface should be prepared. Dunnage, where used, should be of rough lumber and placed in the direction which will spread the load across the ship's hatches or main deck structure and assist in draining.

A.1.22 Extra lashing points, if required, should be approved by the Administration.

A.1.23 It should be ensured that dunnage is readily available and in good condition.

A.1.24 Friction enhancing arrangements, where fitted, should be checked for their condition.

A.1.25 Cranes with wires, brakes, micro switches and signals (if they are to be used) should be controlled.

A.1.26 It should be verified that illumination on deck is working and ready for use.

Ship to shore communication

A.1.27 Radio channels to be used during cargo operations should be assigned and tested.

A.1.28 It should be confirmed that crane drivers and loading stevedores/crew understands signals to be used during cargo operations.

A.1.29 A plan should be worked out to halt loading or unloading operations due to any unforeseen circumstances that may jeopardize safety of ship and/or anyone on board.

A.2 Safety during Loading and Securing of Timber Deck Cargoes

Lashing equipment

A.2.1 If applicable, uprights should be mounted before loading on deck is commenced.

A.2.2 It should be checked that all lashing equipment is in place.

Vessel's safety

A.2.3 All loading operations should be planned to immediately cease if a list develops for which there is no satisfactory explanation.

A.2.4 In the event that the vessel takes up an unexplained list, then no further work should be undertaken until all ship's tanks are sounded and assessment made of the ship's stability condition.

A.2.5 If deemed necessary, samples of the timber cargo should be weighed during loading and their actual weight should be compared to the weight stated by the shipper, in order to correctly assess the ship's stability.

A.2.6 Draft checks should be regularly carried out during the course of loading and the ship's displacement should be calculated to ensure the ship's stability and draft in the final condition are within prescribed limits.

A.2.7 Permitted loading weights on deck and hatches should not be exceeded.

A.2.8 The stability of the vessel should at all times be positive and in compliance with the vessels intact stability requirements.

A.2.9 Emergency escape routes should be free and ready for use.

A.2.10 There should be free access to ventilation ducts and valves if required.

A.2.11 Any obstruction such as lashings or securing points in the access way of escape routes or operational spaces and to safety equipment, fire fighting equipment or sounding pipes should be kept to a minimum and in any case they should be clearly marked.

A.2.12 An approximation of the metacentric height should be obtained (when safe to do so) from the rolling period or static list at a late stage of loading. Rolling or static list may be initiated by quick or slow (as appropriate) shifting of cargo with the deck cranes or lowering cargo bundles onto other deck cargo at one side of the vessel.

Stowage

A.2.13 The stow of the deck cargo should be as solid, compact and stable as practicable. Slack in the stow should be prevented as such could cause lashings to slacken and/or water to accumulate.

A.2.14 A binding effect should, as far as practicable, be obtained within the stow to enhance the stability of stack structure and to minimize the risk of cargo shifting during the sea voyage.

A.2.15 Stowage of damaged timber packages should not be allowed. Timber packages that have deformed or are found with broken bands should be returned to shore for rectification.

A.2.16 Cargo should not be stowed overhanging the ship's side.

A.2.17 Timber deck cargo which overhangs the outer side of hatch coamings or other structures, should be supported at the outer end by other cargo stowed on deck or railing or equivalent structure of sufficient strength to support it. (refer to 2.9.6)

Avoid the risk of sliding in the stow

A.2.18 Ice and snow accretions should be cleared from the hatches and deck cargo before placing further cargo layers in order to obtain a high coefficient of friction in the stow.

A.2.19 Sliding between the layers should if possible be prevented by stowing timber packages of different heights in the same layer or by inserting vertical, sturdy battens between the layers. Transverse tipping of wooden packages could be prevented by overlapping packages in successive tiers so as to create a binding stow. (refer to 6.5.7)

Work safety

A.2.20 Personnel involved in the loading process should be equipped with protective clothing, i.e. hardhats, proper footwear, gloves, etc., according to ship's and harbour requirements.

A.2.21 Personnel working on cargo stowed at heights 2 metres and above, within 1 m of an unguarded edge, should if deemed necessary be protected from falls with fall restraint equipment such as a safety harness or other fall restraining devices approved by the Administration.

A.2.22 While working on the cargo there should be provisions to attach a safety harness.

A.2.23 Safe access should be available to the top of, and across the cargo stow.

A.2.24 Personnel should exercise caution when working or moving on timber packages covered by plastic wrapping or tarpaulins.

A.3 Securing of Timber Deck Cargoes

Basic requirements on the securing

A.3.1 The stevedoring company and the crew should be informed about the requirements on the securing arrangements.

A.3.2 Uprights, when used, should be well fastened and protected from falling inwards during loading and discharging operations.

A.3.3 If required by this code and as prescribed in the cargo securing manual, uprights should be connected by hog lashings, running between each pair of uprights on opposing sides of the stow.

Repair or replacement of damaged securing equipment

A.3.4 Only undamaged cargo securing equipment should be used for securing timber deck cargo.

A.3.5 Damaged equipment that is beyond repair should be marked as unserviceable and removed from the vessel.

A.3.6 If any damage is noted on any of the uprights or their support on deck, coamings or hatches, this should immediately be repaired.

A.3.7 If any damage is noted on the fixed lashing equipment this should immediately be repaired.

A.3.8 If any damage is noted on the portable lashing equipment this should immediately be repaired or the equipment should be exchanged by new certified equipment.

Tightening of lashings

A.3.9 Threads on turnbuckles should be greased to increase pre-tension in the lashings.

A.3.10 All lashings should be thoroughly tightened and all bolts and screws on shackles and turnbuckles should be tightly fastened.

A.3.11 Turnbuckles should have sufficient threads remaining to permit lashings to be tightened during the voyage as needed.

A.3.12 Lashings should be tensioned as specified in this code and as prescribed in the cargo securing manual.

A.3.13 Edge protectors should be used when required according to this code and as prescribed in the vessel's Cargo Securing Manual to obtain good pretension in both vertical and horizontal parts of the lashings.

Provision of catwalk

A.3.14 If there is no convenient passage on or below the deck of the ship, a sturdy catwalk with strong railings should be provided above the deck cargo. (refer to 2.8.6)

Securing according to the vessel's Cargo Securing Manual

A.3.15 The timber deck cargo should be stowed and secured according to this code and as prescribed in the vessel's Cargo Securing Manual.

A.3.16 Number and strength of uprights and lashing equipment used for the securing of the timber deck cargo should be in accordance with this code and as prescribed in the vessel's Cargo Securing Manual.

A.4 Actions to be taken during the Voyage

Voyage Planning

A.4.1 During voyage planning, all foreseeable risks which could lead to either excessive accelerations causing cargo to shift or sloshing sea causing water absorption and ice aggregation, should be taken under consideration.

A.4.2 Before the vessel proceeds to sea, the following should be verified:

- The ship is upright
- The ship has an adequate metacentric height
- The ship meets the required stability criteria
- The cargo is properly secured.

A.4.3 Soundings of tanks should be regularly carried out throughout the voyage.

A.4.4 The rolling period of the vessel should be regularly checked in order to establish that the metacentric height is still within the acceptable range.

A.4.5 In cases where severe weather and sea conditions are unavoidable, the Master should be conscious of the need to reduce speed and/or alter course at an early stage in order to minimize the forces imposed on the cargo, structure and lashings.

A.4.6 If deviation from the intended voyage plan is considered during the voyage, a new plan should be made.

Cargo Safety Inspections during Sea Voyages

A.4.7 Cargo Safety Inspections, in accordance with the items below, should be frequently conducted throughout the voyage.

A.4.8 Prior to any inspections being commenced on deck, the Master should take appropriate actions to reduce the motions of the vessel during such operations.

A.4.9 Close attention should be given to any movement of the cargo which could compromise the safety of the vessel.

A.4.10 When safety permits fixed and portable lashing equipment should be visually examined for any abnormal wear or tear or other damages.

A.4.11 Since vibrations and working of the ship will cause the cargo to settle and compact, lashing equipment should be retightened to produce the necessary pre-tension, as needed.

A.4.12 Uprights should be checked for any damage or deformation.

A.4.13 Supports for upright should be undamaged.

A.4.14 Corner protections should still be in place.

A.4.15 All examinations and adjustments to cargo securing equipment during the voyage should be entered in the ship's log-book.

List during voyage

A.4.16 If a list occurs that cannot be attributed to normal use of consumables the matter should be immediately investigated. This should consider that the cause may be due to one or more of the following:

- Cargo shift
- Water ingresses
- An angle of loll (inadequate GM).

A.4.17 Even if no major shift of the deck cargo is apparent, it should be examined whether the deck cargo has shifted slightly or if there has been a shift of cargo below deck. However, prior to entering any closed hold that contains timber the atmosphere should be checked to make sure that the hold atmosphere has not been oxygen depleted by the timber.

A.4.18 It should be considered whether the weather conditions are such that sending the crew to release or tighten the lashings on a moving or shifted cargo present a greater hazard than retaining an overhanging load.

A.4.19 The possibility of water ingress should be determined by sounding throughout the vessel. In the event that unexplained water is detected, all available pumps, as appropriate, should be used to bring the situation under control.

A.4.20 An approximation of the current metacentric height should be determined by timing the rolling period.

A.4.21 If the list is corrected by ballasting and deballasting operations, the order in which tanks are filled and emptied should be decided with consideration to the following factors:

- When the draft of the vessel increases, water ingress may occur through openings and ventilation pipes.
- If ballast has been shifted to counteract a cargo shift or water ingress, a far greater list may rapidly develop to the opposite side.
- If the list is due to the ship lolling, and if empty divided double bottom space is available, the tank on the lower side should be ballasted first in order to immediately provide additional metacentric height – after which the tank on the high side should also be ballasted.

- Free surface moments should be kept at a minimum by operating only one tank at a time.

A.4.22 As a final resort when all other options have been exhausted if the list is to be corrected by jettisoning deck cargo, the following aspects should be noted:

- Jettisoning is unlikely to improve the situation entirely as the whole stack would probably not fall at once
- Severe damage may be sustained by the propeller if it is still turning when the timber is jettisoned
- It will be inherently dangerous to anyone involved in the actual jettison procedure
- The position of the jettisoning procedure and estimated navigational hazard must be immediately reported to coastal authorities.

A.4.23 If the whole or partial timber deck load is either jettisoned or accidentally lost overboard, the information on a direct danger to navigation^[28] should be communicated by the master by all means at his disposal to the following parties:

- Ships in the vicinity
- Competent authorities at the first point on the coast with which he can communicate directly.

Such information is to include the following:

- The kind of danger
- The position of the danger when last observed
- The time and date (coordinated universal time) when the danger was last observed.

A.5 Safety during Discharge of Timber Deck Cargoes

Cargo Securing Equipment

A.5.1 The cargo securing equipment should be collected and examined and damaged equipment should be either repaired or scrapped.

A.5.2 Uprights, when used, should be well fastened to the deck, hatches or coamings of the vessel and protected from falling inwards during discharging operations.

Vessel's Safety

A.5.3 All discharge operations should be planned to immediately cease if a list develops for which there is no satisfactory explanation and it would be imprudent to continue loading.

A.5.4 The stability of the vessel should, at all times, be positive and in compliance with the vessels intact stability requirements.

A.5.5 Emergency escape routes should be free and ready for use.

Work Safety

A.5.6 Personnel involved in the discharge process should be dressed with protective clothing, i.e. hardhats, proper footwear, gloves, etc., according to ship's and harbour requirements.

A.5.7 While working on the cargo there should be provisions to attach a safety harness.

A.5.8 Correct signals should be agreed and used with crane operator(s).

A.5.9 Safe access should be available to the top of, and across the cargo stow.

A.5.10 All possible actions should be taken to minimize the risk of slipping on the cargo (i.e. when plastic wrapping or tarpaulins are used as covers).

A.5.11 Illumination should be used when required during the cargo operation.

ANNEX B – SAMPLES OF STOWAGE AND SECURING ARRANGEMENTS

B.1 Example Calculation – Top-over lashings

In the examples below, the number of lashings required to secure packages of sawn wood on deck as well as the required racking strength in the packages in the bottom layer are calculated for a 16,600 DWT vessel.

Example B.1.1 – Top-over Lashings on a 16,600 DWT Vessel

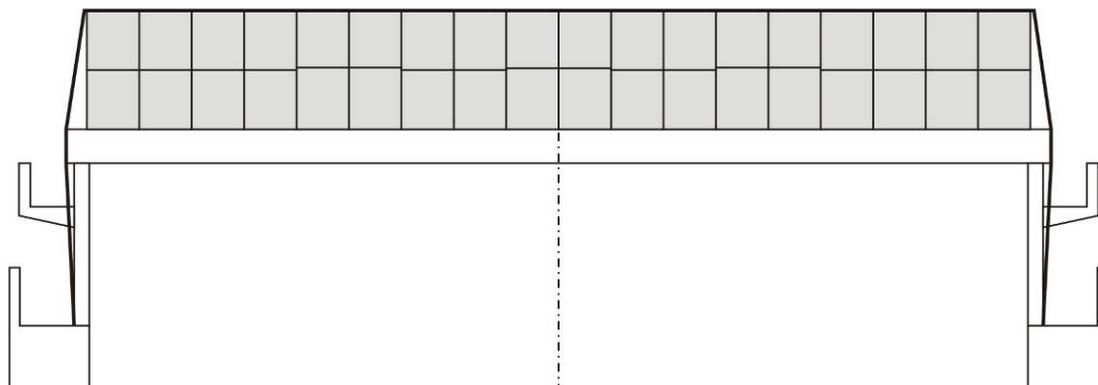


Figure B.1. Midship section of 16,600 DWT vessel with packages of sawn wood in two layers secured with top-over lashings

Vessel particulars

<i>Length between perpendiculars, LPP:</i>	134 metres
<i>Moulded breadth, BM:</i>	22 metres
<i>Service speed:</i>	14.5 knots
<i>Metacentric height, GM:</i>	0.70 metres

The deck cargo has the dimensions $L \times B \times H = 80 \times 19.7 \times 2.4$ metres. The total weight of the deck cargo is taken as 1,600 tons. Sliding between the layers is prevented by packages of different heights in the bottom layer.

