標題

MSC 98 の審議結果の紹介

ClassNK
テクニカル
インフォメーション

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各位

2017 年 6 月 7 日から 16 日に IMO（英国・ロンドン）において第 98 回海上安全委員会（MSC 98）が開催されました。今般、IMO より MSC 98 の議事録及び決議並びにサーキュラーが発行されたことから、次の通り同会合の情報及び審議結果をお知らせ致します。

1. 採択された条約及び関連コードの主要な改正
今回の会合で採択された主要な義務要件は以下の通りです。

(1) 区画と損傷時復原性要件の改正（添付 1 参照）
区画及び損傷時復原性に関する SOLAS 条約 II-1 章の改正が採択されました。主な改正内容は以下の通りです。
(i) 客船の要求区画指数 R (6 規則)
旅客船の要求区画指数 R を、旅客数 400 人以下, 400 から 1350 人、1350 から 6000 人、6000 人超の 4 ケースに応じたクライテリアとする改正。
(ii) 二重底に設けられるウェル (9 規則)
旅客船及びタンカー以外の貨物船の二重底に設けられるウェルについて、ウェルの底からキール線に一致する面までの垂直距離は、500mm もしくは要求される二重底高さの半分の距離のいずれか大きい方以上とし、満足しない場合には、9.8 規則の船底損傷時復原性計算を満足することを要求する改正。
(iii) 貨物船の船首隔壁弁へのバタフライ弁の使用 (12 規則)
貨物船の船首隔壁弁へのねじ下げ弁の使用に関し、代替手段としてバタフライ弁の使用を認める改正。ただし、バタフライ弁は弁座またはフランジで適切に支持され、乾舷甲板上から操作できなければならない。
(iv) 旅客船に対する損傷制御訓練の実施 (19-1 規則)
全ての旅客船に対し、損傷制御訓練に含めるべき内容を規定し、定期的な損傷制御訓練の実施を要求する改正。

適用: 2020 年 1 月 1 日発効

（次頁に続く）

(2) 36 人以下の旅客を運送する旅客船の窓の防熱（添付 1 参照）
36 人以下の旅客を運送する旅客船において、救命設備、乗艇場所、招集場所及び脱出経路として用いる外部階段及び開放された甲板に面する窓並びに救命いかだ及び脱出用の滑り台の乗艇場所の下方にある窓に A-0 級の保全防熱性を要求する SOLAS 条約 II-2 章 9.4.1.3 規則の改正が採択されました。

適用: 2020 年 1 月 1 日発効

(3) 車両積載区域に適用される要件（添付 1 参照）
車両が SOLAS 条約 II-2 章 19 規則「危険物の運送」及び IMDG Code の適当な要件に適合している場合で、かつ貨物区域内を自走しない場合においては、当該貨物区域に対して SOLAS 条約 II-2 章 20 規則を適用する必要がない旨を明確化した同規則の改正が採択されました。

適用: 2020 年 1 月 1 日発効

(4) IGF コードの改正（添付 2 参照）
IGC コード 3 章 3.2.5 規則の改正の採択に合わせ、開放甲板に設置される燃料タンクに面する船橋の窓に A-0 級保全防熱性を要求する規定を削除する IGF コード 11 章 11.3.2 規則の改正が採択されました。

適用: 2020 年 1 月 1 日発効

(5) IMSBC コードの改正（添付 3 参照）
IMSBC コード未掲載貨物 13 種類を新たに取り入れた貨物個別スケジュールの改正、及びばら積固体貨物の運送許容水分値測定及び船積み前の含有水分値測定は荷送者の責任であることを明確化した IMSBC コード 4.5.1 及び 4.5.2 の改正が採択されました。

適用: 2019 年 1 月 1 日発効
（ただし、主管庁判断により 2018 年 1 月 1 日からの早期適用が可能）

2. 承認された条約及び関連コードの主要な改正
以下の改正案が、2018 年 5 月に開催される MSC 99 にて採択される見込みです。

旅客船の安全性強化（添付 5 参照）
2014 年 1 月 1 日より前に建造された旅客船に対し、浸水事故に備えた船上復原性計算機もしくは陸上からの支援を要求する SOLAS 条約 II-1 章 8-1 規則の改正案が承認されました。

（次頁に続く）

3. 今回の会合において承認された統一解釈及びガイドラインのうち、主要なものは以下のとおりです。以下で参照されている IACS 統一解釈（UI）については、IACS ホームページ（http://www.iacs.org.uk/）にて公開されております。

3.1 統一解釈

(1) VDR、S-VDR、AIS 及び EPIRB の年次性能試験の実施時期に関する統一解釈（SOLAS V/18.8、V/18.9、IV/15.9）（添付 10 参照）

・ SOLAS 条約 V 章 18.8 規則、18.9 規則及び IV 章 15.9 規則でそれぞれ規定される VDR、S-VDR、AIS 及び EPIRB の年次性能試験に関し、検査と証書の調和システム(HSSC)で定める定期的検査の期間内に実施する旨の解釈（UI SC279 関連）

(2) 車両を積載する船舶に対する追加要件及び隔壁甲板上にある閉囲された区域の排水の統一解釈（SOLAS II-1/17-1.1.1、20-2、35-1.2.6.1）（添付 7 参照）

・ SOLAS 条約 II-1 章 17-1.1.1 規則及び 20-2 規則のロールオン・ロールオフ旅客船に対する追加要件の明確化、並びに SOLAS 条約 II-1 章 35-1.2.6.1 規則で要求される排水設備として、隔壁甲板上にある閉囲された区域の排水を認める解釈（UI SC81、SC220 関連）

(3) 点検設備及び貨物倉の浸水警報装置に関する 4 つの MSC サーキュラーを統合した統一解釈（SOLAS II-1、XII）（添付 8 参照）

・ SOLAS 条約 II-1 章で要求されている点検設備の要件及び XII 章で要求されている貨物倉の浸水警報装置に対する要件の解釈として、現在発行されている MSC.1/Circ.1464/Rev.1 及び Corr.1、MSC.1/Circ.1507、MSC.1/Circ.1545 の内容を統合した解釈（UI SC191, SC156 関連）

(4) 載貨重量の算定方法の統一解釈（SOLAS II-1/2.20、II-2/3.21、MARPOL Annex I/1.23）（添付 9 参照）

・ SOLAS 条約 II-1 章 2.20 規則、II-2 章 3.21 規則及び MARPOL 附属書 I 1.23 規則で定義される載貨重量について、キール傾斜なしでの排水量を用いて算定する旨の解釈

(5) タンカーの可搬式ガス検知器（SOLAS II-2/4.5.7.1）（添付 13 参照）

・ SOLAS 条約 II-2 章 4.5.7.1 規則でタンカーに対して要求される可搬式ガス検知器の較正手段として、製造者のインストラクションに従った陸上における較正を認める解釈

(6) 船橋室と船橋室に隣接し同場所からのみ出入り可能なロッカー室間の境界の保全防熱性に関する統一解釈（SOLAS II-2/9.2.4.2.2）（添付 13 参照）