Dimensioning transverse acceleration

With vessel particulars as above and considering a stowage position on deck low, Annex 13 of the Code of Safe Practice for Cargo Stowage and Securing gives a transverse acceleration of $a_t = 5.3 \text{ m/s}^2$, using the following basic acceleration and correction factors:

$a_{t \text{ basic}}$	=	6.5 m/s^2	=	Basic transverse acceleration
f_{R1}	=	0.81	=	Correction factor for length and speed
f_{R2}	=	1.00	=	Correction factor for B_M/GM

$$a_t = a_{t \text{ basic}} \cdot f_{R1} \cdot f_{R2} = 6.5 \cdot 0.81 \cdot 1.00 = 5.3 \text{ m/s}^2$$

Cargo properties

m	=	1,600 ton	=	Mass of the section to be secured in tons, including absorbed water and possible icing
μ_{static}	=	0.45	=	Coefficient of static friction between the timber deck cargo and the ship's deck/hatch cover
H	=	2.4 m	=	Height of deck cargo in metres
B	=	19.7 m	=	Width of deck cargo in metres
L	=	80 m	=	Length of the deck cargo or section to be secured in metres
PW	=	192 kN	=	Wind pressure in kN based on 1 kN per m ² wind exposed area, see CSS Annex 13
PS	=	160 kN	=	Pressure from unavoidable sea sloshing in kN based on 1 kN per m ² exposed area, see CSS Annex 13
PT_V	=	16 kN	=	Pretension in the vertical part of the lashings in kN
α	=	85°	=	Angle between the horizontal plane and the lashings in degrees
n_p	=	18 pcs	=	Number of stacks of packages abreast in each row

Number of required top-over lashings

For pure top-over lashing arrangements with no bottom blocking, the friction alone will have to counteract the transverse forces so that the following equilibrium of forces is satisfied:

$$(m \cdot g_0 + 2 \cdot n \cdot PT_V \cdot \sin \alpha) \cdot \mu_{static} \geq m \cdot a_t + PW + PS$$

units denoted with _a consider cargo units above the bottom layer only

Thus the required number of top-over lashings can be calculated as:

$$n \geq \frac{\frac{m \cdot a_t + PW + PS}{\mu_{static}} - m \cdot g_0}{2 \cdot PT_V \cdot \sin \alpha} = \frac{1600 \cdot 5.3 + 192 + 160}{0.45} - 1600 \cdot 9.81}{2 \cdot 16 \cdot \sin 85} = 123 \text{ pcs}$$

Racking strength

To prevent the packages in the bottom layer from collapsing due to racking, the weight of the cargo stowed on top of the bottom layer should be limited so that the following equilibrium of forces is satisfied:

$$n_p \cdot L \cdot RS \geq m_a \cdot (a_t - 0.5 g_0) + PW_a + PS_a$$

Units denoted with _a consider cargo units above the bottom layer only.

Thus the required racking strength can be calculated to 0.33 kN/metre:

$$RS \geq \frac{m_a \cdot (a_t - 0.5 \cdot g_0) + PW_a + PS_a}{n_p \cdot L} = \frac{800 \cdot (5.3 - 0.5 \cdot 9.81) + 96 + 64}{18 \cdot 80} = 0.33 \text{ kN/m} = 0.034 \text{ ton/m}$$

B.2 Example Calculation – Bottom blocking and top-over lashings

In the example below, the required strength of the bottom blocking devices are calculated for a deck load of packages of sawn wood. The number of lashings used and the pretension of the lashings have been taken in accordance with sections 6.5.19 and 6.5.20 of this code.

Example B.2.1 – Bottom blocking and top-over lashings on a 16,600 DWT Vessel

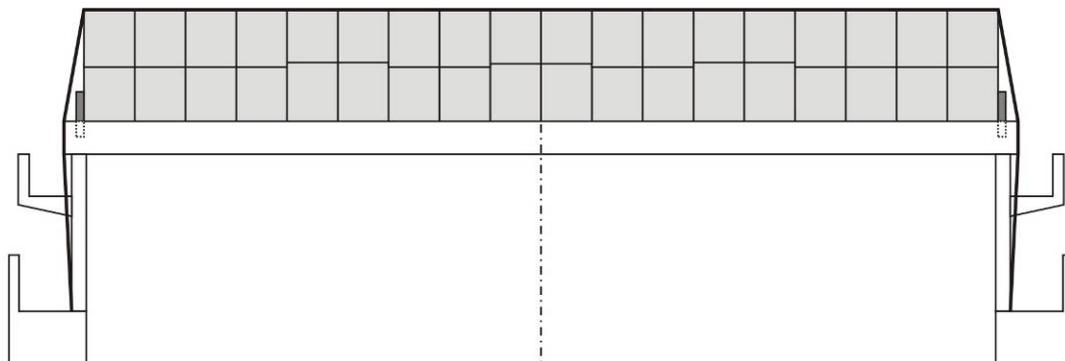


Figure B.2. Midship section of 16,600 DWT vessel with packages of sawn wood in two layers secured with bottom blocking devices and top-over lashings

Vessel particulars

Length between perpendiculars, LPP:	134 metres
Moulded breadth, BM:	22 metres
Service speed:	14.5 knots
Metacentric height, GM:	0.70 metres

The deck cargo has the dimensions $L \times B \times H = 80 \times 19.7 \times 2.4$ metres. The total weight of the deck cargo is taken as 1,600 tons. Sliding between the layers is prevented by packages of different heights in the bottom layer.

Dimensioning transverse acceleration

With vessel particulars as above and considering a stowage position on deck low, Annex 13 of the Code of Safe Practice for Cargo Stowage and Securing gives a transverse acceleration of $a_t = 5.3 \text{ m/s}^2$, using the following basic acceleration and correction factors:

$a_{t \text{ basic}}$	=	6.5 m/s^2	=	Basic transverse acceleration
f_{R1}	=	0.81	=	Correction factor for length and speed
f_{R2}	=	1.00	=	Correction factor for B_M/GM

$$a_t = a_{t \text{ basic}} \cdot f_{R1} \cdot f_{R2} = 6.5 \cdot 0.81 \cdot 1.00 = 5.3 \text{ m/s}^2$$

Cargo properties

m	=	1,600 ton	=	Mass of the section to be secured in tons, including absorbed water and possible icing
μ_{static}	=	0.45	=	Coefficient of static friction between the timber deck cargo and the ship's deck/hatch cover
H	=	2.4 m	=	Height of deck cargo in metres
B	=	19.7 m	=	Width of deck cargo in metres

L	=	80 m	=	Length of the deck cargo or section to be secured in metres
PW	=	192 kN	=	Wind pressure in kN based on 1 kN per m ² wind exposed area, see CSS Annex 13
PS	=	160 kN	=	Pressure from unavoidable sea sloshing in kN based on 1 kN per m ² exposed area, see CSS Annex 13
n	=	26 pcs	=	Number of top-over lashings
PT_V	=	16 kN	=	Pretension in the vertical part of the lashings in kN
α	=	85°	=	Angle between the horizontal plane and the lashings in degrees
n_p	=	18 pcs	=	Number of stacks of packages abreast in each row
n_b	=	26 pcs	=	Number of bottom blocking devices per side of the deck cargo

Required strength of the bottom blocking

The required strength, MSL, of the bottom blocking devices is given by the following equilibrium:

$$(m \cdot g_0 + 2 \cdot n \cdot PT_V \cdot \sin \alpha) \cdot \mu_{static} + n_b \frac{MSL}{1.35} \geq m \cdot a_t + PW + PS$$

$$MSL \geq \frac{1.35}{n_b} (m \cdot a_t + PW + PS - (m \cdot g_0 + 2 \cdot n \cdot PT_V \cdot \sin \alpha) \cdot \mu_{static})$$

$$MSL \geq \frac{1.35}{26} (2000 \cdot 5.3 + 192 + 160 - (2000 \cdot 9.81 + 2 \cdot 26 \cdot 16 \cdot \sin 85) \cdot 0.45) = 91kN$$

B.3 Example Calculation – Loop lashings

In the example below, the required strength in loop lashings used for secure packages of sawn wood on deck is calculated.

Example B.3.1 – Loop Lashings on a 16,600 DWT Vessel

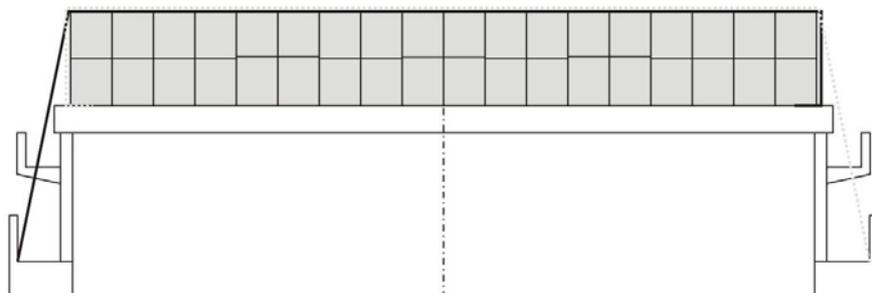


Figure B.3. Midship section of 16,600 DWT vessel with packages of sawn wood secured with loop lashings

Vessel particulars

Length between perpendiculars, LPP:	134 metres
Moulded breadth, BM:	22 metres
Service speed:	14.5 knots
Metacentric height, GM:	0.70 metres

The deck cargo has the dimensions $L \times B \times H = 80 \times 19.7 \times 2.4$ metres. The total weight of the deck cargo is taken as 1,600 tons. Sliding between the layers is prevented by packages of different heights in the bottom layer.

Dimensioning transverse acceleration

With vessel particulars as above and considering a stowage position on deck low, Annex 13 of the Code of Safe Practice for Cargo Stowage and Securing gives a transverse acceleration of $a_t = 5.3 \text{ m/s}^2$, using the following basic acceleration and correction factors:

$a_{t \text{ basic}}$	=	6.5	m/s^2	=	Basic transverse acceleration
f_{R1}	=	0.81		=	Correction factor for length and speed
f_{R2}	=	1.00		=	Correction factor for B_M/GM

$$a_t = a_{t \text{ basic}} \cdot f_{R1} \cdot f_{R2} = 6.5 \cdot 0.81 \cdot 1.00 = 5.3 \text{ m/s}^2$$

Cargo properties

m	=	1,600	ton	=	Mass of the section to be secured in tons, including absorbed water and possible icing
$\mu_{dynamic}$	=	0.32		=	Coefficient of dynamic friction between the timber deck cargo and the ship's deck/hatch cover
H	=	2.4	m	=	Height of deck cargo in metres
B	=	19.7	m	=	Width of deck cargo in metres
L	=	80	m	=	Length of the deck cargo or section to be secured in metres
PW	=	192	kN	=	Wind pressure in kN based on 1 kN per m^2 wind exposed area, see CSS Annex 13
PS	=	160	kN	=	Pressure from unavoidable sea sloshing in kN based on 1 kN per m^2 exposed area, see CSS Annex 13
α	=	70°		=	Angle between the horizontal plane and the lashings in degrees
n	=	36	pcs	=	Number of loop lashings pairs
L_L	=	25	m	=	Length of each lashing in metres
PT_V	=	16	kN	=	Pretension in the vertical part of the lashings in kN
n_p	=	13	pcs	=	Number of stacks of packages abreast in each row

Number of required loop lashings

The number and strength of the lashings are to be chosen so that the following equilibrium is satisfied:

$$(m \cdot g_0 + n \cdot CS \cdot \sin \alpha) \cdot \mu_{dynamic} + n \cdot CS + n \cdot CS \cdot \cos \alpha \geq m \cdot a_t + PW + PS$$

If the number of loop lashings pairs is 36 then the required strength in the lashings can be calculated as:

$$CS \geq \frac{m \cdot (a_t - g_0 \cdot \mu_{dynamic}) + PW + PS}{n \cdot (\sin \alpha \cdot \mu_{dynamic} + 1 + \cos \alpha)} = \frac{1600 \cdot (5.3 - 9.81 \cdot 0.32) + 192 + 160}{36 \cdot (\sin 70 \cdot 0.32 + 1 + \cos 70)} = 64 \text{ kN}$$

The required MSL in the lashings is calculated as:

$$MSL = CS \cdot 1.35 = 64 \cdot 1.35 = 86 \text{ kN} = 8.8 \text{ ton}$$

Transverse movement of cargo due to elongation in lashings

The transverse movement of the deck cargo due to elongation of the lashings is calculated according to the formula below. If chains are used the elongation factor is set to $\varepsilon = 0.02$, and the transverse movement is calculated as:

$$\delta = L_L \cdot \frac{(CS - PT_V)}{MSL} \cdot \varepsilon = 25 \cdot \frac{(64 - 16)}{86} \cdot 0.02 = 0.28 \text{ m}$$

If web lashings are used the elongation factor is set to $\varepsilon = 0.07$, and the transverse movement is calculated as:

$$\delta = L_L \cdot \frac{(CS - PT_V)}{MSL} \cdot \varepsilon = 25 \cdot \frac{(64 - 16)}{86} \cdot 0.07 = 0.98 \text{ m}$$

In accordance with 6.5.16 the transverse movement of the cargo should not generate a greater heeling angle than 5 degrees. In order to comply with this requirement significantly more and/or stronger lashings than described above have to be used.

Racking strength

To prevent the packages in the bottom layer from collapsing due to racking, the weight of the cargo stowed on top of the bottom layer should be limited so that the following equilibrium of forces is satisfied:

$$n_p \cdot L \cdot RS + n \cdot CS \cdot \cos \alpha \geq m_a \cdot (a_t - 0.5g_0) + PW_a + PS_a$$

units denoted with _a consider cargo units above the bottom layer only.

Thus the required racking strength can be calculated as:

$$\begin{aligned} RS &\geq \frac{m_a \cdot (a_t - 0.5 \cdot g_0) + PW_a + PS_a - n \cdot CS \cdot \cos \alpha}{n_p \cdot L} = \\ &= \frac{800 \cdot (5.3 - 0.5 \cdot 9.81) + 96 + 64 - 46 \cdot 62 \cdot \cos 70}{13 \cdot 80} < 0 \text{ kN / m} \end{aligned}$$

There is no requirement on the racking strength of the packages, since the calculated value is less than zero.!

B.4 Example Calculation – Uprights for Packages of Sawn Wood

In the example below, the dimensioning moment for uprights supporting packages of sawn wood on deck is calculated for a 16,600 DWT vessel.

Example B.4.1 – Uprights on a 16,600 DWT Vessel

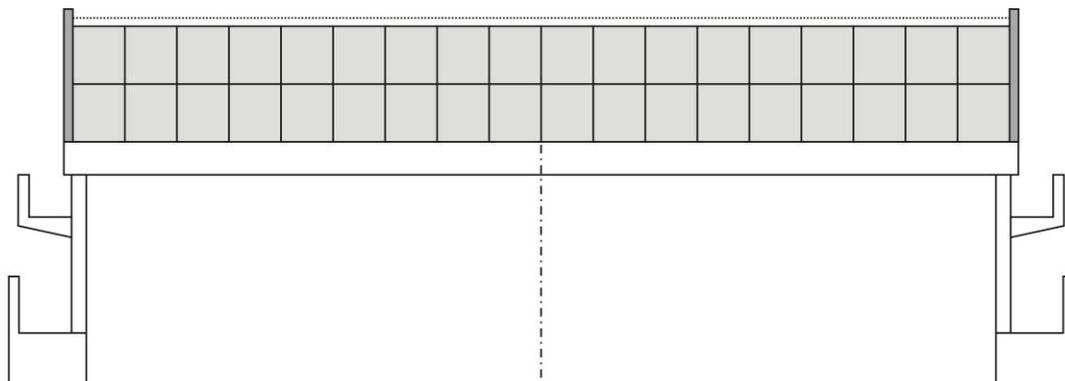


Figure B.4. Midship section of vessel with timber packages secured with uprights

Vessel particulars

Length between perpendiculars, L_{PP} :	134 metres
Moulded breadth, B_M :	22 metres
Service speed:	14.5 knots
Metacentric height, GM :	0.7 metres

The deck cargo has the dimensions $L \times B \times H = 80 \times 19.7 \times 2.4$ metres. The total weight of the deck cargo is taken as 1,600 tons.