・ 船橋室と船橋室に隣接し同場所からのみ出入り可能なロッカー室間の境界に対する保全防熱性には B-0 級が要求される旨の解釈

（次頁に続く）

(7) タンカーのイナートガスシステムに関する統一解釈（FSS コード 15 章）（添付 14 参照）
- FSS コード 15 章で規定されるタンカーのイナートガスシステムに対する 4 件の統一解釈

(i) イナートガスシステムの緊急自動停止条件(15.2.2.2.2)
(ii) 貨物タンクにおける弁の操作状況の表示方法(15.2.2.3.2.2)
(iii) イナートガスシステムの操作状況の表示方法(15.2.2.4.1)
(iv) 低圧可聴警報システムの要件(15.2.2.4.5.3)

3.2 ガイドライン

(1) 自由降下式救命艇の模擬進水ガイドラインの改正（MSC.1/Circ.1578）（添付 11 参照）
- SOLAS III 章 19 規則に規定される船体放棄の操練における自由降下式救命艇の模擬進水に関するガイドライン（MSC.1/Circ.1206/Rev.1）の改正。当該模擬進水において離脱装置の作動を省略する手順が明記された。

(2) 船位保持システムガイドラインの改正（添付 12 参照）
- MSC/Circ.645 で規定される船位保持システム（Dynamic positioning system、DPS）ガイドラインにおいて、無停電電源装置（UPS）を含む船位保持システムの故障を考慮した冗長性等の規定を追加する改正。

(3) 救命艇離脱フックの評価及び交換のためのガイドラインの改正（添付 15 参照）
- フック連結具の構成部材に対する状態評価手法、及び耐腐食材料を構成部材に使用する場合は評価の実施が要求されない旨を定めた、救命艇離脱フックの評価及び交換のためのガイドライン（MSC.1/Circ.1392）の改正。

(4) 旅客船の損傷制御図及び船長のための復原性資料のガイドラインの改正（添付 6 参照）
- 上記 4.2 に関連し、MSC.1/Circ.1245 で規定される損傷制御図及び船長のための復原性資料のガイドラインにおいて、旅客船の損傷制御図に含めるべき情報を追加する改正。

4. その他

(1) GBS（目標指向型新造船基準）適合検証ガイドラインの見直し

SOLAS 条約 II-1 章 3-10 規則に規定される GBS（Goal-based standard）により、船の長さが 150m 以上である油タンカー及びばら積貨物船*は、GBS に定められるゴール及び機能要件に適合した船級協会の規則に従って設計・建造することが要求されます。GBS では、各船級協会の規則が GBS 要件に適合していることを確認するための適合監査を行うこととしており、GBS 適合検証ガイドライン(MSC.296(87))に基づいて、初回適合監査に加えて、初回適合監査後の規則改正部分については維持監査が実施されます。

同ガイドラインは次の A 部及び B 部で構成されており、今回の会合では、ガイドラインの改正案について審議が行われ、原則として維持監査は 3 年毎に行うことを盛り込んだ A 部の改正案が作成されました。

A 部 初回及び維持監査のプロセス

B 部 検証のための提出文書及び評価方法

また、維持監査の対象範囲は新たに制定された規則及び規則改正部分のみとすることが確認されています。次回の会合では B 部について引き続き審議を行い、MSC100 にて同ガイドラインの改正案が採択される見込みです。

* 2016 年 7 月 1 日以降に建造契約が行われる船舶、建造契約がない場合には 2017 年 7 月 1 日以降に起工又は同等段階にある船舶、2020 年 7 月 1 日以降に引渡しが行われる船舶に適用されます。

(2) 自律化船に対する要件の検討

船舶の自律化が進んでいる中で、将来的な船舶の無人化も見据え、自律化船に適用される航行上の安全や海洋環境に関する要件について検討すべき旨の提案がありました。

審議の結果、初期段階の検討作業として、既存の条約要件を自律化船に適用する必要があるものとないものに分類し、自律化船を見据えた基準の必要性を検討することが合意されました。自律化船の定義及び船舶の自律化レベルについても今後検討が行われる予定です。

(3) サイバーリスクマネージメント（添付 4、16 参照）

MSC.1/Circ.1526 では業界ガイドライン及び国際規格を盛り込んだ非強制のサイバーセキュリティ対策に関する暫定ガイドラインが規定されております。包括的なリスクマネージメント手法が最適との観点から、米国は ISM コードで規定される安全管理システムにおいて、サイバーリスクをマネージメントすることを提案しました。

審議の結果、安全管理システムでサイバーリスクをマネージメントする方針が合意されました。暫定ガイドラインが正式なガイドライン（MSC-FAL.1/Circ.3）として承認されると共に、2021 年 1 月 1 日以降の最初の DOC 年次審査において、安全管理システムにサイバーリスクマネージメントが含まれていることを確認することが合意されました。

（次頁に続く）

なお、本件に関してご不明な点は、以下の部署にお問い合わせください。

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添付:

1. RESOLUTION MSC.421(98)
2. RESOLUTION MSC.422(98)
3. RESOLUTION MSC.426(98)
4. RESOLUTION MSC.428(98)
5. DRAFT AMENDMENTS TO SOLAS REGULATIONS II-1/1 AND II-1/8-1
6. MSC.1/Circ.1570
7. MSC.1/Circ.1571
8. MSC.1/Circ.1572
9. MSC.1/Circ.1573
10. MSC.1/Circ.1576
11. MSC.1/Circ.1578
12. MSC.1/Circ.1580
13. MSC.1/Circ.1581
14. MSC.1/Circ.1582
15. MSC.1/Circ.1584
16. MSC-FAL.1/Circ.3

ANNEX 3

RESOLUTION MSC.421(98)
(adopted on 15 June 2017)

AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, AS AMENDED

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO article VIII(b) of the International Convention for the Safety of Life at Sea, 1974 ("the Convention"), concerning the amendment procedure applicable to the annex to the Convention, other than to the provisions of chapter I,

HAVING CONSIDERED, at its ninety-eighth session, amendments to the Convention proposed and circulated in accordance with article VIII(b)(i) of the Convention,

1 ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the Convention the text of which is set out in the annex to the present resolution;

2 DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that said amendments shall be deemed to have been accepted on 1 July 2019, unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified the Secretary-General of their objections to the amendments;

3 INVITES Contracting Governments to the Convention to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 January 2020 upon their acceptance in accordance with paragraph 2 above;

4 REQUESTS the Secretary-General, for the purposes of article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the annex to all Contracting Governments to the Convention;

5 REQUESTS ALSO the Secretary-General to transmit copies of this resolution and its annex to Members of the Organization which are not Contracting Governments to the Convention.

ANNEX

CHAPTER II-1
CONSTRUCTION – STRUCTURE, SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS

PART A
GENERAL

Regulation 1 – Application

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

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

.1 for which the building contract is placed on or after 1 January 2020; or

.2 in the absence of a building contract, the keel of which is laid or which are at a similar stage of construction on or after 1 July 2020; or

.3 the delivery of which is on or after 1 January 2024.