With vessel particulars as above and considering a stowage position on deck low, Annex 13 of the Code of Safe Practice for Cargo Stowage and Securing gives a transverse acceleration of $a_t = 5.3 \text{ m/s}^2$, using the following basic acceleration and correction factors:

$a_{t \text{ basic}}$	=	6.5 m/s^2	=	Basic transverse acceleration
f_{R1}	=	0.80	=	Correction factor for length and speed
f_{R2}	=	1.00	=	Correction factor for B_M/GM

$$a_t = a_{t \text{ basic}} \cdot f_{R1} \cdot f_{R2} = 6.5 \cdot 0.81 \cdot 1.00 = 5.3 \text{ m/s}^2$$

Cargo properties

m	=	1,600 ton	=	Mass of the section to be secured in tons, including absorbed water and possible icing
μ_{internal}	=	0.30	=	Coefficient of internal friction between the timber packages
H	=	2.4 m	=	Height of deck cargo in metres
b	=	1.1 m	=	Width of each individual stack of packages
n_p	=	18 pcs	=	Number of stacks of timber packages abreast in each row
q	=	2 pcs	=	Number of layers of timber packages
RS	=	3.5 kN	=	Racking Strength per timber package in kN
N	=	36 pcs	=	Number of uprights supporting the considered section on each side
H	=	2.4 m	=	Height above deck at which hoglashings are attached to the uprights in metres

$$K = 1.8 = \text{Factor for considering hog lashings}$$

$$k = 1 \text{ if no hog lashings are used}$$

$$k = 1.8 \text{ if hog lashings are used}$$

Bending moment in uprights

The design bending moment per upright supporting timber packages is to be taken as the greatest of the three moments given by the following formulas:

$$CM_{bending1} = \frac{m}{n_p \cdot k \cdot N} \cdot \left(a_t \cdot \frac{H}{2} - g_0 \cdot \frac{b}{2} \right) \cdot \frac{1 - (1 - f_i)^{n_p}}{f_i} \quad (\text{Moment required to prevent tipping})$$

$$\text{where } f_i = \mu_{\text{internal}} \cdot \frac{2b}{H} \quad (f_i = \text{Factor for considering internal moment})$$

$$CM_{bending2} = \frac{H}{2 \cdot k \cdot N} \cdot m \cdot \left(a_t - \mu_{\text{internal}} \cdot g_0 \right) \cdot \frac{q-1}{2q} \quad (\text{Moment required to prevent sliding})$$

$$CM_{bending3} = \frac{H}{k \cdot N} \cdot \left(m \cdot a_t - (n_p - 4)(q-2) \cdot L \cdot RS \right) \cdot \frac{(q-1)}{2q} \quad (\text{Moment required to prevent racking})$$

With cargo properties and acceleration as given above, the following bending moments are calculated:

$$f_i = 0.3 \cdot \frac{2 \cdot 1.1}{2.4} = 0.275$$

$$CM_{bending1} = \frac{1600}{18 \cdot 1.8 \cdot 36} \cdot \left(5.3 \cdot \frac{2.4}{2} - 9.81 \cdot \frac{1.1}{2} \right) \cdot \frac{1 - (1 - 0.275)^{18}}{0.275} = 4.8 \text{ kNm}$$

$$CM_{bending2} = \frac{2.4}{2 \cdot 1.8 \cdot 36} \cdot 1600 \cdot (5.3 - 0.30 \cdot 9.81) \cdot \frac{2-1}{2 \cdot 2} = 17.5 \text{ kNm}$$

$$CM_{bending3} = \frac{2.4}{1.8 \cdot 36} \cdot (1600 \cdot 5.3 - (18 - 4)(2 - 2) \cdot 80 \cdot 3.5) \cdot \frac{(2-1)}{2 \cdot 2} = 78.5 \text{ kNm}$$

The design bending moment, taken as the maximum bending moment calculated by the three formulae above multiplied with the safety factor of 1.35, thus becomes 106 kNm:

$$M_{bending} \geq 1.35 \cdot \max(CM_{bending1}, CM_{bending2}, CM_{bending3}) = 1.35 \cdot 78.5 = 106 \text{ kNm}$$

Suitable dimensions for uprights

With MSL taken as 50% of the MBL for steel with the ultimate strength 360 MPa (N/mm²), the required bending resistance, W, can be calculated as:

$$W = \frac{M_{bending}}{50\% \text{ of } 360MPa} = \frac{106 \cdot 10^6}{180} = 589 \cdot 10^3 \text{ mm}^3 = 589 \text{ cm}^3$$

Thus, uprights made from either HE220A profiles or a cylindrical profile with an outer diameter of 324 mm and a wall thickness of 10.3 mm are suitable (see section B.7).

Strength in hoglashings

The required MSL of each hog lashing is calculated by the following formula:

$$MSL \geq \frac{M_{bending}}{2 \cdot h}$$

In this case, the hoglashings are attached at a height of $h = 3.5$ metres and the required strength is calculated as:

$$MSL \geq \frac{M_{bending}}{2 \cdot h} = \frac{106}{2 \cdot 3.5} = 15 \text{ kN} \approx 1.5 \text{ ton}$$

B.5 Example Calculation – Uprights for Round Wood

In the examples below, the dimensioning moments for uprights supporting round wood on deck are calculated for three different vessels of varying sizes.

Example B.5.1 – Uprights for Round Wood on a 28,400 DWT Vessel

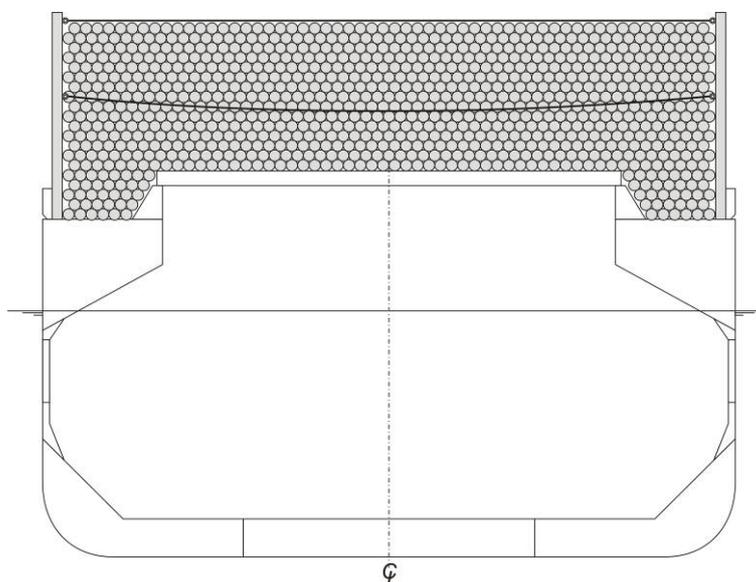


Figure B.5. Midship section of 28,400 DWT vessel with round wood secured with uprights

Vessel particulars

<i>Length between perpendiculars, LPP:</i>	<i>160 metres</i>
<i>Moulded breadth, BM:</i>	<i>27 metres</i>
<i>Service speed:</i>	<i>14 knots</i>
<i>Metacentric height, GM:</i>	<i>0.80 metres</i>

The deck cargo has the dimensions $L \times B \times H = 110 \times 25.6 \times 7$ metres and is supported by 42 uprights on each side. The total weight is taken as 10,500 tons.

In addition to the uprights and hog-lashings, the cargo has been secured with top-over lashings applied in accordance with sections 5.4 and 6.5.28 – 6.5.30 .

With vessel particulars as above and considering a stowage position on deck low, Annex 13 of the Code of Safe Practice for Cargo Stowage and Securing gives a transverse acceleration of $a_t = 4.6 \text{ m/s}^2$, using the following basic acceleration and correction factors:

$$\begin{aligned} a_{t \text{ basic}} &= 6.5 \text{ m/s}^2 &= \text{Basic transverse acceleration} \\ f_{R1} &= 0.71 &= \text{Correction factor for length and speed} \\ f_{R2} &= 1.00 &= \text{Correction factor for } B_M/GM \end{aligned}$$

$$a_t = a_{t \text{ basic}} \cdot k_1 \cdot k_2 = 6.5 \cdot 0.71 \cdot 1.00 = 4.6 \text{ m/s}^2$$

Cargo properties

M	=	10,500 ton	=	Mass of the section to be secured in tons, including absorbed water and possible icing
μ_{static}	=	0.5	=	Coefficient of static friction between the timber deck cargo and the ship's deck/hatch cover
H	=	7 m	=	Height of deck cargo in metres
B	=	25.6 m	=	Width of deck cargo in metres
L	=	110 m	=	Length of the deck cargo or section to be secured in metres
PW	=	770 kN	=	Wind pressure in kN based on 1 kN per m^2 wind exposed area, see CSS Annex 13
PS	=	220 kN	=	Pressure from unavoidable sea sloshing in kN based on 1 kN per m^2 exposed area, see CSS Annex 13
N	=	42 pcs	=	Number of uprights supporting the considered section on each side
h	=	3.7 / 6.7 m	=	Height above deck at which hog lashings are attached to the uprights in metres
n_{hog}	=	2 pcs	=	Number of hog lashings for each upright
k	=	1.8	=	Factor for considering hog lashings; $k = 1$ if no hog lashings are used $k = 1.8$ if hog lashings are used

Bending moment in uprights

For vessels carrying loose sawn wood and round wood, the design bending moment per upright is calculated as the greater of the two moments given by the following formulas:

$$CM_{bending1} = 0.1 \cdot \frac{H^2}{k \cdot B \cdot N} \cdot m \cdot g_0$$

$$CM_{bending2} = \frac{H}{3 \cdot k \cdot N} \cdot (m \cdot (a_t - 0.6 \cdot \mu_{static} \cdot g_0) + PW + PS)$$

With cargo properties and acceleration as given above, the following bending moments are calculated:

$$CM_{bending1} = 0.1 \cdot \frac{7^2}{1.8 \cdot 25.6 \cdot 42} \cdot 10500 \cdot 9.81 = 260 \text{ kNm}$$

$$CM_{bending2} = \frac{7}{3 \cdot 1.8 \cdot 42} \cdot (10500 \cdot (4.6 - 0.6 \cdot 0.5 \cdot 9.81) + 770 + 220) = 568 \text{ kNm}$$

The design bending moment, taken as the maximum bending moment calculated by the formulae above multiplied with a safety factor of 1.35 and considering the 12% reduction allowed for by the use of properly applied top-over lashings, thus becomes:

$$M_{bending} \geq 88\% \cdot 1.35 \cdot \max(CM_{bending1}, CM_{bending2}) = 0.88 \cdot 1.35 \cdot 568 = 675 \text{ kNm}$$

Suitable dimensions for uprights

With MSL taken as 50% of the MBL for steel with the ultimate strength 360 MPa (N/mm²), the required bending resistance, W, can be calculated as:

$$W = \frac{M_{bending}}{50\% \text{ of } 360 \text{ MPa}} = \frac{675 \cdot 10^6}{180} = 3749 \cdot 10^3 \text{ mm}^3 = 3749 \text{ cm}^3$$

Thus, uprights made from either HE500B profiles or a cylindrical profile with an outer diameter of 508 mm and a wall thickness of 26.2 mm are suitable (see section B.7).

Strength in hog lashings

The required MSL of each hog lashing is calculated by the following formula:

$$MSL \geq \frac{M_{bending}}{2 \cdot h \cdot n_{hog}}$$

In this case, the hog lashings are attached at the heights 3.7 and 6.7 metres (mean height=5.2) and the required strength is calculated as:

$$MSL \geq \frac{M_{bending}}{2 \cdot h \cdot n_{hog}} = \frac{528}{2 \cdot 5.2 \cdot 2} = 25 \text{ kN} \approx 2.5 \text{ ton}$$

Example B.5.2 – Uprights for Round Wood on a 16 600 DWT Vessel

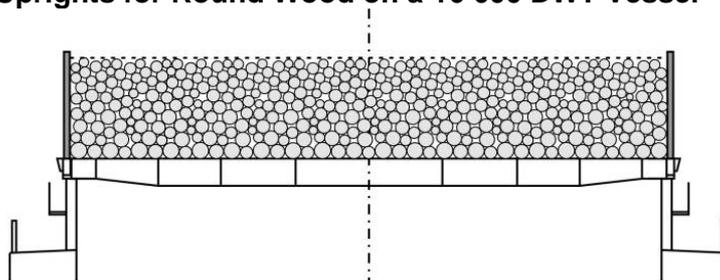


Figure B.6. Midship section of 16 600 DWT vessel with round wood secured with uprights

Vessel particulars

<i>Length between perpendiculars, LPP:</i>	134 metres
<i>Moulded breadth, BM:</i>	22 metres
<i>Service speed:</i>	14.5 knots
<i>Metacentric height, GM:</i>	0.70 metres

The deck cargo has the dimensions $L \times B \times H = 80 \times 19.7 \times 3.7$ metres and is supported by 30 uprights on each side. The weight of the cargo is taken as 3,000 tons.

With vessel particulars as above and considering a stowage position on deck low, Annex 13 of the Code of Safe Practice for Cargo Stowage and Securing gives a transverse acceleration of $a_t = 5.3 \text{ m/s}^2$, using the following basic acceleration and correction factors:

$a_{t \text{ basic}}$	=	6.5 m/s^2	=	<i>Basic transverse acceleration</i>
f_{R1}	=	0.81	=	<i>Correction factor for length and speed</i>
f_{R2}	=	1.00	=	<i>Correction factor for B_M/GM</i>

$$a_t = a_{t \text{ basic}} \cdot k_1 \cdot k_2 = 6.5 \cdot 0.81 \cdot 1.00 = 5.3 \text{ m/s}^2$$

Cargo properties

M	=	3,000 ton	=	<i>Mass of the section to be secured in tons, including absorbed water and possible icing</i>
μ_{static}	=	0.35	=	<i>Coefficient of static friction between the timber deck cargo and the ship's deck / hatch cover</i>
H	=	3.7 m	=	<i>Height of deck cargo in metres</i>
B	=	19.7 m	=	<i>Width of deck cargo in metres</i>
L	=	80 m	=	<i>Length of the deck cargo or section to be secured in metres</i>
PW	=	296 kN	=	<i>Wind pressure in kN based on 1 kN per m^2 wind exposed area, see CSS Annex 13</i>
PS	=	160 kN	=	<i>Pressure from unavoidable sea sloshing in kN based on 1 kN per m^2 exposed area, see CSS Annex 13</i>
N	=	30 pcs	=	<i>Number of uprights supporting on each side</i>
h	=	3.7 m	=	<i>Height above deck at which hog lashings are attached to the uprights in metres</i>
n_{hog}	=	1 pcs	=	<i>Number of hog lashings for each uprights</i>
k	=	1.8	=	<i>Factor for considering hog lashings;</i> $k = 1$ if no hog lashings are used $k = 1.8$ if hog lashings are used

Bending moment in uprights

For vessels carrying loose sawn wood and round timber, the design bending moment per upright is calculated as the greater of the two moments given by the following formulas:

$$CM_{\text{bending}1} = 0.1 \cdot \frac{H^2}{k \cdot B \cdot N} \cdot m \cdot g_0$$

$$CM_{\text{bending}2} = \frac{H}{3 \cdot k \cdot N} \cdot (m \cdot (a_t - 0.6 \cdot \mu_{\text{static}} \cdot g_0) + PW + PS)$$

With cargo properties and acceleration as given above, the following bending moments are calculated:

$$CM_{bending1} = 0.1 \cdot \frac{3.7^2}{19.7 \cdot 30} \cdot 3000 \cdot 9.81 = 68 \text{ kNm}$$

$$CM_{bending2} = \frac{3.7}{3 \cdot 2 \cdot 30} \cdot (3000 \cdot (5.3 - 0.6 \cdot 0.35 \cdot 9.81) + 296 + 160) = 209 \text{ kNm}$$

The design bending moment, taken as the maximum bending moment calculated by the formulae above multiplied with a safety factor of 1.35, thus becomes 282 kNm:

$$M_{bending} \geq 1.35 \cdot \max(CM_{bending1}, CM_{bending2}) = 1.35 \cdot 209 = 282 \text{ kNm}$$

Suitable dimensions for uprights

With MSL taken as 50% of the MBL for steel with the ultimate strength 360 MPa (N/mm²), the required bending resistance, W, can be calculated as:

$$W = \frac{M_{bending}}{50\% \text{ of } 360 \text{ MPa}} = \frac{282 \cdot 10^6}{180} = 1568 \cdot 10^3 \text{ mm}^3 = 1568 \text{ cm}^3$$

Thus, uprights made from either HE320B profiles or a cylindrical profile with an outer diameter of 406 mm and a wall thickness of 16.7 mm are suitable (see section B.7).