1.1.2 Unless expressly provided otherwise, for ships not subject to the provisions of subparagraph 1.1.1 but constructed on or after 1 January 2009, the Administration shall:

.1 ensure that the requirements in parts B, B-1, B-2 and B-4 which are applicable under chapter II-1 of the International Convention for the Safety of Life at Sea, 1974, as amended by resolutions MSC.216(82), MSC.269(85) and MSC.325(90) are complied with; and

.2 ensure that the requirements of regulation 19-1 are complied with."

2 The existing paragraph 1.3.4 is deleted and at the end of the existing paragraph 1.3.3, replaced ";" with ".".

3 The existing paragraph 2 is replaced with the following:

"2 Unless expressly provided otherwise, for ships constructed before 1 January 2009, the Administration shall:

.1 ensure that the requirements which are applicable under chapter II-1 of the International Convention for the Safety of Life at Sea, 1974, as amended by resolutions MSC.1(XLV), MSC.6(48), MSC.11(55), MSC.12(56), MSC.13(57), MSC.19(58), MSC.26(60), MSC.27(61), Resolution 1 of the 1995 SOLAS Conference, MSC.47(66), MSC.57(67), MSC.65(68), MSC.69(69), MSC.99(73), MSC.134(76), MSC.151(78) and MSC.170(79) are complied with; and

.2 ensure that the requirements of regulation 19-1 are complied with."

Regulation 2 – Definitions

4 The existing paragraph 2 is replaced with the following:

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

5 The existing paragraphs 9 and 10 are replaced with the following:

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

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

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

to the waterline in question.

10 *Deepest subdivision draught (d_s)* is the summer load line draught of the ship."

6 The existing paragraph 13 is replaced with the following:

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

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

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

disregarding any rake of keel."

7 The existing paragraph 19 is replaced with the following:

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

.1 to which the main bulkheads and the ship's shell are carried watertight, for ships subject to the provisions of regulation II-1/1.1.1.1; and

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

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

8 The existing paragraph 26 is deleted and remaining paragraphs are renumbered accordingly.

PART B
SUBDIVISION AND STABILITY

Regulation 4 – General

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

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

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

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

2.1 In part B-1:

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

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

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

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

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

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

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

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

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

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

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

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

11 The existing paragraphs 2 to 4 are renumbered accordingly.

PART B-1
STABILITY

Regulation 5 – Intact stability

12 The footnote to the title is deleted and the existing paragraphs 1 and 2 are replaced with the following:

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

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

13 The existing paragraph 5 is replaced with the following:

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

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

14 The existing footnote to the title of the regulation is replaced with the following:

"* Refer also to the *Guidelines for the preparation of intact stability information* (MSC/Circ.456) and the *Revised guidance to the master for avoiding dangerous situations in adverse weather and sea conditions* (MSC.1/Circ.1228)."

15 The existing regulation 5-1.1 is replaced with the following:

"1 The master shall be supplied with such information to the satisfaction of the Administration as is necessary to enable him by rapid and simple processes to obtain accurate guidance as to the stability of the ship under varying conditions of service. A copy of the stability information shall be furnished to the Administration."

16 The existing paragraph 2.1 is replaced with the following:

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

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

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

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

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

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

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

Regulation 6 – Required subdivision index R

19 The existing chapeau in paragraph 2 is replaced with the following:

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

20 The existing chapeau in paragraph 2.2 is replaced with the following:

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

21 The text in the existing paragraph 2.3 is replaced with the following:

"2.3 In the case of passenger ships:

Persons on board	***R***
$N < 400$	$R = 0.722$
$400 \leq N \leq 1{,}350$	$R = N / 7{,}580 + 0.66923$
$1{,}350 < N \leq 6{,}000$	$R = 0.0369 \times \text{Ln}(N + 89.048) + 0.579$
N > 6,000	$R = 1 - (852.5 + 0.03875 \times N) / (N + 5{,}000)$

Where:

N = total number of persons on board."

22 The existing paragraph 2.4 is deleted.

Regulation 7 – Attained subdivision index *A*

23 The first sentence of the existing paragraph 1 is replaced with the following:

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

24 The existing paragraphs 2 and 3 are replaced with the following:

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

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

Regulation 7-1 – Calculation of the factor p_i

25 In the existing paragraph 1, the text of the notation for the mean transverse distance *b* is replaced with the following:

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

Regulation 7-2 – Calculation of the factor s_i

26 The existing paragraphs 2 to 4.1.2 are replaced with the following:

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

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

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

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

For passenger and cargo ships, where cross-flooding devices are fitted, the time for equalization shall not exceed 10 min.

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

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

where:

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

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

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

TGZ_{max} = 0.12 m, otherwise;

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

TRange = 16º, otherwise;

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

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

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

where:

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

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

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

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

where:

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

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

$s_{mom,i} \leq 1$

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

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

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

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

where:

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

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

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

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

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

where:

$P = 120$ N/m^2;

A = projected lateral area above waterline;

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

T = respective draught (d_s, d_p or d_l)."

27 The existing paragraph 5 is replaced with the following:

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

* Reference is made to the *Revised recommendation on a standard method for evaluating cross-flooding arrangements*, adopted by the Organization by resolution MSC.362(92), as may be amended."

28 The existing chapeau of paragraph 5.2 is replaced with the following:

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

29 The existing paragraph 5.3 is replaced with the following:

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

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

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

.3 immersion of any part of piping or ventilation ducts located within the assumed extent of damage and carried through a watertight boundary if this can lead to the progressive flooding of compartments not assumed as flooded."

30 The existing paragraph 5.5 is replaced with the following:

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

Regulation 8 – Special requirements concerning passenger ship stability

31 The existing paragraphs 1 and 2, and the chapeau of paragraph 3 are replaced with the following:

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

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

3 The damage extent to be assumed when demonstrating compliance with paragraph 2, is to be dependent on the total number of persons carried, and *L,* such that:"

32 The existing paragraph 3.2 is replaced with the following:

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

33 The existing paragraph 3.4 is replaced with the following:

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

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

2 Availability of essential systems in case of flooding damage

34 The existing text is replaced with the following:

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

3 Operational information after a flooding casualty

35 The text of the existing chapeau is replaced with the following:

"For the purpose of providing operational information to the Master for safe return to port after a flooding casualty, passenger ships shall have:"

36 The existing footnote to the regulation is replaced with the following:

"* Refer to the *Guidelines on operational information for masters of passenger ships for safe return to port by own power or under tow* (MSC.1/Circ.1400) and the *Revised guidelines on operational information for masters of passenger ships for safe return to port* (MSC.1/Circ.1532)."

PART B-2
SUBDIVISION, WATERTIGHT AND WEATHERTIGHT INTEGRITY

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

37 The existing paragraph 3 is replaced with the following:

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

3.2 Other wells (e.g. for lubricating oil under main engines) may be permitted by the Administration if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this regulation.

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

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

38 The existing paragraphs 6 to 8 are replaced with the following:

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

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

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

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

.2 Assumed extent of damage shall be as follows:

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

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

Regulation 10 – Construction of watertight bulkheads

39 The existing paragraph 1 is replaced with the following:

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

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

40 The existing paragraph 1 is replaced with the following:

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

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

41 The existing paragraphs 2 to 10 are replaced with the following:

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

.1 at the mid-length of such extension;

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

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

whichever gives the smallest measurement.

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

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

6.1 Except as provided in paragraph 6.2, the collision bulkhead may be pierced below the bulkhead deck of passenger ships and the freeboard deck of cargo ships by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a screw-down valve capable of being operated from above the bulkhead deck of passenger ships and the freeboard deck of cargo ships, the valve being located inside the forepeak at the collision bulkhead. The Administration may, however, authorize the fitting of this valve on the after side of the collision bulkhead provided that

the valve is readily accessible under all service conditions and the space in which it is located is not a cargo space. Alternatively, for cargo ships, the pipe may be fitted with a butterfly valve suitably supported by a seat or flanges and capable of being operated from above the freeboard deck. All valves shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable.

6.2 If the forepeak is divided to hold two different kinds of liquids the Administration may allow the collision bulkhead to be pierced below the bulkhead deck of passenger ships and the freeboard deck of cargo ships by two pipes, each of which is fitted as required by paragraph 6.1, provided the Administration is satisfied that there is no practical alternative to the fitting of such a second pipe and that, having regard to the additional subdivision provided in the forepeak, the safety of the ship is maintained.

7 Where a long forward superstructure is fitted, the collision bulkhead shall be extended weathertight to the deck next above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The extension need not be fitted directly above the bulkhead below provided that all parts of the extension, including any part of the ramp attached to it are located within the limits prescribed in paragraph 1 or 3, with the exception permitted by paragraph 8 and that the part of the deck which forms the step is made effectively weathertight. The extension shall be so arranged as to preclude the possibility of the bow door or ramp, where fitted, causing damage to it in the case of damage to, or detachment of, a bow door or any part of the ramp.

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

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

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

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

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

42 The existing paragraph 11.1 is replaced with the following:

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

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

43 The existing paragraphs 4 and 5.1 are replaced with the following:

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

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

44 The existing paragraph 8.2.1 is replaced with the following:

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

45 The existing paragraph 8.4 is replaced with the following:

"8.4 Moving parts penetrating the shell plating below the deepest subdivision draught shall be fitted with a watertight sealing arrangement acceptable to the Administration. The inboard gland shall be located within a watertight space of such volume that, if flooded, the bulkhead deck of passenger ships and the freeboard

deck of cargo ships will not be submerged. The Administration may require that if such compartment is flooded, essential or emergency power and lighting, internal communication, signals or other emergency devices must remain available in other parts of the ship."

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

46 The title of the regulation is replaced with the following:

"**Regulation 16 – Construction and initial tests of watertight closures**"

47 The existing paragraphs 1 and 2 are replaced with the following:

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

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

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

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

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

48 The existing paragraphs 2 and 3 are replaced with the following:

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

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

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

49 The existing paragraph 3 is replaced with the following:

"3 Air pipes terminating within a superstructure which are not fitted with watertight means of closure shall be considered as unprotected openings when applying regulation 7-2.6.1.1."

PART B-4
STABILITY MANAGEMENT

Regulation 19 – Damage control information

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

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

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

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

2 A damage control drill shall take place at least every three months. The entire crew need not participate in every drill, but only those crew members with damage control responsibilities.

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

4 Each damage control drill shall include:

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

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

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

.4 operation of watertight doors and other watertight closures;

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

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

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

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

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

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

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

52 The existing title and paragraph 1 of regulation 20 are replaced with the following:

"**Regulation 20 – Loading of ships**

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

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

53 The existing paragraph 1 is replaced with the following:

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

54 The existing paragraph 4 is replaced with the following:

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

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

55 In the existing paragraph 1, at the end of the first sentence, the words "paragraphs 3 and 4" are replaced with "paragraph 3".

56 The existing paragraph 2 is replaced with the following:

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

57 The existing paragraph 3 is replaced with the following:

"3 A watertight door may be opened during navigation to permit the passage of passengers or crew, or when work in the immediate vicinity of the door necessitates it being opened. The door must be immediately closed when transit through the door is complete or when the task which necessitated it being open is finished. The Administration shall authorize that such a watertight door may be opened during navigation only after careful consideration of the impact on ship operations and survivability taking into account guidance issued by the Organization*. A watertight door permitted to be opened during navigation shall be clearly indicated in the ship's stability information and shall always be ready to be immediately closed.

* Refer to the *Revised guidance for watertight doors on passenger ships which may be opened during navigation* (MSC.1/Circ.1564)."

58 The existing paragraphs 4 to 8 are replaced with the following:

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

5 Watertight doors fitted in watertight bulkheads dividing cargo between deck spaces in accordance with regulation 13.9.1 shall be closed before the voyage commences and shall be kept closed during navigation. The time at which such doors are opened or closed shall be recorded in such log-book as may be prescribed by the Administration.

6 Gangway, cargo and fuelling ports fitted below the bulkhead deck of passenger ships and the freeboard deck of cargo ships shall be effectively closed and secured watertight before voyage commences, and shall be kept closed during navigation.

7 The following doors, located above the bulkhead deck of passenger ships and the freeboard deck of cargo ships, shall be closed and locked before the voyage commences and shall remain closed and locked until the ship is at its next berth:

.1 cargo loading doors in the shell or the boundaries of enclosed superstructures;

.2 bow visors fitted in positions as indicated in paragraph 7.1;

.3 cargo loading doors in the collision bulkhead; and

.4 ramps forming an alternative closure to those defined in paragraphs 7.1 to 7.3 inclusive."

59 The existing paragraph 9 is renumbered as paragraph 8, and the existing paragraphs 10 to 16 are replaced with the following:

"9 Notwithstanding the requirements of paragraphs 7.1 and 7.4, the Administration may authorize that particular doors can be opened at the discretion of the master, if necessary for the operation of the ship or the embarking and disembarking of passengers when the ship is at safe anchorage and provided that the safety of the ship is not impaired.

10 The master shall ensure that an effective system of supervision and reporting of the closing and opening of the doors referred to in paragraph 7 is implemented.

11 The master shall ensure, before any voyage commences, that an entry in such log-book as may be prescribed by the Administration is made of the time the doors specified in paragraph 12 are closed and the time at which particular doors are opened in accordance with paragraph 13.

12 Hinged doors, portable plates, sidescuttles, gangway, cargo and bunkering ports and other openings, which are required by these regulations to be kept closed during navigation, shall be closed before the voyage commences. The time at which such doors are opened and closed (if permissible under these regulations) shall be recorded in such log-book as may be prescribed by the Administration.

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

.1 The time at which such sidescuttles are opened in port and closed and locked before the voyage commences shall be recorded in such log-book as may be prescribed by the Administration.

.2 For any ship that has one or more sidescuttles so placed that the requirements of paragraph 13 would apply when it was floating at its deepest subdivision draught, the Administration may indicate the limiting mean draught at which these sidescuttles will have their sills above the line drawn parallel to the bulkhead deck at side of passenger ships and the freeboard deck at side of cargo ships, and having its lowest point 1.4 m plus 2.5% of the breadth of the ship above the waterline corresponding to the limiting mean draught, and at which it will therefore be permissible for the voyage to commence without them being closed and locked and to be opened during navigation on the responsibility of the master during navigation. In tropical zones as defined in the International Convention on Load Lines in force, this limiting draught may be increased by 0.3 m.