Strength in hog lashings

The required MSL of each hog lashing is calculated by the following formula:

$$MSL \geq \frac{M_{bending}}{2 \cdot h \cdot n_{hog}}$$

In this case, the hog lashings are attached at a height of 3.7 metres and the required strength is calculated as:

$$MSL \geq \frac{M_{bending}}{2 \cdot h \cdot n_{hog}} = \frac{282}{2 \cdot 3.7 \cdot 1} = 38 \text{ kN} \approx 3.9 \text{ ton}$$

Example B.5.3 – Uprights for Round Wood on a 6,000 DWT Vessel on the Baltic Sea

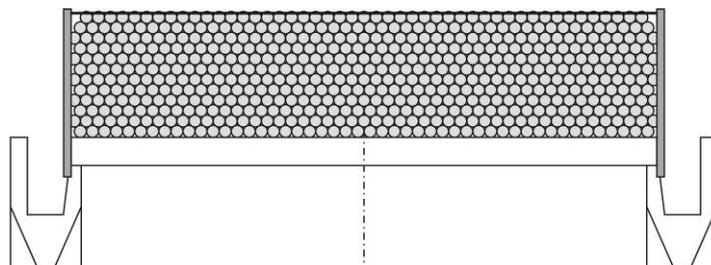


Figure B.7. Midship section of 6,000 DWT vessel with round wood secured with uprights

Vessel particulars

Length between perpendiculars, LPP:	101 metres
Moulded breadth, BM:	17.5 metres
Service speed:	13 knots
Metacentric height, GM:	0.50 metres

The deck cargo has the dimensions $L \times B \times H = 65 \times 14.5 \times 3.1$ metres and is supported by 25 uprights on each side. The weight of the cargo is taken as 1,500 tons.

With vessel particulars as above and considering a stowage position on deck low, Annex 13 of the Code of Safe Practice for Cargo Stowage and Securing gives the following basic transverse acceleration and correction factors:

$a_{t \text{ basic}}$	=	6.5 m/s ²	=	Basic transverse acceleration
f_{R1}	=	0.93	=	Correction factor for length and speed
f_{R2}	=	1.00	=	Correction factor for B_M/GM

The vessel is trading in the Baltic Sea where the maximum expected significant wave height on a 20-year basis can be taken as 8.5 metres. Thus, the reduction factor for operation in restricted waters is taken as:

$$f_R = \sqrt[3]{\frac{H_M}{19.6}} = \sqrt[3]{\frac{8.5}{19.6}} = 0.76$$

$$a_t = a_{t \text{ basic}} \cdot f_{R1} \cdot f_{R2} \cdot f_R = 6.5 \cdot 0.93 \cdot 1.00 \cdot 0.76 = 4.6 \text{ m/s}^2$$

Cargo properties

M	=	1,500 ton	=	Mass of the section to be secured in tons, including absorbed water and possible icing
μ_{static}	=	0.35	=	Coefficient of static friction between the timber deck cargo and the ship's deck / hatch cover
H	=	3.1 m	=	Height of deck cargo in metres
B	=	14.5 m	=	Width of deck cargo in metres
L	=	65 m	=	Length of the deck cargo or section to be secured in metres
PW	=	202 kN	=	Wind pressure in kN based on 1 kN per m ² wind exposed area, see CSS Annex 13

PS	$=$	130 kN	$=$	<i>Pressure from unavoidable sea sloshing in kN based on 1 kN per m² exposed area, see CSS Annex 13</i>
N	$=$	25 pcs	$=$	<i>Number of uprights supporting the considered section on each side</i>
h	$=$	3.1 m	$=$	<i>Height above deck at which hog lashings are attached to the uprights in metres</i>
n_{hog}	$=$	1 pcs	$=$	<i>Number of hog lashings for each uprights</i>
k	$=$	1.8	$=$	<i>Factor for considering hog lashings; k = 1 if no hog lashings are used k = 1.8 if hog lashings are used</i>

Bending moment in uprights

For vessels carrying loose sawn wood and round timber, the design bending moment per upright is calculated as the greater of the two moments given by the following formulas:

$$CM_{bending1} = 0.1 \cdot \frac{H^2}{k \cdot B \cdot N} \cdot m \cdot g_0$$

$$CM_{bending2} = \frac{H}{3 \cdot k \cdot N} \cdot (m \cdot (a_t - 0.6 \cdot \mu_{static} \cdot g_0) + PW + PS)$$

With cargo properties and acceleration as given above, the following bending moments are calculated:

$$CM_{bending1} = 0.1 \cdot \frac{3.1^2}{14.5 \cdot 25} \cdot 1500 \cdot 9.81 = 39 \text{ kNm}$$

$$CM_{bending2} = \frac{3.1}{3 \cdot 1.8 \cdot 25} \cdot (1500 \cdot (4.6 - 0.6 \cdot 0.35 \cdot 9.81) + 202 + 130) = 95 \text{ kNm}$$

The design bending moment, taken as the maximum bending moment calculated by the formulae above multiplied with a safety factor of 1.35, thus becomes 128 kNm:

$$M_{bending} \geq 1.35 \cdot \max(CM_{bending1}, CM_{bending2}) = 1.35 \cdot 95 = 128 \text{ kNm}$$

Suitable dimensions for uprights

With MSL taken as 50% of the MBL for steel with the ultimate strength 360 MPa (N/mm²), the required bending resistance, W, can be calculated as:

$$W = \frac{M_{bending}}{50\% \text{ of } 360 \text{ MPa}} = \frac{128 \cdot 10^6}{180} = 713 \cdot 10^3 \text{ mm}^3 = 713 \text{ cm}^3$$

Thus, uprights made from either HE220 B profiles or a cylindrical profile with an outer diameter of 324 mm and a wall thickness of 10 mm are suitable (see section B.7).

Strength in hog lashings

The required MSL of each hog lashing is calculated by the following formula:

$$MSL \geq \frac{M_{bending}}{2 \cdot h \cdot n_{hog}}$$

In this case, the hog lashings are attached at a height of 3.7 metres and the required strength is calculated as:

$$MSL \geq \frac{M_{bending}}{2 \cdot h \cdot n_{hog}} = \frac{128}{2 \cdot 3.1 \cdot 1} = 20.6 \text{ kN} \approx 2.1 \text{ ton}$$

B.6 Example Calculation – Frictional Securing of Transversely Stowed Round Wood

Example B.6.1 – Frictional securing of Round Wood on a 6,000 DWT Vessel

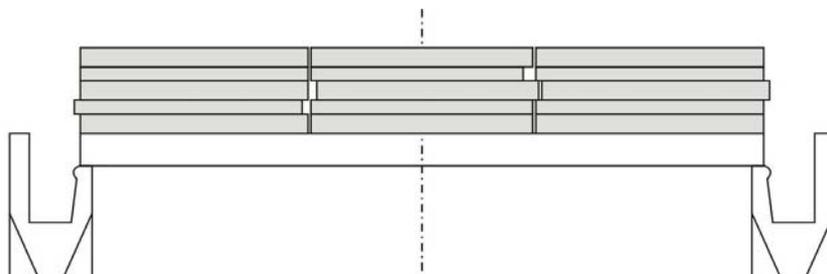


Figure B.8. Midship section of 6,000 DWT vessel frictional secured wood secured

Vessel particulars

Length between perpendiculars, LPP:	101 metres
Moulded breadth, BM:	17.5 metres
Service speed:	13 knots
Metacentric height, GM:	0.50 metres

The deck cargo has the dimensions $L \times B \times H = 65 \times 14.5 \times 3.1$ metres. The weight of the cargo is taken as 1,500 tons.

Cargo properties

M	=	1,500 ton	=	Mass of the section to be secured in tons, including absorbed water and possible icing
μ_{static}	=	0.35	=	Coefficient of static friction between the timber deck cargo and the ship's deck/hatch cover
H	=	3.1 m	=	Height of deck cargo in metres
B	=	14.5 m	=	Width of deck cargo in metres
L	=	65 m	=	Length of the deck cargo or section to be considered in metres
PW	=	202 kN	=	Wind pressure in kN based on 1 kN per m^2 wind exposed area, see CSS Annex 13
PS	=	130 kN	=	Pressure from unavoidable sea sloshing in kN based on 1 kN per m^2 exposed area, see CSS Annex 13

Transverse acceleration

With a static friction of 0.35 between the layers of wood and between the wood and the hatch cover the maximum acceptable transverse acceleration can be calculated by satisfying the following equilibrium:

$$m \cdot g_0 \cdot \mu_{static} \geq m \cdot a_t + PW + PS$$

In this case transverse acceleration can not exceed 3.2 m/s² as shown below:

$$a_t \leq \frac{m \cdot g_0 \cdot \mu_{static} - PW - PS}{m}$$

$$a_t \leq \frac{1500 \cdot 9.81 \cdot 0.35 - 202 - 130}{1500} = 3.2 \text{ m/s}^2$$

With vessel particulars as above and considering a stowage position on deck low, Annex 13 of the Code of Safe Practice for Cargo Stowage and Securing gives the following basic acceleration and correction factors:

$$\begin{aligned} a_{t \text{ basic}} &= 6.5 \text{ m/s}^2 &= \text{Basic transverse acceleration} \\ f_{R1} &= 0.93 &= \text{Correction factor for length and speed} \\ f_{R2} &= 1.00 &= \text{Correction factor for } B_M/GM \end{aligned}$$

The maximum allowed significant wave height with this stowage arrangement is calculated to 2.9 m according to the following:

$$\begin{aligned} a_t &= a_{t \text{ basic}} \cdot f_{R1} \cdot f_{R2} \cdot f_R \\ f_R &= \frac{a_t}{a_{t \text{ basic}} \cdot f_{R1} \cdot f_{R2}} = \frac{3.2}{6.5 \cdot 0.93 \cdot 1.00} = 0.53 \text{ m/s}^2 \\ f_R &= \sqrt[3]{\frac{H_M}{19.6}} \\ H_M &= 19.6 \cdot f_R^3 = 19.6 \cdot 0.53^3 = 2.9 \text{ m} \end{aligned}$$

B.7 Maximum Bending Resistance in Common Profiles for Uprights

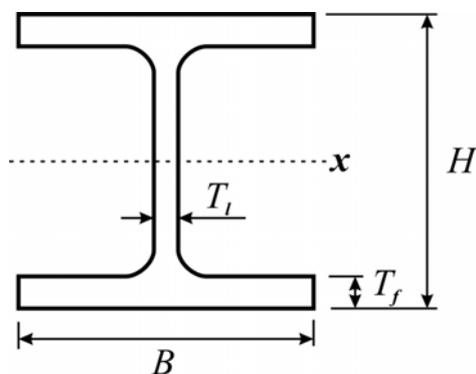
HE-A Beams

Size	H [mm]	B [mm]	T ₁ [mm]	T _f [mm]	Maximum Bending Resistance, W _x [cm ³]
HE 220 A	210	220	7	11	515
HE 240 A	230	240	7.5	12	675
HE 260 A	250	260	7.5	12.5	836
HE 280 A	270	280	8	13	1010
HE 300 A	290	300	8.5	14	1260
HE 320 A	310	300	9	15.5	1480
HE 340 A	330	300	9.5	16.5	1680
HE 360 A	350	300	10	17.5	1890
HE 400 A	390	300	11	19	2310
HE 450 A	440	300	11.5	21	2900

Size	H [mm]	B [mm]	T _l [mm]	T _f [mm]	Maximum Bending Resistance, W _x [cm ³]
HE 500 A	490	300	12	23	3550
HE 550 A	540	300	12.5	24	4150
HE 600 A	590	300	13	25	4790
HE 650 A	640	300	13.5	27	5470

HE-B Beams

Size	H [mm]	B [mm]	T _l [mm]	T _f [mm]	Maximum Bending Resistance, W _x [cm ³]
HE 220 B	210	220	9.5	16	736
HE 240 B	230	240	10	17	938
HE 260 B	250	260	10	17.5	1150
HE 280 B	270	280	10.5	18	1380
HE 300 B	290	300	11	19	1680
HE 320 B	310	300	11.5	20.5	1930
HE 340 B	330	300	12	21.5	2160
HE 360 B	350	300	12.5	22.5	2400
HE 400 B	390	300	13.5	24	2880
HE 450 B	440	300	14	26	3550
HE 500 B	490	300	14.5	28	4290
HE 550 B	540	300	15	29	4970
HE 600 B	590	300	15.5	30	5700
HE 650 B	640	300	16	31	6480



Pipes

Size	Schedule	Outer diameter [mm]	Wall thickness [mm]	Bending Resistance, W [cm ³]
8"	40	219.1	8.2	276
	60	219.1	10.3	337
	80	219.1	12.7	402
12"	40	323.9	10.3	772
	60	323.9	14.3	1029
	80	323.9	17.5	1223
16"	40	406.4	12.7	1499
	60	406.4	16.7	1910
	80	406.4	21.4	2371
18"	40	457.2	14.3	2132
	60	457.2	19.1	2758
	80	457.2	23.8	3342

Size	Schedule	Outer diameter [mm]	Wall thickness [mm]	Bending Resistance, W [cm³]
20"	40	508.0	15.1	2797
	60	508.0	20.6	3697
	80	508.0	26.2	4542
	100	508.0	32.5	5433
24"	40	610.0	17.5	4686
	60	610.0	24.6	6368
	80	610.0	31.0	7761

**ANNEX C – INSTRUCTION TO A MASTER ON CALCULATION
OF MASS CHANGE OF A TIMBER DECK CARGO DUE TO WATER ABSORPTION**

C.1 Mass increase due to water absorption for a timber deck cargo in protective packaging or covered by a protective awning or timber that has been immersed in water until loaded on board should not be taken into account in the ship's stability calculation for arrival at the port of destination.

C.2 Calculation of mass change P of a timber deck cargo should be done by the formula:

$$\delta P, \% = T_{pl} \cdot \delta P_{day}, \%$$

where:

- T_{pl} – planned duration of the voyage, days;
- $\delta P_{day}, \%$ – wood mass change per day, to be chosen from table C.1

C.3 Corresponding line in table C.1 should be chosen by means of comparison of the forthcoming voyage with the timber cargo transportation lines specified in the leftmost column "Line".

C.4 With calculation value being $\delta P \leq 2\%$, water absorption of a timber deck cargo should not be taken into account in the ship's stability calculations as it is commensurable with initial calculation data determination errors.

C.5 With calculation value being $\delta P \geq 10\%$, water absorption of a timber deck cargo $\delta P = 10\%$ should be taken into account.

Table C.1. Daily wood mass change

Line	Deck cargo mass change per day, $\delta P_{day}, \%$	
	Sawn wood	Round wood cargo
Vladivostok – ports of Japan	1.00	0.14
Ports of Malaysia – ports of Japan	0.73	0.10
Ports of Canada, USA – ports of Japan	1.00	0.14
Saint-Petersburg – London	0.83	0.11
Arkhangelsk – Manchester	1.16	0.15
Australasia – North Asia	-	-0.10

ANNEX D – REFERENCES

- [1] **SOLAS** – Chapter VI Reg. 5 Section 1 – Carriage of cargoes – Stowage and securing
- [2] **ISM Code** – Part A – Implementation – Paragraph 1.1.2
- [3] **IMDG Code** – Part 1 – Chapter 1.2.1 – Definitions
- [4] **SOLAS** – Chapter VI Reg. 2 – Cargo Information
- [5] **ISM Code** – Clause 7 – Development of Plans for Shipboard Operations
- [6] **Load Lines, 1966** – Annex I – Chapter II – Reg. 16 – Regulations for Determining Load Lines – Conditions of Assignment of Freeboard.
- [7] **SOLAS** – Chapter II-1 Part B-1 Reg. 25-8 – Stability Information
- [8] **2008 IS Code** [(SLF 50/4/1) – Part A – Ch 3.3 (Special criteria) for ships carrying timber deck cargoes.]
- [9] **2008 IS Code** [(SLF 50/4/1) – Part B – Ch 3.6.3 (Stability booklet) for ships carrying timber deck cargoes]
- [10] **2008 IS Code** [(SLF 50/4/1) – Part B – Ch 3.7 Operational measures for ships carrying timber deck cargoes]
- [11] **2008 IS Code** [(SLF 50/4/1)] – Intact Stability for All Types of Ships Covered by IMO Instruments
- [12] **MEPC.127(53)** – Development of Ballast Water Management Plans
- [13] **Load Lines, 1966** – Annex I – Regulations for Determining Load Lines – Chapter IV – Special requirements for ships assigned timber freeboards – Regulation 44 – Stowage, Uprights, Lashings, Stability, Protection of crew, access to machinery spaces, etc.
- [14] **Load Lines, 1966** – Annex I – Regulations for Determining Load Lines – Chapter IV – Special requirements for ships assigned timber freeboards – Regulation 45 – Computation for freeboard
- [15] **SOLAS** – Chapter V – Reg. 22 – Navigational bridge visibility
- [16] **ISM Code** – Clause 6.6 – Resources and Personnel
- [17] **ILO Convention No. 152** – Convention Concerning Occupational Safety and Health in Dock Work
- [18] **Load Lines, 1966** – Annex I – Regulations for Determining Load Lines – Chapter II – Conditions of Assignment of Freeboard – Reg. 25 – Protection of the Crew

- [19] **Load Lines, 1966** – Annex I – Regulations for Determining Load Lines – Chapter IV – Special requirements for ships assigned timber freeboards – Reg. 44 – Stowage, Uprights, Lashings, Stability, Protection of crew, Access to machinery spaces, etc.
- [20] **CSS Code** – Annex 13 – Chapter 4 – Strength of Securing Equipment.
- [21] **ISM Code** – Clause 7 – Development of Plans for Shipboard Operations
- [22] **STCW Code** – Section A – VIII/2 – Watchkeeping arrangements and principles to be observed – Part 2 – Voyage Planning
- [23] **SOLAS** – Chapter V – Reg. 34 – Safe Navigation
- [24] **CSS Code** – Chapter 6 – Actions which may be taken in heavy weather – 6.3
- [25] **MCS/Circ.1228** – Revised Guidance to the master for avoiding dangerous situations in adverse weather and sea conditions
- [26] **SOLAS** – Chapter VI – Reg. 5 – Section 2 – Carriage of cargoes – Stowage and securing
- [27] **MSC/Circular.745** – Guidelines for the Preparation of the Cargo Securing Manual
- [28] **SOLAS** – Chapter V – Reg. 31– Safety of navigation – Danger messages
- [29] **ILO Convention No. 27** – Marking of weight (packages transported by vessels) Convention, 1929.

ANNEX 5

DRAFT AMENDMENTS TO THE IMO/ILO/UNECE GUIDELINES FOR PACKING OF CARGO TRANSPORT UNITS (CTUs)

SCOPE

- 1 The existing text of this section is replaced by the following:

"These Guidelines are essential to the safe packing of cargo transport units by those responsible for the packing and securing of the cargo and by those whose task it is to train people to pack such units. However, they are not exhaustive and other sources of information may be relevant. Training is essential if safety standards are to be maintained. These Guidelines detail practical measures to ensure the safe packing of cargo onto or into cargo transport units. As such they are concerned with issues of safety and are not intended to address practical measures to enhance security, *per se*.

These Guidelines are not intended to conflict with, or to replace or supersede, any existing regulations or recommendations which may concern the carriage of cargo in cargo transport units. They do not cover the filling or emptying of tank containers, portable tanks or road tank vehicles, or the transport of any cargo in bulk containers.

Guidance on the security aspects of the movement of cargo transport units intended for carriage by sea may be found in a variety of documents including the International Convention for the Safety of Life at Sea, 1974, as amended; the International Ship and Port Facility Security Code; the ILO/IMO Code of Practice on Security in Ports; and the Standards and the Publicly Available Specifications developed or being developed by the International Standards Organization (ISO) to address cargo security management and other aspects of supply chain security. Furthermore, the World Customs Organization (WCO) has developed a SAFE Framework of standards to secure and facilitate global trade.

However, it is important to bear in mind that all personnel involved in the transport chain have a significant role to play enhancing safety and security, not only in the prevention of unlawful acts. Significant financial losses are incurred through theft of cargo and the costs must ultimately be borne by customers and end users through increased insurance and transport costs. The trafficking of illicit drugs has a detrimental effect on society. The movement of weapons in contravention of national laws and internationally agreed arms embargoes; the illegal migration and human trafficking; the smuggling of nuclear materials and precursors for weapons of mass destruction; protection of national revenues; environmental and cultural concerns, and the need to deprive terrorist organizations of funding are all issues of relevance to the transport of cargo transport units. Furthermore, cargo handlers' and transporters' lives are lost and environments are damaged through the transport of undeclared, improperly described and unsafely packed dangerous goods.

It is therefore extremely important that all personnel involved in the packing, security sealing, handling, transport and processing of cargo should be made aware of the need for vigilance and the diligent application of practical procedures to enhance security, in accordance with national legislation and international agreements."

4 ADDITIONAL ADVICE ON THE PACKING AND SECURING OF DANGEROUS CARGOES

2 The existing title and the text of section 4 is replaced by the following:

"4 ADVICE ON THE PACKING AND SECURING OF DANGEROUS GOODS

4.1 General

4.1.1 The advice of this section applies to cargo transport units in which dangerous goods are packed. It should be followed in addition to the advice given elsewhere in these Guidelines.

4.1.2 International (and often national) transport of dangerous goods may be subject to several dangerous goods transport regulations, depending on the origin, final destination and the modes of transport used.

4.1.3 For intermodal transport, involving several modes of transport other than by sea, the rules and regulations applicable depend on whether it is a national movement or international transport or transport within a political or economic union or trading zone.

4.1.4 Transport of dangerous goods by road, rail or inland waterways may be subject to various regulations and agreements. Examples are:

- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR);
- Regulations concerning the International Carriage of Dangerous Goods by Rail (RID); and
- Title 49 of the Code of Federal Regulations of the United States.

4.1.5 Most national and international regulations are based on the United Nations Recommendations on the Transport of Dangerous Goods (Orange Book). However, national rules, applicable to domestic transport, may differ from international regulations.

4.1.6 For maritime transport, the provisions of the International Maritime Dangerous Goods (IMDG)¹ Code apply. The IMDG Code provides detailed provisions on all aspects of the transport of packaged dangerous goods by sea. Special attention is drawn to the following chapters of the IMDG Code:

- 1.3 Training
- 1.4 Security provisions
- 5.1 General provisions for consignment procedures
- 5.2 Marking and labelling of packages
- 5.3 Placarding and marking of cargo transport units
- 5.4 Documentation
- 7.1 Stowage

¹ International Maritime Dangerous Goods (IMDG) Code, Amendment (35-10), published by the International Maritime Organization (IMO).

- 7.2 Segregation
- 7.4 Transport of cargo transport units on board ships
- 7.5 Packing of cargo transport units
- 7.7 Temperature control provisions

4.1.7 Dangerous goods are classified as stated below. Some of these classes are subdivided into divisions. The shipper is responsible that packages with dangerous goods bear the appropriate labels and marks.

Class 1 – Explosives

Division 1.1: Substances and articles which have a mass explosion hazard

Division 1.2: Substances and articles which have a projection hazard but not a mass explosion hazard

Division 1.3: Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard

Division 1.4: Substances and articles which present no significant hazard

Division 1.5: Very insensitive substances which have a mass explosion hazard

Division 1.6: Extremely insensitive articles which do not have a mass explosion hazard



(No.1)

Divisions 1.1, 1.2 and 1.3



(No.1.4)

Division 1.4



(No.1.5)

Division 1.5



(No.1.6)

Division 1.6

** Place for division – to be left blank if explosive is the subsidiary risk.

* Place for compatibility group – to be left blank if explosive is the subsidiary risk.

Class 2 – Gases: compressed, liquefied or dissolved under pressure

Class 2.1 – Flammable² gases

Class 2.2 – Non-flammable, non-toxic gases

Class 2.3 – Toxic³ gases



(No.2.1)
Class 2.1
Flammable gases



(No.2.2)
Class 2.2.
Non-flammable, non-toxic gases



(No.2.3)
Class 2.3
Toxic gases

Class 3 – Flammable liquids



(No.3)

Class 4 – Flammable solids; substances liable to spontaneous combustion; substances which, in contact with water, emit flammable gases

Class 4.1 – Flammable solids, self-reactive substances and solid desensitized explosives

Class 4.2 – Substances liable to spontaneous combustion

Class 4.3 – Substances which, in contact with water, emit flammable gases

² "inflammable" has the same meaning as "flammable".

³ "poisonous" has the same meaning as "toxic".



(No.4.1)
Class 4.1
Flammable solids



(No.4.2)
Class 4.2
***Substances liable to
spontaneous combustion***



(No.4.3)
Class 4.3
***Substances which, in contact
with water, emit flammable
gases***

Class 5 – Oxidizing substances and organic peroxides

Class 5.1 – Oxidizing substances

Class 5.2 – Organic peroxides



(No.5.1)
Class 5.1
Oxidizing substances



(No.5.2)
Class 5.2
Organic peroxides



Class 6 – Toxic and infectious substances

Class 6.1 – Toxic substances

Class 6.2 – Infectious substances



(No.6.1)
Class 6.1
Toxic substances



(No.6.2)
Class 6.2
Infectious substances

Class 7 – Radioactive materials



(No.7A)
Category I – White



(No.7B)
Category II – Yellow



(No.7C)
Category III – Yellow



(No.7E)
Class 7
Fissile material

Class 8 – Corrosives



(No.8)

Class 9 – Miscellaneous dangerous substances and articles and environmentally hazardous substances



(No.9)

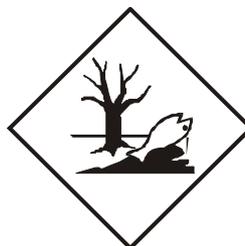
Subsidiary Risks

Some substances or articles can exhibit more than one hazard. In these cases additional label(s) for the subsidiary risks are required, e.g., class 6.1 with subsidiary risk 8



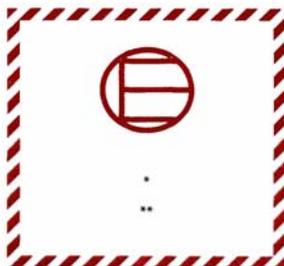
Environmentally Hazardous Substances (Aquatic Environment)

For maritime transport these substances are known as marine pollutants and subject to the provisions of Annex III of MARPOL 73/78, as amended



4.1.8 Limited quantities and excepted quantities

Under certain conditions the IMDG Code provides exemptions from some requirements if the dangerous goods are transported in "limited quantities" or "excepted quantities". Packages to which these exemptions apply, are marked as follows:



4.1.9 There may be other marks in addition to 4.1.7 and 4.1.8 of these Guidelines as required by the IMDG Code.

4.2 Before packing

4.2.1 The IMDG Code and other international and national regulations require that the shipper provides transport information on each dangerous substance, material or article. This information shall include at least the following basic item:

- the UN Number;
- the Proper Shipping Name (including the technical name, as applicable);
- the class and/or division (and the compatibility group letter for goods of class 1);
- subsidiary risks when assigned;
- the packing group when assigned;
- the total quantity of dangerous goods (by volume or mass, and for explosives the net explosive content); and
- the number and kind of packages.

Other items of information may be required, depending on the mode of transport and the classification of the goods (e.g., flashpoint for transport by sea). The various items of information required under each regulation and applicable during intermodal transport operations should be provided so that appropriate documentation may be prepared for each shipment.

4.2.2 The shipper should also ensure that dangerous goods are classified, packaged, packed, marked, labelled, placarded and provided with the required signs, in accordance with the applicable regulations. A declaration by the shipper that this has been carried out is normally required. Such a declaration may be included with the required transport information.