14 Sidescuttles and their deadlights which will not be accessible during navigation shall be closed and secured before the voyage commences.

15 If cargo is carried in spaces referred to in regulation 15.5.2, the sidescuttles and their deadlights shall be closed watertight and locked before the cargo is shipped and the time at which such scuttles and deadlights are closed and locked shall be recorded in such log-book as may be prescribed by the Administration."

60 The existing paragraph 17 is renumbered as paragraph 16.

Regulation 22-1 – Flooding detection systems for passenger ships carrying 36 or more persons constructed on or after 1 July 2010

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

Regulation 23 – Special requirements for ro-ro passenger ships

62 The existing text of this regulation is replaced with the following:

"1 Special category spaces and ro-ro spaces shall be continuously patrolled or monitored by effective means, such as television surveillance, so that any movement of vehicles in adverse weather conditions and unauthorized access by passengers thereto can be detected during navigation.

2 Documented operating procedures for closing and securing all shell doors, loading doors and other closing appliances which, if left open or not properly secured, could, in the opinion of the Administration, lead to flooding of a special category space or ro-ro space, shall be kept on board and posted at an appropriate place.

3 All accesses from the ro-ro deck and vehicle ramps that lead to spaces below the bulkhead deck shall be closed before the voyage commences and shall remain closed until the ship is at its next berth.

4 The master shall ensure that an effective system of supervision and reporting of the closing and opening of such accesses referred to in paragraph 3 is implemented.

5 The master shall ensure, before the voyage commences, that an entry in the log-book, as required by regulation 22.12, is made of the time of the last closing of the accesses referred to in paragraph 3.

6 Notwithstanding the requirements of paragraph 3, the Administration may permit some accesses to be opened during the voyage, but only for a period sufficient to permit through passage and, if required, for the essential working of the ship.

7 All transverse or longitudinal bulkheads which are taken into account as effective to confine the seawater accumulated on the ro-ro deck shall be in place and secured before the voyage commences and remain in place and secured until the ship is at its next berth.

8 Notwithstanding the requirements of paragraph 7, the Administration may permit some accesses within such bulkheads to be opened during the voyage but only for sufficient time to permit through passage and, if required, for the essential working of the ship.

9 In all ro-ro passenger ships, the master or the designated officer shall ensure that, without the expressed consent of the master or the designated officer, no passengers are allowed access to an enclosed ro-ro deck during navigation."

63 In regulation 24, the existing title and paragraph 1 are replaced with the following:

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

1 Openings in the shell plating below the deck limiting the vertical extent of damage shall be kept permanently closed during navigation."

64 The existing paragraph 3 is replaced with the following:

"3 Watertight doors or ramps fitted to internally subdivide large cargo spaces shall be closed before the voyage commences and shall be kept closed during navigation. The time at which such doors are opened or closed shall be recorded in such log-book as may be prescribed by the Administration."

PART C
MACHINERY INSTALLATIONS

Regulation 35-1 – Bilge pumping arrangements

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

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

66 In paragraph 3.2, the existing text of the whole volume of the passenger and crew spaces below the bulkhead deck *P* is replaced with the following:

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

67 In paragraph 3.4, the existing chapeau is replaced with the following:

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

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

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

CHAPTER II-2
CONSTRUCTION – FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION

PART A
GENERAL

Regulation 3 – Definitions

69 Regulation II-2/3.56 is replaced as follows:

"56 Vehicle carrier means a cargo ship which only carries cargo in ro-ro spaces or vehicle spaces, and which is designed for the carriage of unoccupied motor vehicles without cargo, as cargo."

PART C
SUPPRESSION OF FIRE

Regulation 9 – Containment of fire

70 The following new paragraphs 4.1.3.4 to 4.1.3.6 are added after the existing paragraph 4.1.3.3:

"4.1.3.4 Notwithstanding the requirement in paragraph 4.1.3.3, the requirements in paragraphs 4.1.3.5 and 4.1.3.6 shall apply to ships constructed on or after 1 January 2020.

4.1.3.5 For ships carrying more than 36 passengers, windows facing survival craft, embarkation and assembly stations, external stairs and open decks used for escape routes, and windows situated below liferaft and escape slide embarkation areas shall have fire integrity as required in table 9.1. Where automatic dedicated sprinkler heads are provided for windows, "A-0" windows may be accepted as equivalent. To be considered under this paragraph, the sprinkler heads must either be:

.1 dedicated heads located above the windows, and installed in addition to the conventional ceiling sprinklers; or

.2 conventional ceiling sprinkler heads arranged such that the window is protected by an average application rate of at least 5 l/min per square metre and the additional window area is included in the calculation of the area of coverage; or

.3 water-mist nozzles that have been tested and approved in accordance with the Guidelines approved by the Organization*; and

Windows located in the ship's side below the lifeboat embarkation area shall have fire integrity at least equal to "A-0" class.

4.1.3.6 For ships carrying not more than 36 passengers, windows facing survival craft and escape slide, embarkation areas and windows situated below such areas shall have fire integrity at least equal to "A-0" class.

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* Refer to the *Revised guidelines for approval of sprinkler systems equivalent to that referred to in SOLAS regulation II-2/12* (resolution A.800(19), as amended)."

PART G

SPECIAL REQUIREMENTS

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

71 The existing paragraph under 2.1 is numbered as 2.1.1, the following paragraph 2.1.2 is added after the paragraph 2.1.1:

"2.1.2 On all ships, vehicles with fuel in their tanks for their own propulsion may be carried in cargo spaces other than vehicle, special category or ro-ro spaces, provided that all the following conditions are met:

.1 the vehicles do not use their own propulsion within the cargo spaces;

.2 the cargo spaces are in compliance with the appropriate requirements of regulation 19; and

.3 the vehicles are carried in accordance with the IMDG Code, as defined in regulation VII/1.1."

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

72 The existing paragraph 2.1 is replaced with the following:

"2.1 In addition to complying with the requirements of regulation 20, as appropriate, vehicle carriers constructed on or after 1 January 2016 intended for the carriage of motor vehicles with compressed hydrogen or compressed natural gas in their tanks for their own propulsion as cargo shall comply with the requirements in paragraphs 3 to 5 of this regulation."

CHAPTER III
LIFE-SAVING APPLIANCES AND ARRANGEMENTS

PART A
GENERAL

Regulation 1 – Application

73 The existing paragraph 4 is replaced with the following:

"4 For ships constructed before 1 July 1998, the Administration shall:

.1 ensure that, subject to the provisions of paragraph 4.2, the requirements which are applicable under chapter III of the International Convention for the Safety of Life at Sea, 1974, in force prior to 1 July 1998 to new or existing ships as prescribed by that chapter are complied with;

.2 ensure that when life-saving appliances or arrangements on such ships are replaced or such ships undergo repairs, alterations or modifications of a major character which involve replacement of, or any addition to, their existing life-saving appliances or arrangements, such life-saving appliances or arrangements, in so far as is reasonable and practicable, comply with the requirements of this chapter. However, if a survival craft other than an inflatable liferaft is replaced without replacing its launching appliance, or vice versa, the survival craft or launching appliance may be of the same type as that replaced; and

.3 ensure that the requirements of regulations 30.3 and 37.3.9 are complied with."