- 4.2.3** The shipper should also ensure that the goods to be transported are authorized for transport by the modes to be used during the transport operation. For example, self-reacting substances and organic peroxides requiring temperature control are not authorized for transport by rail under the RID regime. Certain types of dangerous goods are not authorized to be transported on board passenger ships and therefore the requirements of the IMDG Code should be carefully studied.
- 4.2.4** Current versions of all applicable regulations should be easily accessible and referred to during packing to ensure compliance.
- 4.2.5** Dangerous goods should only be handled, packed and secured by trained personnel. Supervision by a responsible person who is familiar with the legal provisions, the risks involved and the measures that should be taken in an emergency is required.
- 4.2.6** Suitable measures to prevent fires should be taken, including the prohibition of smoking in the vicinity of dangerous goods.
- 4.2.7** Packages of dangerous goods should be examined and any found to be damaged, leaking or sifting should not be packed. Packages showing evidence of staining, etc., should not be packed without first determining that it is safe and acceptable to do so. Water, snow, ice or other matter adhering to packages should be removed before packing. Substances that have accumulated on drum heads should initially be treated with caution in case they are the result of leakage or sifting of contents. If pallets have been contaminated by spilled dangerous goods they should be destroyed by appropriate disposal methods to prevent use at a later date.
- 4.2.8** If dangerous goods are palletized or otherwise unitized they should be compacted so as to be regularly shaped, with approximately vertical sides and level at the top. They should be secured in a manner unlikely to damage the individual packages comprising the unit load. The materials used to bond a unit load together should be compatible with the substances unitized and retain their efficiency when exposed to moisture, extremes of temperature and sunlight.
- 4.2.9** An overpack and unit load should be marked with the Proper Shipping Name and the UN Number and marked and labelled, as required for packages, for each item of dangerous goods contained in the overpack or unit load unless markings and labels representative of all dangerous goods in the overpack or unit load are clearly visible. An overpack, in addition, should be marked with the word "OVERPACK" unless markings and labels representatives of all dangerous goods as required for packages in to overpack are visible.
- 4.2.10** The stowage and method of securing of dangerous goods in a cargo transport unit should be planned before packing is commenced.
- 4.3 Packing and securing**
- 4.3.1** Special care should be taken during handling to avoid damage to packages. However, if a package containing dangerous goods is damaged during handling so that the contents leak out, the immediate area should be evacuated until the hazard potential can be assessed. The damaged

package should not be shipped. It should be moved to a safe place in accordance with instructions given by a responsible person who is familiar with the risks involved and knows the measures that should be taken¹ in an emergency.

- 4.3.2** If a leakage of dangerous goods presents safety or health hazards such as explosion, spontaneous combustion, poisoning or similar danger, personnel should immediately be moved to a safe place and the Emergency Response Organization notified.
- 4.3.3** Dangerous goods should not be packed in the same cargo transport unit with incompatible goods. In some instances even goods of the same class are incompatible with each other and should not be packed in the same unit, e.g., acids and alkalis of class 8. The requirements of the IMDG Code concerning the segregation of dangerous goods inside cargo transport units are usually more stringent than those for road and rail transport. Whenever an intermodal transport operation does not include transport by sea, compliance with the respective inland transport regulations may be sufficient. However, if there is any possibility that a part of the transport operation will be by sea, the segregation requirements of the IMDG Code should be strictly complied with.
- 4.3.4** When dangerous goods are being handled, smoking or the consumption of food and drink should be prohibited.
- 4.3.5** Packages marked with orientation arrows should be packed with the arrows pointing upwards. Vented packages should be packed in such a way that the vents will not be blocked.
- 4.3.6** Drums containing dangerous goods should always be stowed in an upright position unless otherwise authorized by the competent authority.
- 4.3.7** Dangerous goods consignments which form only part of the load of a cargo transport unit should, whenever possible, be packed adjacent to the doors with markings and labels visible. Particular attention is drawn to 3.3.1 concerning the securing of cargo by the doors of a unit.
- 4.3.8** The number of packages containing dangerous goods in excepted quantities in any cargo transport unit is limited to a maximum of 1,000.

4.4 On completion of packing

4.4.1 *Placarding*

- 4.4.1.1** Placards (enlarged labels and marks) as shown in 4.1.7 (minimum size 250 mm x 250 mm) and other signs should be affixed to the exterior surfaces of a cargo transport unit.

¹ The Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS) and the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG) in the Supplement of the IMDG Code give further useful advice, but it should be borne in mind that the former may not be appropriate for use on land; emergency response handbooks, giving emergency response information cross-referenced to the United Nations identification number (UN Number) of the substance are usually available at the national level. More information for emergency response action can be found in the appropriate Safety Data Sheet (SDS) which should be available.

4.4.1.2 Cargo transport units containing dangerous goods or residues of dangerous goods should clearly display placards and marks or other signs as follows:

- .1 a freight container or semi trailer, one on each side and one on each end of the unit;
- .2 a railway wagon, at least one on each side; and
- .3 any other cargo transport unit, at least one on both sides and on the back of the unit, unless otherwise specified in the applicable transport regulations.

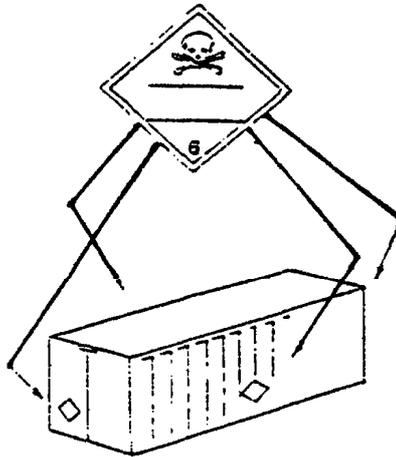


Figure 37 - Placards on a container

Figure 38



Road freight vehicle and full-trailer:
Each unit shall be placarded on both sides and on the rear



Semi-trailer:
The unit shall be placarded on both sides and both ends

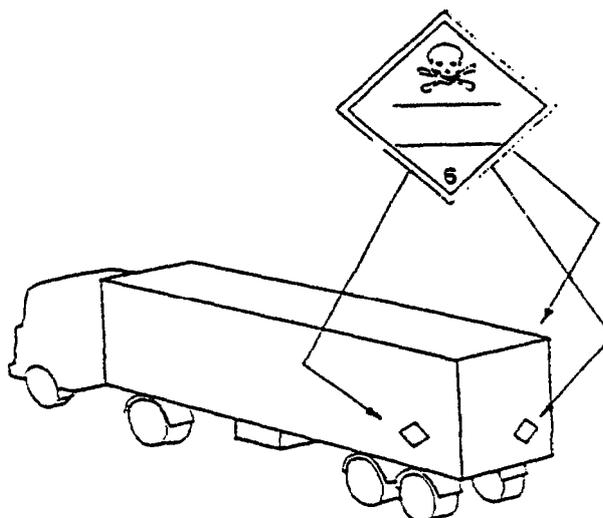
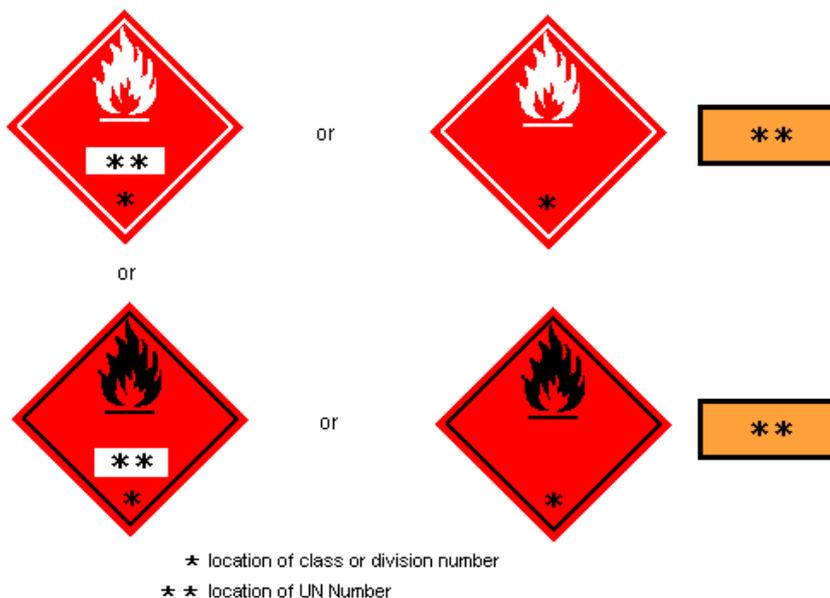


Figure 39 – Placards on a road vehicle

- 4.4.1.3** Whenever dangerous goods present several risks, subsidiary risk placards should be displayed in addition to primary risk placards. However, cargo transport units containing goods of more than one class, need not bear a subsidiary risk placard if the hazard represented is already indicated by the primary risk placard.
- 4.4.1.4** The IMDG Code requires that, except for goods of Class 1, the UN Number shall be displayed as required in 4.4.1.5 on consignments of:
- Packaged dangerous goods loaded in excess of 4,000 kg gross mass, to which only one UN Number has been assigned and which are the only dangerous goods in the cargo transport unit;
 - Unpackaged LSA-1 or SCO-1 material of class 7 in or on a vehicle or in a freight container; and
 - Packaged radioactive material with a single UN Number under exclusive use in or on a vehicle, or in a freight container.
- 4.4.1.5** The UN Number for the goods shall be displayed in black digits not less than 65 mm high, either:
- .1 against a white background in the area below the pictorial symbol and above the class number and the compatibility group letter in a manner that does not obscure or detract from the other required label elements; or
 - .2 on an orange rectangular panel not less than 120 mm high and 300 mm wide, with a 10 mm black border, to be placed immediately adjacent to each placard or marine pollutant mark. When no placard or marine pollutant mark is required, the UN Number shall be displayed immediately adjacent to the Proper Shipping Name.

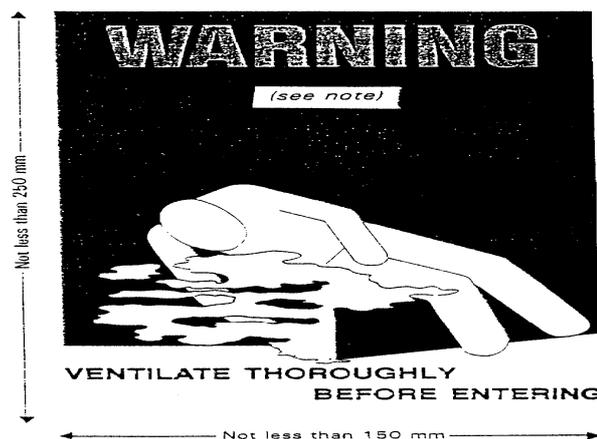
Example:



4.4.1.6 For radioactive materials special requirements.

4.4.1.7 When solid carbon dioxide (CO₂ – dry ice) or other expendable refrigerant is used for cooling purposes, a warning sign should be affixed to the outside of the doors so that it is clearly visible to any person operating the doors. The sign should warn of the possibility of an asphyxiating atmosphere. An example of such a warning sign is given-below.

Warning label for dry ice or other expendable refrigerant used for cooling purposes



Note: The text under "WARNING" should refer to the refrigerant gas used.

4.4.1.8 When fumigants have been applied to the contents of a container, the marking of the proper shipping name (Fumigated cargo transport unit) and the UN number (UN 3359) are not required. However, if a fumigated unit is loaded with dangerous goods, any label, mark or sign required by the IMDG Code shall be marked on the fumigated cargo transport unit.

4.4.1.9 A fumigated cargo transport unit shall be marked with the warning mark, as specified in 4.4.1.10, affixed in a location where it will be easily seen by persons attempting to enter the interior of the unit. The marking, as required by this paragraph, shall remain on the unit until the following provisions are met:

- .1 the fumigated cargo transport unit has been ventilated to remove harmful concentrations of fumigant gas; and
- .2 the fumigated goods or materials have been unloaded.

4.4.1.10 The fumigation warning mark shall be rectangular and shall be not less than 300 mm wide and 250 mm high. The markings shall be in black print on a white background with lettering not less than 25 mm high. The mark should state the fumigant, the method of fumigation employed and the date and time when it took place. An illustration of this mark is given below:



4.4.2 Container/vehicle packing certificate

4.4.2.1 When dangerous goods are packed or loaded into any container or vehicle, the IMDG Code and other transport regulations require that those responsible for packing the container or vehicle shall provide a "container/vehicle packing certificate" specifying the container/vehicle identification number(s) and certifying that the operation has been carried out in accordance with the following conditions:

- .1 The container/vehicle was clean, dry and apparently fit to receive the goods;
- .2 Packages which need to be segregated in accordance with applicable segregation requirements have not been packed together onto or in the container/vehicle (unless approved by the competent authority concerned);

- .3 All packages have been externally inspected for damage, and only sound packages have been loaded;
- .4 Drums have been stowed in an upright position, unless otherwise authorized by the competent authority, and all goods have been properly loaded and, where necessary, adequately braced with securing material to suit the mode(s) of transport for the intended journey;
- .5 For consignments including goods of class 1 other than division 1.4, the container/vehicle is structurally serviceable;
- .6 The container/vehicle and packages are properly marked, labelled and placarded, as appropriate;
- .7 When solid carbon dioxide (CO₂ – dry ice) is used for cooling purposes, the container/vehicle is externally marked or labelled in a conspicuous place, such as, at the door end, with the words: "DANGEROUS CO₂ (DRY ICE) INSIDE. VENTILATE THOROUGHLY BEFORE ENTERING"; and
- .8 A dangerous goods transport document has been received for each dangerous goods consignment loaded in the container/vehicle.

4.4.2.2 The information required in the dangerous goods transport document and the container/vehicle packing certificate may be incorporated into a single document; if not, these documents shall be attached into one another. If the information is incorporated into a single document, the document shall include a signed declaration such as "It is declared that the packing of the goods into the container/vehicle has been carried out in accordance with the applicable provisions". This declaration shall be dated and the person signing this declaration shall be identified on the document. Facsimile signatures are acceptable where applicable laws and regulations recognize the legal validity of facsimile signatures.

4.4.3 If the doors of a cargo transport unit are locked, the means of locking shall be such that, in cases of emergency, the doors can be opened without delay."

5 ADVICE ON RECEIPT OF CARGO TRANSPORT UNITS

- 3 In paragraph 5.3, in the first sentence, the word "cargoes" is replaced by the word "goods".
- 4 In paragraph 5.5, in the third sentence, the word "MARINE POLLUTANT" is replaced by the word "ENVIRONMENTALLY HAZARDOUS SUBSTANCE (AQUATIC ENVIRONMENT)".
- 5 In paragraph 5.7, in the second sentence, the word "cargoes" is replaced with the word "goods".

7 TRAINING IN PACKING OF CARGO IN CTUs

6 Add the following new sentence at the end of paragraph 7.5

7.5 In assistance to maritime institutes and their technical staff in organizing and introducing new training courses, or in enhancing, updating or supplementing existing training material reference is made to the IMO Model Course 3.18 – Safe Packing of Cargo Transport Units (CTUs).

ANNEX 2

LABELS, PLACARDS, MARKS AND SIGNS

7 Annex 2 of the Guidelines is deleted and annexes 3 to 6 are renumbered as annexes 2 to 5.

ANNEX 6

DRAFT ASSEMBLY RESOLUTION

**ADOPTION OF THE REVISED RECOMMENDATIONS FOR ENTERING
ENCLOSED SPACES ABOARD SHIPS**

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING ALSO that it adopted, by resolution A.864(20), the Recommendations for Entering Enclosed Spaces Aboard Ships, incorporating therein recommendations for entering cargo spaces, tanks, pump-rooms, fuel tanks, cofferdams, duct keels, ballast tanks and similar enclosed spaces,

BEING CONCERNED at the continued loss of life resulting from personnel entering shipboard spaces in which the atmosphere is oxygen-depleted, oxygen enriched, toxic or flammable,

BEING AWARE of the work undertaken in this regard by the International Labour Organization, Governments and segments of the private sector,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its [eighty-ninth] session,

1. ADOPTS the Revised Recommendations for Entering Enclosed Spaces Aboard Ships set out in the Annex to the present resolution;
2. INVITES Governments to bring the annexed Revised Recommendations to the attention of shipowners, ship operators and seafarers, urging them to apply the Revised Recommendations, as appropriate, to all ships;
3. REQUESTS the Maritime Safety Committee to keep the Revised Recommendations under review and amend them, as necessary;
4. REVOKES resolution A.864(20).