PART B
REQUIREMENTS FOR SHIPS AND LIFE-SAVING APPLIANCES

Regulation 30 – Drills

74 The following new paragraph 3 is added after the existing paragraph 2:

"3 Damage control drills shall be conducted as required in regulation II-1/19-1."

Regulation 37 – Muster list and emergency instructions

75 In paragraph 3, the existing sub-paragraphs .7 and .8 are replaced with the following:

".7 manning of fire parties assigned to deal with fires;

.8 special duties assigned in respect to the use of fire-fighting equipment and installations; and

.9 for passenger ships only, damage control for flooding emergencies."

APPENDIX

CERTIFICATES

RECORD OF EQUIPMENT FOR PASSENGER SHIP SAFETY (FORM P)

76 In part 5, the existing item 3.1 is replaced by the following:

"3.1 Receiver for a global navigation satellite system/terrestrial radionavigation system/multi-system shipborne radionavigation receiver[3,4]"

RECORD OF EQUIPMENT FOR CARGO SHIP SAFETY (FORM E)

77 In part 3, the existing item 3.1 is replaced by the following:

"3.1 Receiver for a global navigation satellite system/terrestrial radionavigation system/multi-system shipborne radionavigation receiver[2,3]"

RECORD OF EQUIPMENT FOR CARGO SHIP SAFETY (FORM C)

78 In part 5, the existing item 3.1 is replaced by the following:

"3.1 Receiver for a global navigation satellite system/terrestrial radionavigation system/multi-system shipborne radionavigation receiver[2,3]"

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ANNEX 4

RESOLUTION MSC.422(98)
(adopted on 15 June 2017)

AMENDMENTS TO THE INTERNATIONAL CODE OF SAFETY FOR SHIPS USING GASES OR OTHER LOW-FLASHPOINT FUELS (IGF CODE)

THE MARITIME SAFETY COMMITTEE,

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

NOTING resolution MSC.391(95), by which it adopted the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels ("the IGF Code"), which has become mandatory under chapters II-1 and II-2 of the International Convention for the Safety of Life at Sea, 1974 ("the Convention"),

NOTING ALSO article VIII(b) and regulation II-1/2.29 of the Convention concerning the procedure for amending the IGF Code,

HAVING CONSIDERED, at its ninety-eighth session, amendments to the IGF Code proposed and circulated in accordance with article VIII(b)(i) of the Convention,

1 ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the IGF Code, the text of which is set out in the annex to the present resolution;

2 DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the amendments shall be deemed to have been accepted on 1 July 2019 unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;

3 INVITES Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 January 2020 upon their acceptance in accordance with paragraph 2 above;

4 REQUESTS the Secretary-General, for the purpose of article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the annex to all Contracting Governments to the Convention;

5 REQUESTS ALSO the Secretary-General to transmit copies of this resolution and its annex to Members of the Organization which are not Contracting Governments to the Convention.

ANNEX

AMENDMENTS TO THE INTERNATIONAL CODE OF SAFETY FOR SHIPS USING GASES OR OTHER LOW-FLASHPOINT FUELS (IGF CODE)

CHAPTER 11
FIRE SAFETY

11.3 Regulations for fire protection

1 In paragraph 11.3.2, the words ", and any boundaries above that, including navigation bridge windows, shall have A-0 class divisions" are deleted.

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ANNEX 8

RESOLUTION MSC.426(98)
(adopted on 15 June 2017)

AMENDMENTS TO THE INTERNATIONAL MARITIME SOLID BULK CARGOES (IMSBC) CODE

THE MARITIME SAFETY COMMITTEE,

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

NOTING resolution MSC.268(85) by which it adopted the International Maritime Solid Bulk Cargoes Code ("the IMSBC Code"), which has become mandatory under chapter VI of the International Convention for the Safety of Life at Sea, 1974, as amended ("the Convention"),

NOTING ALSO article VIII(b) and regulation VI/1-1.1 of the Convention concerning the procedure for amending the IMSBC Code,

HAVING CONSIDERED, at its ninety-eighth session, amendments to the IMSBC Code, proposed and circulated in accordance with article VIII(b)(i) of the Convention,

1 ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the IMSBC Code, the text of which is set out in the annex to the present resolution;

2 DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that said amendments shall be deemed to have been accepted on 1 July 2018 unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified the Secretary-General of their objections to the amendments;

3 INVITES Contracting Governments to the Convention to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 January 2019 upon their acceptance in accordance with paragraph 2 above;

4 AGREES that Contracting Governments to the Convention may apply the aforementioned amendments in whole or in part on a voluntary basis as from 1 January 2018;

5 REQUESTS the Secretary-General, for the purpose of article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the annex to all Contracting Governments to the Convention; and

6 FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its annex to Members of the Organization which are not Contracting Governments to the Convention.

ANNEX

AMENDMENTS TO THE INTERNATIONAL MARITIME SOLID BULK CARGOES (IMSBC) CODE

Section 1
General provisions

1.4 Application and implementation of this Code

1 In paragraph 1.4.2, the words "Characteristics (other than CLASS and GROUP)" are replaced with the words "Characteristics (other than CLASS, SUBSIDIARY RISK and GROUP)". The words "Paragraph 4.2.2.2;" and "Section 14 Prevention of pollution by cargo residues from ships;" are deleted.

1.7 Definitions

2 In the definition for "*Bulk Cargo Shipping Name (BCSN)*", the third sentence is replaced with the following:

"When a cargo is dangerous goods as defined in the IMDG Code, as defined in regulation VII/1.1 of the SOLAS Convention, refer to 4.1.1."

Section 4
Assessment of acceptability of consignments for safe shipment

4.1 Identification and classification

3 The existing paragraph "4.1.1" is replaced with the following:

"4.1.1 Bulk Cargo Shipping Name

4.1.1.1 Each solid bulk cargo in this Code has been assigned a Bulk Cargo Shipping Name (BCSN). When a solid bulk cargo is carried by sea it shall be identified in the transport documentation by the BCSN.

4.1.1.2 Where the cargo is dangerous goods and not identified with a generic Proper Shipping Name, or not otherwise specified (N.O.S) in the IMDG Code, the BCSN shall consist of the Proper Shipping Name followed by the UN number.

4.1.1.3 Except for RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non-fissile or fissile – excepted UN 2912 and RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I), non-fissile or fissile – excepted UN 2913, where the cargo is dangerous goods identified with a generic Proper Shipping Name and/or not otherwise specified (N.O.S) in the IMDG Code, the BCSN shall consist of, in the following order:

.1 a chemical or technical name of the material;

.2 a specific description to identify the properties of the material; and

.3 the UN number."

4.2 Provision of information

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

5 In the renumbered paragraph 4.2.2, in sub-paragraph .15, the word "and" is deleted.

6 In the renumbered paragraph 4.2.2, a new sub-paragraph .16 is inserted as follows:

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

7 In the renumbered paragraph 4.2.2, the existing sub-paragraph .16 is renumbered as sub-paragraph .17.

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

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

9 Replace the existing paragraphs 4.5.1 and 4.5.2 with the following:

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

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

Section 9
Materials possessing chemical hazards

9.3.3 Segregation between bulk materials possessing chemical hazards and dangerous goods in packaged form

10 In the segregation table as contained in paragraph 9.3.3, in the row of "Substances which, in contact with water, emit flammable gases", under the column "2.1", replace the number "1" with "2".

Section 13
References to related information and recommendations

13.2 Reference list

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

4.2	MARPOL Annex V, regulation 4.3	*Discharge of garbage outside special areas*
4.2	MARPOL Annex V, regulation 6.1.2.2	*Discharge of garbage within special areas*

13.2.10 Segregation

12 Delete row "9.3.3".

13.2.11 Transport of solid wastes in bulk

13 In row "10.6", under the column "Reference to the relevant IMO instruments or standard (2)", replace the term "chapter 7.8.4" with "sub-section 2.0.5.4".

Section 14
Prevention of pollution by cargo residues from ships

14 Section 14 is deleted.

APPENDIX 1

Individual schedules of solid bulk cargoes

Amendments to existing individual schedules

ALUMINA

15 In the individual schedule for "ALUMINA", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

ALUMINA, CALCINED

16 In the individual schedule for "ALUMINA, CALCINED", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

ALUMINA HYDRATE

17 In the individual schedule for "ALUMINA HYDRATE", under the section for "Hazard", in the first sentence, add the word "a" before "moisture content"; in the second sentence, replace the words "of the Code" with the words "of this Code" and under the section for "Loading", replace the words "of the Code" with the words "of this Code".

ALUMINA SILICA

18 In the individual schedule for "ALUMINA SILICA", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

ALUMINA SILICA, pellets

19 In the individual schedule for "ALUMINA SILICA, pellets", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

ALUMINIUM FERROSILICON POWDER UN 1395

20 In the individual schedule for "ALUMINIUM FERROSILICON POWDER UN 1395", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

ALUMINIUM FLUORIDE

21 In the individual schedule for "ALUMINIUM FLUORIDE", under the section for "Weather precautions", the words "less than its TML during voyage" are replaced with the words "less than its TML during loading operations and the voyage".

ALUMINIUM NITRATE UN 1438

22 In the individual schedule for "ALUMINIUM NITRATE UN 1438 ", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

ALUMINIUM SILICON POWDER, UNCOATED UN 1398

23 In the individual schedule for "ALUMINIUM SILICON POWDER, UNCOATED UN 1398", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

**ALUMINIUM SMELTING BY-PRODUCTS or
ALUMINIUM REMELTING BY-PRODUCTS UN 3170**

24 In the individual schedule for "ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIUM REMELTING BY-PRODUCTS UN 3170", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

ALUMINIUM SMELTING/REMELTING BY-PRODUCTS, PROCESSED

25 In the individual schedule for "ALUMINIUM SMELTING/REMELTING BY-PRODUCTS, PROCESSED", under the section for "Hazard", in the second sentence, add the word "a" before "moisture content"; in the third sentence, replace the words "of the Code" with the words "of this Code". Under the section for "Loading", replace the words "of the Code" with the words "of this Code". Under the section for "Clean-up", in the third sentence, replace the word "should" with "shall".

AMMONIUM NITRATE UN 1942

26 In the individual schedule for "AMMONIUM NITRATE UN 1942", under the section for "Loading", in the second sentence, replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

AMMONIUM NITRATE BASED FERTILIZER UN 2067

27 In the individual schedule for "AMMONIUM NITRATE BASED FERTILIZER UN 2067", under the section for "Loading", in the first sentence, replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

AMMONIUM NITRATE BASED FERTILIZER UN 2071

28 In the individual schedule for "AMMONIUM NITRATE BASED FERTILIZER UN 2071", under the section for "Loading", in the first sentence, replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

AMMONIUM NITRATE BASED FERTILIZER (non-hazardous)

29 In the individual schedule for "AMMONIUM NITRATE BASED FERTILIZER (non-hazardous)", under the section for "Stowage and segregation", in the first sentence, replace the word "should" with "shall". Under the section for "Loading", in the first sentence, replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

AMMONIUM SULPHATE

30 In the individual schedule for "AMMONIUM SULPHATE", under the section for "Loading", in the third sentence, replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

ANTIMONY ORE AND RESIDUE

31 In the individual schedule for "ANTIMONY ORE AND RESIDUE", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

BARIUM NITRATE UN 1446

32 In the individual schedule for "BARIUM NITRATE UN 1446", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

BARYTES

33 In the individual schedule for "BARYTES", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

BAUXITE

34 In the individual schedule for "BAUXITE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

BIOSLUDGE

35 In the individual schedule for "BIOSLUDGE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

BORAX (PENTAHYDRATE CRUDE)

36 In the individual schedule for "BORAX (PENTAHYDRATE CRUDE)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

BORAX, ANHYDROUS (crude or refined)

37 In the individual schedule for "BORAX, ANHYDROUS (crude or refined)", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

BROWN COAL BRIQUETTES

38 In the individual schedule for "BROWN COAL BRIQUETTES", in the appendix of the schedule, under the section for "Carriage", in 8.1, after the words "The company's", add "*" with the following footnote:

"* Refer to SOLAS regulation IX/1.2.";

and under the section for "Discharge", after the words "self-contained breathing apparatus", add "*" with the following footnote:

"* Refer to the *Revised recommendations for entering enclosed spaces aboard ships,* adopted by the Organization by resolution A.1050(27)."

CALCIUM NITRATE UN 1454

39 In the individual schedule for "CALCIUM NITRATE UN 1454", under the section for "Loading", in the second sentence, replace the words "of the Code" with the words "of this Code".

CALCIUM NITRATE FERTILIZER

40 In the individual schedule for "CALCIUM NITRATE FERTILIZER", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

CARBORUNDUM

41 In the individual schedule for "CARBORUNDUM", under the section for "Loading", replace the words "of the Code" with the words "of this Code" and add the following text:

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

and under the section for "Precautions", replace the word "should" with the word "shall".

CASTOR BEANS or CASTOR MEAL or CASTOR POMACE or CASTOR FLAKE UN 2969

42 In the individual schedule for "CASTOR BEANS or CASTOR MEAL or CASTOR POMACE or CASTOR FLAKE UN 2969", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

CEMENT CLINKERS

43 In the individual schedule for "CEMENT CLINKERS", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

CHAMOTTE

44 In the individual schedule for "CHAMOTTE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

CHARCOAL

45 In the individual schedule for "CHARCOAL", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

CHOPPED RUBBER AND PLASTIC INSULATION

46 In the individual schedule for "CHOPPED RUBBER AND PLASTIC INSULATION", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

CHROME PELLETS

47 In the individual schedule for "CHROME PELLETS", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

CHROMITE ORE

48 In the individual schedule for "CHROMITE ORE ", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

CLAY

49 In the individual schedule for "CLAY", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

CLINKER ASH

50 In the existing individual schedule for "CLINKER ASH", under the section for "Description", in the fourth sentence, the words "taken out" are replaced with "discharged" twice. Under the section for "Hazard", in the second sentence, replace the words "of the Code" with the words "of this Code". Under the section for "Loading", replace the words "of the Code" with the words "of this Code".