ANNEX

REVISED RECOMMENDATIONS FOR ENTERING ENCLOSED SPACES ABOARD SHIPS

PREAMBLE

The object of these recommendations is to encourage the adoption of safety procedures aimed at preventing casualties to ships' personnel entering enclosed spaces where there may be an oxygen deficient, oxygen enriched, flammable and/or toxic atmosphere.

Investigations into the circumstances of casualties that have occurred have shown that accidents on board ships are in most cases caused by an insufficient knowledge of, or disregard for, the need to take precautions rather than a lack of guidance.

The following practical recommendations apply to all types of ships and provide guidance to ship operators and seafarers. It should be noted that on ships where entry into enclosed spaces may be infrequent, for example, on certain passenger ships or small general cargo ships, the dangers may be less apparent, and accordingly there may be a need for increased vigilance.

The recommendations are intended to complement national laws or regulations, accepted standards or particular procedures which may exist for specific trades, ships or types of shipping operations.

It may be impracticable to apply some recommendations to particular situations. In such cases, every endeavour should be made to observe the intent of the recommendations, and attention should be paid to the risks that may be involved.

1 INTRODUCTION

The atmosphere in any enclosed space may be oxygen deficient or oxygen enriched and/or contain flammable and/or toxic gases or vapours. Such unsafe atmospheres could also subsequently occur in a space previously found to be safe. Unsafe atmospheres may also be present in spaces adjacent to those spaces where a hazard is known to be present.

2 DEFINITIONS

2.1 *Enclosed space* means a space which has any of the following characteristics:

- .1 limited openings for entry and exit;
- .2 inadequate ventilation; and
- .3 is not designed for continuous worker occupancy,

and includes, but is not limited to, cargo spaces, double bottoms, fuel tanks, ballast tanks, cargo pump-rooms, cargo compressor rooms, cofferdams, chain lockers, void spaces, duct keels, inter-barrier spaces, boilers, engine crankcases, engine scavenge air receivers, sewage tanks, and adjacent connected spaces. This list is not exhaustive and that a list should be produced on a ship-by-ship basis to identify enclosed spaces.

2.2 *Adjacent connected space* means a normally unventilated space which is not used for cargo but which may share the same atmospheric characteristics with the enclosed space such as, but not limited to, a cargo space accessway.

2.3 *Competent person* means a person with sufficient theoretical knowledge and practical experience to make an informed assessment of the likelihood of a dangerous atmosphere being present or subsequently arising in the space.

2.4 *Responsible person* means a person authorized to permit entry into an enclosed space and having sufficient knowledge of the procedures to be established and complied with on board in order to ensure that the space is safe for entry.

2.5 *Attendant* means a person who is suitably trained within the safety management system, maintains a watch over those entering the enclosed space, maintains communications with those inside the space and initiates the emergency procedures in the event of an incident occurring.

3 SAFETY MANAGEMENT FOR ENTRY INTO ENCLOSED SPACES

3.1 The safety strategy to be adopted in order to prevent accidents on entry to enclosed spaces should be approached by the company in a comprehensive manner.

3.2 The company should ensure that the procedures for entering enclosed spaces are included among the key shipboard operations concerning the safety of the personnel and the ship, in accordance with paragraph 7 of the ISM Code.

3.3 The company should elaborate a procedural implementation scheme which provides for training in the use of atmospheric testing equipment in such spaces and a schedule of regular onboard drills for crews.

3.3.1 Competent and responsible persons should be trained on enclosed space hazard recognition, evaluation, measurement, control and elimination, using standards acceptable to the Administration.

3.3.2 Crew members should be trained, as appropriate, on enclosed space safety, including familiarization with onboard procedures for recognizing, evaluating, and controlling hazards associated with entry into enclosed spaces.

3.4 Internal audits by the company and external audits by the Administration of the ship's safety management system should verify that the established procedures are complied with in practice and are consistent with the strategic plan contained in paragraph 3.1.

4 ASSESSMENT OF RISK

4.1 The company should ensure that a risk assessment be conducted to identify all enclosed spaces on board the ship. This risk assessment should be periodically revisited to ensure its continued validity.

4.2 In order to ensure safety, a competent person should always make a preliminary assessment of any potential hazards in the space to be entered, taking into account previous cargo carried, ventilation of the space, coating of the space and other relevant factors. The competent person's preliminary assessment should determine the potential for the presence of an oxygen deficient, oxygen enriched, flammable or toxic atmosphere. The competent person should bear in mind that the ventilation procedures for an adjacent connected space may be different from the procedures for the ventilation of the enclosed space itself.

4.3 The procedures to be followed for testing the atmosphere in the space and for entry should be decided on the basis of the preliminary assessment. These will depend on whether the preliminary assessment shows that:

- .1 there is minimal risk to the health or life of personnel entering the space;
- .2 there is no immediate risk to health or life but a risk could arise during the course of work in the space; and
- .3 a risk to health or life is identified.

4.4 Where the preliminary assessment indicates minimal risk to health or life or potential for a risk to arise during the course of work in the space, the precautions described in sections 5, 6, 7 and 8 should be followed as appropriate.

4.5 Where the preliminary assessment identifies risk to life or health, if entry is to be made, the additional precautions specified in section 9 should also be followed.

4.6 Throughout the assessment process, there should be an assumption that the space to be entered is considered to be hazardous until positively proved to be safe for entry.

5 AUTHORIZATION OF ENTRY

5.1 No person should open or enter an enclosed space unless authorized by the master or nominated responsible person and unless the appropriate safety procedures laid down for the particular ship have been followed.

5.2 Entry into enclosed spaces should be planned and the use of an entry permit system, which may include the use of a checklist, is recommended. An Enclosed Space Entry Permit should be issued by the master or nominated responsible person, and completed by the personnel who enter the space prior to entry. An example of the Enclosed Space Entry Permit is provided in the appendix.

6 GENERAL PRECAUTIONS

6.1 Entry doors or hatches leading to enclosed spaces should at all times be secured against entry, when entry is not required.

6.2 A door or hatch cover which is opened to provide natural ventilation of an enclosed space may, wrongly, be taken to be an indication of a safe atmosphere and therefore, an attendant may be stationed at the entrance or the use of a mechanical barrier such as a rope or chain positioned across the opening with an attached warning sign could prevent such accidental entry.

6.3 The master or responsible person should determine that it is safe to enter an enclosed space by ensuring that:

- .1 potential hazards have been identified in the assessment and as far as possible isolated or made safe;
- .2 the space has been thoroughly ventilated by natural or mechanical means to remove any toxic or flammable gases, and to ensure an adequate level of oxygen throughout the space;

- .3 the atmosphere of the space has been tested as appropriate with properly calibrated instruments to ascertain acceptable levels of oxygen and acceptable levels of flammable or toxic vapours;
- .4 the space has been secured for entry and properly illuminated;
- .5 a suitable system of communication between all parties for use during entry has been agreed and tested;
- .6 an attendant has been instructed to remain at the entrance to the space whilst it is occupied;
- .7 rescue and resuscitation equipment has been positioned ready for use at the entrance to the space, and that rescue arrangements have been agreed;
- .8 personnel are properly clothed and equipped for the entry and subsequent tasks; and
- .9 a permit has been issued authorizing entry.

The precautions in subparagraphs .6 and .7 may not apply to every situation described in this section. The person authorizing entry should determine whether an attendant and the positioning of rescue equipment at the entrance to the space are necessary.

6.4 Only trained personnel should be assigned the duties of entering, functioning as attendants, or functioning as members of rescue teams. Ships' crews with rescue and first aid duties should be drilled periodically in rescue and first aid procedures. Training should include as a minimum:

- .1 identification of the hazards likely to be faced during entry into enclosed spaces;
- .2 recognition of the signs of adverse health effects caused by exposure to hazards during entry; and
- .3 knowledge of personal protective equipment required for entry.

6.5 All equipment used in connection with entry should be in good working condition and inspected prior to use.

7 TESTING THE ATMOSPHERE

7.1 Appropriate testing of the atmosphere of a space should be carried out with properly calibrated equipment by persons trained in the use of the equipment. The manufacturers' instructions should be strictly followed. Testing of the space should be carried out before any person enters the space, and at regular intervals thereafter until all work is completed. Where appropriate, the testing of the space should be carried out at as many different levels as is necessary to obtain a representative sample of the atmosphere in the space. In some cases it may be difficult to test the atmosphere throughout the enclosed space without entering the space (e.g., the bottom landing of a stairway) and this should be taken into account when assessing the risk to personnel entering the space. The use of flexible hoses or fixed sampling lines which reach remote areas within the enclosed space, may allow for safe testing without having to enter the space.

7.2 For entry purposes, steady readings of all the following should be obtained:

.1 21% oxygen by volume by oxygen content meter,

Note: National requirements may determine the safe atmosphere range;

.2 not more than 1% of lower flammable limit (LFL) on a suitably sensitive combustible gas indicator, where the preliminary assessment has determined that there is potential for flammable gases or vapours; and

.3 not more than 50% of the occupational exposure limit (OEL)* of any toxic vapours and gases.

If these conditions cannot be met, additional ventilation should be applied to the space and re-testing should be conducted after a suitable interval.

7.3 Any gas testing should be carried out with ventilation to the enclosed space stopped, and after conditions have stabilized, in order to obtain accurate readings.

7.4 Where the preliminary assessment has determined that there is potential for the presence of toxic gases and vapours, appropriate testing should be carried out using fixed or portable gas or vapour detection equipment. The readings obtained by this equipment should be below the occupational exposure limits for the toxic gases or vapours given in accepted national or international standards, in accordance with paragraph 6.2. It should be noted that testing for flammability or oxygen content does not provide a suitable means of measuring for toxicity, nor *vice versa*.

7.5 It should be emphasized that the internal structure of the space, cargo, cargo residues and tank coatings may also present situations where oxygen-deficient areas may exist, and should always be suspected, even when an enclosed space has been satisfactorily tested as being suitable for entry, this is particularly the case for spaces where the path of the supply and outlet ventilation is obstructed by structural members or cargo.

8 PRECAUTIONS DURING ENTRY

8.1 The atmosphere should be tested frequently whilst the space is occupied, and persons should be instructed to leave the space should there be a deterioration in the conditions.

8.2 Persons entering enclosed spaces should be provided with calibrated and tested multi-gas detectors that monitor the levels of oxygen, carbon monoxide and other gases as appropriate.

8.3 Ventilation should continue during the period that the space is occupied and during temporary breaks. Before re-entry after a break, the atmosphere should be re-tested. In the event of failure of the ventilation system, any persons in the space should leave immediately.

8.4 Particular care should be exhibited when working on pipelines and valves within the space. If conditions change during the work, increased frequency of testing of the atmosphere should be performed. Changing conditions that may occur include increasing

* It should be noted that the term Occupational Exposure Limit (OEL) includes the Permissible Exposure Limit (PEL), Maximum Admissible Concentration (MAC) and Threshold Limit Value (TLV) or any other internationally recognized terms.

ambient temperatures, the use of oxygen-fuel torches, mobile plant, work activities in the enclosed space that could evolve vapours, work breaks, or if the ship is ballasted or trimmed during the work.

8.5 In the event of an emergency, under no circumstances should the attending crew member enter the space before help has arrived and the situation has been evaluated to ensure the safety of those entering the space to undertake rescue operations. Only properly trained and equipped personnel should perform rescue operations in enclosed spaces.

9 ADDITIONAL PRECAUTIONS FOR ENTRY INTO A SPACE WHERE THE ATMOSPHERE IS KNOWN OR SUSPECTED TO BE UNSAFE

9.1 Spaces that have not been tested should be considered unsafe for persons to enter. If the atmosphere in an enclosed space is suspected or known to be unsafe, the space should only be entered when no practical alternative exists. Entry should only be made for further testing, essential operation, safety of life or safety of a ship. The number of persons entering the space should be the minimum compatible with the work to be performed.

9.2 Suitable breathing apparatus, e.g., of the air-line or self-contained type, should always be worn, and only personnel trained in its use should be allowed to enter the space. Air-purifying respirators should not be used as they do not provide a supply of clean air from a source independent of the atmosphere within the space.

9.3 Persons entering enclosed spaces should be provided with calibrated and tested multi-gas detectors that monitor the levels of oxygen, carbon monoxide and other gases as appropriate.

9.4 Rescue harnesses should be worn and, unless impractical, lifelines should be used.

9.5 Appropriate protective clothing should be worn particularly where there is any risk of toxic substances or chemicals coming into contact with the skin or eyes of those entering the space.

9.6 The advice in paragraph 8.5 concerning emergency rescue operations is particularly relevant in this context.

10 HAZARDS RELATED TO SPECIFIC TYPES OF SHIPS OR CARGO

10.1 Dangerous goods in packaged form

10.1.1 The atmosphere of any space containing dangerous goods may put at risk the health or life of any person entering it. Dangers may include flammable, toxic or corrosive gases or vapours that displace oxygen, residues on packages and spilled material. The same hazards may be present in spaces adjacent to the cargo spaces. Information on the hazards of specific substances is contained in the IMDG Code, the Emergency Procedures for Ships Carrying Dangerous Goods (EMS) and Material Safety Data Sheets (MSDS)*. If there is evidence or suspicion that leakage of dangerous substances has occurred, the precautions specified in 8 should be followed.

* Refer to the Recommendations for material safety data sheets (MSDS) for MARPOL Annex I oil cargo and oil fuel (resolution MSC.286(86)).

10.1.2 Personnel required to deal with spillages or to remove defective or damaged packages should be appropriately trained and wear suitable breathing apparatus and appropriate protective clothing.

10.2 Bulk liquid

The tanker industry has produced extensive advice to operators and crews of ships engaged in the bulk carriage of oil, chemicals and liquefied gases, in the form of specialist international safety guides. Information in the guides on enclosed space entry amplifies these recommendations and should be used as the basis for preparing entry plans.

10.3 Solid bulk

On ships carrying solid bulk cargoes, dangerous atmospheres may develop in cargo spaces and adjacent spaces. The dangers may include flammability, toxicity, oxygen depletion or self-heating, as identified in the shipper's declaration. For additional information, reference should be made to the **International Maritime Solid Bulk Cargoes (IMSBC) Code**.

10.4 Use of Nitrogen as an inert gas

Nitrogen is a colourless and odourless gas that when used as an inert gas causes oxygen deficiency in enclosed spaces, and at exhaust openings on deck, during purging of tanks and void spaces and use in cargo holds. It should be noted that one deep breath of 100% nitrogen gas will be fatal.

10.5 Oxygen-depleting cargoes and materials

A prominent risk with such cargoes is oxygen depletion due to the inherent form of the cargo, for example, self-heating, oxidation of metals and ores or decomposition of vegetable oils, fish oils, animal fats, grain and other organic materials or their residues. The materials listed below are known to be capable of causing oxygen depletion. However, the list is not exhaustive. Oxygen depletion may also be caused by other materials of vegetable or animal origin, by flammable or spontaneously combustible materials, and by materials with a high metal content, including, but not limited to:

- .1 grain, grain products and residues from grain processing (such as bran, crushed grain, crushed malt or meal), hops, malt husks and spent malt;
- .2 oilseeds as well as products and residues from oilseeds (such as seed expellers, seed cake, oil cake and meal);
- .3 copra;
- .4 wood in such forms as packaged timber, round wood, logs, pulpwood, props (pit props and other propwood), woodchips, woodshavings, wood pellets, and sawdust;
- .5 jute, hemp, flax, sisal, kapok, cotton and other vegetable fibres (such as esparto grass/Spanish grass, hay, straw, bhusa), empty bags, cotton waste, animal fibres, animal and vegetable fabric, wool waste and rags;
- .6 fish, fishmeal and fishscrap;

- .7 guano;
- .8 sulphidic ores and ore concentrates;
- .9 charcoal, coal, lignite and coal products;
- .10 direct reduced iron (DRI)
- .11 dry ice;
- .12 metal wastes and chips, iron swarf, steel and other turnings, borings, drillings, shavings, filings and cuttings; and
- .13 scrap metal.

10.6 Fumigation

When a ship is fumigated, the detailed recommendations contained in the Recommendations on the Safe Use of Pesticides in Ships* should be followed. Spaces adjacent to fumigated spaces should be treated as if fumigated.

11 CONCLUSION

Failure to observe simple procedures can lead to people being unexpectedly overcome when entering enclosed spaces. Observance of the principles and procedures outlined above will form a reliable basis for assessing risks in such spaces and for taking necessary precautions.

APPENDIX

EXAMPLE OF AN ENCLOSED SPACE ENTRY PERMIT

This permit relates to entry into any enclosed space and should be completed by the master or responsible person and by any persons entering the space: competent person and the attendant.

GENERAL		
Location/name of enclosed space		
Reason for entry		
This permit is valid	from: _____ hrs	Date
	to: _____ hrs	Date
(See note 1)		

* Refer to the Revised Recommendations on safe use of pesticides in ships (MSC.1/Circ.1358).

SECTION 1 – PRE-ENTRY PREPARATION		
(To be checked by the master or nominated responsible person)		
	Yes	No
• Has the space been thoroughly ventilated by mechanical means?	"	"
• Has the space been segregated by blanking off or isolating all connecting pipelines or valves and electrical power/equipment?	"	"
• Has the space been cleaned where necessary?	"	"
• Has the space been tested and found safe for entry? (See note 2)	"	"
• Pre-entry atmosphere test readings:		
- oxygen% vol (21%)*	By:	
- hydrocarbon% LFL (less than 1%)		
- toxic gases ppm (less than 50% OEL of the specific gas)	Time:	
	(See note 3)	
• Have arrangements been made for frequent atmosphere checks to be made while the space is occupied and after work breaks?	"	"
• Have arrangements been made for the space to be continuously ventilated throughout the period of occupation and during work breaks?	"	"
• Are access and illumination adequate?	"	"

* Note that National requirements may determine the safe atmosphere range.

	Yes	No
• Is rescue and resuscitation equipment available for immediate use by the entrance to the space?	"	"
• Has an attendant been designated to be in constant attendance at the entrance to the space?	"	"
• Has the officer of the watch (bridge, engine-room, cargo control room) been advised of the planned entry?	"	"
• Has a system of communication between all parties been tested and emergency signals agreed?	"	"
• Are emergency and evacuation procedures established and understood by all personnel involved with the enclosed space entry?	"	"
• Is all equipment used in good working condition and inspected prior to entry?	"	"
• Are personnel properly clothed and equipped?	"	"

SECTION 2 – PRE-ENTRY CHECKS
(To be checked by each person entering the space)

	Yes	No
• I have received instructions or permission from the master or nominated responsible person to enter the enclosed space	"	"
• Section 1 of this permit has been satisfactorily completed by the master or nominated responsible person	"	"
• I have agreed and understand the communication procedures	"	"
• I have agreed upon a reporting interval of minutes	"	"
• Emergency and evacuation procedures have been agreed and are understood	"	"
• I am aware that the space must be vacated immediately in the event of ventilation failure or if atmosphere tests show a change from agreed safe criteria	"	"

SECTION 3 – BREATHING APPARATUS AND OTHER EQUIPMENT		
(To be checked jointly by the master or nominated responsible person and the person who is to enter the space)		
	Yes	No
• Those entering the space are familiar with any breathing apparatus to be used	"	"
• The breathing apparatus has been tested as follows:		
- gauge and capacity of air supply		
- low pressure audible alarm if fitted		
- face mask – under positive pressure and not leaking		
• The means of communication has been tested and emergency signals agreed	"	"
• All personnel entering the space have been provided with rescue harnesses and, where practicable, lifelines	"	"

Signed upon completion of sections 1, 2 and 3 by:

Master or nominated responsible person Date Time

Attendant Date Time

Person entering the space Date Time

SECTION 4 – PERSONNEL ENTRY		
(To be completed by the responsible person supervising entry)		
Names		
Time in		Time out
SECTION 5 – COMPLETION OF JOB		
(To be completed by the responsible person supervising entry)		
• Job completed	Date Time
• Space secured against entry	Date	Time.....
• The officer of the watch has been duly informed	Date	Time.....

Signed upon completion of sections 4 and 5 by:

Responsible person supervising entry Date Time

THIS PERMIT IS RENDERED INVALID SHOULD VENTILATION OF THE SPACE STOP
OR IF ANY OF THE CONDITIONS NOTED IN THE CHECKLIST CHANGE

Notes:

- 1 The permit should contain a clear indication as to its maximum period of validity.
- 2 In order to obtain a representative cross-section of the space's atmosphere, samples should be taken from several levels and through as many openings as possible. Ventilation should be stopped for about 10 minutes before the pre-entry atmosphere tests are taken.
- 3 Tests for specific toxic contaminants, such as benzene or hydrogen sulphide, should be undertaken depending on the nature of the previous contents of the space.

ANNEX 7

BIENNIAL AGENDA OF THE SUB-COMMITTEE*

SUB-COMMITTEE ON DANGEROUS GOODS, SOLID CARGOES AND CONTAINERS (DSC)					
PLANNED OUTPUTS 2010-2011 (resolution A.1012(26))		Parent organ(s)	Coordinating organ(s)	Involved organ(s)	Target completion year
Number	Description				
5.2.1.25	Revision of the Recommendations for entering enclosed spaces aboard ships	MSC	DSC	BLG FP STW	2010
5.2.2**	Amendment to SOLAS to mandate enclosed space entry and rescue drills	MSC	DSC	BLG	2012
5.2.3.1	Amendments to the International Convention for Safe Containers, 1972 and associated circulars	MSC	DSC		2010 2011
5.2.3.3	Amendments to the IMSBC Code, including evaluation of properties of solid bulk cargoes	MSC/MEPC	DSC		Ongoing
5.2.3.4	Amendment (36-12) to the IMDG Code and supplements	MSC	DSC		2011
5.2.3.5	Harmonization of the IMDG Code with the UN Recommendations on the Transport of Dangerous Goods	MSC	DSC		Ongoing
5.2.3.6	Stowage of water-reactive materials	MSC	DSC	FP	2010 2011

* Outputs printed in bold letters have been selected for the provisional agenda for DSC 16, as shown in annex 2. Struck-out text indicates proposed deletions and shaded text indicates proposed additions and/or changes. Deleted outputs will be maintained in the report on the status of planned outputs.

** Unplanned output endorsed by the Council. A new output number will be assigned by the Council in due course.

SUB-COMMITTEE ON DANGEROUS GOODS, SOLID CARGOES AND CONTAINERS (DSC)					
PLANNED OUTPUTS 2010-2011 (resolution A.1012(26))		Parent organ(s)	Coordinating organ(s)	Involved organ(s)	Target completion year
Number	Description				
5.2.3.8	Revision of the Code of Safe Practice for Ships Carrying Timber Deck Cargoes	MSC	DSC		2010
5.2.3.12	Guidance on protective clothing	MSC	DSC		2010
5.2.3.14	Review of the Guidelines for packing of cargo transport units	MSC	DSC		2010 2013
5.2.3.16	Installation of equipment for detection of radioactive sources or radioactive contaminated objects in ports	MSC	DSC		2011
5.3.1.4	Consideration for the efficacy of Container Inspection Programme	MSC	DSC		2010 2011
12.3.1 12.1.2.2	Casualty analysis	MSC	FSI	DSC	Ongoing
12.3.1.3	Reports on incidents involving dangerous goods or marine pollutants in packaged form on board ships or in port areas	MEPC	DSC		Ongoing

ANNEX 8

DRAFT PROVISIONAL AGENDA FOR DSC 16

- Opening of the session
- 1 Adoption of the agenda
 - 2 Decisions of other IMO bodies
 - 3 Amendments to the IMDG Code and supplements, including harmonization of the IMDG Code with the UN Recommendations on the transport of dangerous goods
 - .1 harmonization of the IMDG Code with the UN Recommendations on the transport of dangerous goods
 - .2 amendment (36-12) to the IMDG Code and supplements
 - 4 Amendments to the IMSBC Code, including evaluation of properties of solid bulk cargoes
 - 5 Casualty and incident reports and analysis
 - 6 Stowage of water-reactive materials
 - 7 Revised Guidelines for packing of cargo transport units
 - 8 Consideration for the efficacy of Container Inspection Programme
 - 9 Installation of equipment for detection of radioactive contaminated objects in port
 - 10 Amendments to the International Convention for Safe Containers, 1972 and associated circulars
 - 11 Amendment to SOLAS to mandate enclosed space entry and rescue drills
 - 12 Biennial agenda and provisional agenda for DSC 17
 - 13 Election of Chairman and Vice-Chairman for 2012
 - 14 Any other business
 - 15 Report to the Maritime Safety Committee

ANNEX 9

REPORT ON THE STATUS OF PLANNED OUTPUTS

SUB-COMMITTEE ON DANGEROUS GOODS, SOLID CARGOES AND CONTAINERS								
Planned output number in HLA Plan for 2010-2011	Description	Target completion date	Parent organ(s)	Coordinating organ(s)	Associated organ(s)	Status of output for Year 1	Status of output for Year 2	References
1.1.2.1	Co-operation with IAEA	Continuous	MSC	DSC		Ongoing		
1.1.2.3	Policy input or guidance to or on: Development of carriage of class 7 radioactive materials	Continuous	MSC	DSC		Ongoing		
1.1.2.3	Policy input or guidance to or on: Facilitation of the shipment of class 7 radioactive materials	Continuous	FAL	DSC		Ongoing		
1.3.5.1	Harmonized provisions relating to the safe, secure and efficient carriage of dangerous goods following participation in the activities of UN CETDG and GHS, and IAEA	Continuous	MSC	DSC		Ongoing		DSC 15/18, section 3
5.2.1.25	Revision of the Recommendations for entering enclosed spaces aboard ships	2010	MSC	DSC	BLG, FP, STW	Completed		DSC 15/18, section 10
5.2.2	Amendment to SOLAS to mandate enclosed space entry and rescue drills	2012	MSC	DSC	BLG	In progress		DSC 15/18, section 17

SUB-COMMITTEE ON DANGEROUS GOODS, SOLID CARGOES AND CONTAINERS								
Planned output number in HLA Plan for 2010-2011	Description	Target completion date	Parent organ(s)	Coordinating organ(s)	Associated organ(s)	Status of output for Year 1	Status of output for Year 2	References
5.2.3.1	Amendments to the International Convention for safe containers, 1972 and associated circulars	2010 2011	MSC	DSC		In progress		DSC 15/18, section 13
5.2.3.3	Amendments to the IMSBC Code, including evaluation of properties of solid bulk cargoes	Continuous	MSC MEPC	DSC		Ongoing		DSC 15/18, section 4
5.2.3.4	Amendment (36-12) to the IMDG Code and supplements	2011	MSC	DSC		In progress		DSC 15/18, section 3
5.2.3.5	Harmonization of the IMDG Code with the UN Recommendations on the transport of dangerous goods	Continuous	MSC	DSC		Ongoing		DSC 15/18, section 3
5.2.3.6	Stowage of water-reactive materials	2010 2011	MSC	DSC	FP	In progress		DSC 15/18, section 8
5.2.3.8	Revision of the Code of safe practice for ships carrying timber cargoes	2010	MSC	DSC		completed		DSC 15/18, section 7
5.2.3.12	Guidance on protective clothing*	2010	MSC	DSC		Postponed*		DSC 15/18, section 6
5.2.3.14	Revised Guidelines for packing of cargo transport units	2010 2013	MSC	DSC		In progress		DSC 15/18, section 9

* To be moved to the Committee's post-biennial agenda.

SUB-COMMITTEE ON DANGEROUS GOODS, SOLID CARGOES AND CONTAINERS								
Planned output number in HLA Plan for 2010-2011	Description	Target completion date	Parent organ(s)	Coordinating organ(s)	Associated organ(s)	Status of output for Year 1	Status of output for Year 2	References
5.2.3.16	Installation of equipment for detection of radioactive sources or radioactive contaminated objects in ports	2011	MSC	DSC		In progress		DSC 15/18, section 12
5.3.1.4	Consideration for the efficacy of container inspection programme	2010 2011	MSC	DSC		In progress		DSC 15/18, section 11
12.3.1 12.1.2.2	Casualty analysis	Continuous	MSC	FSI	DSC	Ongoing		DSC 15/18, section 5
12.3.1.3	Reports on incidents involving dangerous goods or marine pollutants in packaged form on board ships or in port areas	Continuous	MEPC	DSC		Ongoing		DSC 15/18, section 5

ANNEX 10

PROPOSED OUTPUTS FOR THE 2012-2013 BIENNIUM IN SMART TERMS

SUB-COMMITTEE ON DANGEROUS GOODS, SOLID CARGOES AND CONTAINERS (DSC)					
PLANNED OUTPUTS 2012-2013 (resolution A.[....](27))		Parent organ(s)	Coordinating organ(s)	Involved organ(s)	Target completion year
Number	Description				
5.2.2	Amendment to SOLAS to mandate enclosed space entry and rescue drills	MSC	DSC	BLG	2012
5.2.3.1	Development of amendments to the International Convention for Safe Containers, 1972 and associated circulars	MSC	DSC		2013
5.2.3.3	Development of amendments to the IMSBC Code, including evaluation of properties of solid bulk cargoes and supplements	MSC/MEPC	DSC		Ongoing
5.2.3.4	Development of amendment (37-14) to the IMDG Code and supplements	MSC	DSC		2013
5.2.3.5	Harmonization of the IMDG Code with the UN Recommendations on the Transport of Dangerous Goods	MSC	DSC		Ongoing
5.2.3.6	Review of fire protection arrangements for the stowage of water-reactive materials	MSC	DSC	FP	2013
5.2.3.12	Development of guidance on protective clothing	MSC	DSC		2013
5.2.3.14	Revision of the Guidelines for packing of cargo transport units	MSC	DSC		2013
12.1.2.2	Casualty analysis	MSC	FSI	DSC	Ongoing
12.3.1.3	Consideration of reports on incidents involving dangerous goods or marine pollutants in packaged form on board ships or in port areas	MEPC	DSC		Ongoing