COAL

51 In the individual schedule for "COAL", under the BCSN, add the following sentences and the corresponding footnote:

> "Coal shall be classified as Group A and B unless classified as Group B only by a test determined by the appropriate authority* or where it has the following particle size distribution:
>
> .1 not more than 10% by weight of particles less than 1 mm (D10 > 1mm); and

.2 not more than 50% by weight of particles less than 10 mm (D50 > 10 mm).

Notwithstanding the above, a blend of two or more coals shall be classified as Group A and B unless all original coals in the blend are Group B only.

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* See subsection 8.1 of this Code."

52 Under the section for "Hazard", delete the sentence "Can liquefy if predominantly fine 75% less than 5 mm coal." and add the sentence "This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code." at the end of the section.

53 Under the section for "Weather precautions", replace paragraphs .1 and .4 with the following sentences, respectively:

".1 the moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;"

and

".4 the cargo may be handled during precipitation under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and";

and under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code". and add the sentence "Due consideration shall be given to moisture migration and formation of dangerous wet base when blended coals are loaded." at the end of the section.

54 In the appendix, under the section "Special precautions", in "2 Self-heating coals", in paragraph .5, after the words "and the company", add "*" with the following footnote:

"* Refer to SOLAS regulation IX/1.2."

COAL SLURRY

55 In the individual schedule for "COAL SLURRY", under the section for "Hazard", replace the first sentence with:

"This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code.";

under the section for "Weather precautions", replace paragraphs .1 and .4 with the following sentences, respectively:

".1 the moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;"

and

".4 the cargo may be handled during precipitation under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and";

and under the section for "Loading", replace the words "of the Code" with the words "of this Code".

COAL TAR PITCH

56 In the individual schedule for "COAL TAR PITCH", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

COARSE CHOPPED TYRES

57 In the individual schedule for "COARSE CHOPPED TYRES", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

COARSE IRON AND STEEL SLAG AND ITS MIXTURE

58 In the individual schedule for "COARSE IRON AND STEEL SLAG AND ITS MIXTURE", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

COKE

59 In the individual schedule for "COKE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

COKE BREEZE

60 In the individual schedule for "COKE BREEZE", under the section for "Hazard", replace the first sentence with:

> "This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code.";

under the section for "Weather precautions", replace paragraphs .1 and .4 with the following sentences, respectively:

> ".1 the moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;"
>
> and
>
> ".4 the cargo may be handled during precipitation under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and";

and under the section for "Loading", replace the words "of the Code" with the words "of this Code".

COLEMANITE

61 In the individual schedule for "COLEMANITE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

COPPER GRANULES

62 In the individual schedule for "COPPER GRANULES", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

COPPER MATTE

63 In the individual schedule for "COPPER MATTE", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

COPPER SLAG

64 In the individual schedule for "COPPER SLAG ", under the section for "Hazard", in the first sentence, add the word "a" before the words "moisture content". Under the section for "Loading", replace the first sentence with the following:

> "This cargo shall be trimmed to ensure that the height difference between peaks and troughs does not exceed 5% of the ship's breadth and that the cargo slopes uniformly from the hatch boundaries to the bulkheads to avoid steep surfaces of cargo that could collapse during voyage.";

and under the section for "Carriage", add the following text at the end of the section:

> "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."

COPRA (dry) UN 1363

65 In the individual schedule for "COPRA (dry) UN 1363", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code". Under the section for "Precautions", after the words "concentration of oxygen", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

CRUSHED CARBON ANODES

66 In the individual schedule for "CRUSHED CARBON ANODES", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

CRYOLITE

67 In the individual schedule for "CRYOLITE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

DIAMMONIUM PHOSPHATE (D.A.P.)

68 In the individual schedule for "DIAMMONIUM PHOSPHATE (D.A.P.)", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

DIRECT REDUCED IRON (A) Briquettes, hot-moulded

69 In the individual schedule for "DIRECT REDUCED IRON (A) Briquettes, hot-moulded", under the section for "Loading", in the sixth sentence, replace the words "of the Code" with the words "of this Code"; add the following text at the end of the section:

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

under the section for "Precautions", in the last sentence, after the words "adjacent spaces", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27).";

and under the sections for "Carriage" and "Discharge", replace the words "(> 25% LEL)" with "(> 25% lower explosive limit (LEL))". Under the section for "Clean-up", in the third sentence, replace the word "should" with the word "shall".

DIRECT REDUCED IRON (B) Lumps, pellets, cold-moulded briquettes

70 In the individual schedule for "DIRECT REDUCED IRON (B) Lumps, pellets, cold-moulded briquettes", under the section for "Loading", in the sentence "Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code", replace the words "of the Code" with the words "of this Code"; add the following text:

> "When the stowage factor of this cargo is equal to or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo.";

under the section for "Precautions", in the sentence "All precautions shall be taken when entering the cargo spaces", after the words "entering the cargo spaces", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27).";

and under the sections for "Carriage" and "Discharge", replace the words "(> 25% LEL)" with "(> 25% lower explosive limit (LEL))". Under the section for "Clean-up", in the second sentence, replace the word "should" with the word "shall".

DIRECT REDUCED IRON (C) By-product fines

71 In the individual schedule for "DIRECT REDUCED IRON (C) (By-product fines)", under the section for "Loading", in the sentence "Trim in accordance with the relevant provisions required under sections 4 and 5 of the Code", replace the words "of the Code" with the words "of this Code"; and add the following text:

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

under the section for "Precautions", in the sixteenth sentence, after the words "to support life", add "*" with the following footnote:

"* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27).";

and under the sections for "Carriage" and "Discharge", replace the words "(> 25% LEL)" with "(> 25% lower explosive limit (LEL))".

DISTILLERS DRIED GRAINS WITH SOLUBLES

72 In the individual schedule for "DISTILLERS DRIED GRAINS WITH SOLUBLES", under the section for "Loading", in the second sentence, replace the words "of the Code" with the words "of this Code".

DOLOMITE

73 In the individual schedule for "DOLOMITE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

FELSPAR LUMP

74 In the individual schedule for "FELSPAR LUMP", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

FERROCHROME

75 In the individual schedule for "FERROCHROME", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

FERROCHROME, exothermic

76 In the individual schedule for "FERROCHROME, exothermic", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

FERROMANGANESE

77 In the individual schedule for "FERROMANGANESE", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

FERRONICKEL

78 In the individual schedule for "FERRONICKEL", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

FERROPHOSPHORUS (including briquettes)

79 In the individual schedule for "FERROPHOSPHORUS (including briquettes)", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

FERROSILICON UN 1408 with 30% or more but less than 90% silicon (including briquettes)

80 In the individual schedule for "FERROSILICON UN 1408 with 30% or more but less than 90% silicon (including briquettes)", replace the table in the section for "Characteristics" with the following:

"

Angle of repose	Bulk density (kg/m^3)		Stowage factor (m^3/t)
Not applicable	1,389 to 2,083 (1,111 to 1,538 for briquettes)		0.48 to 0.72 (0.65 to 0.90 for briquettes)
Size	**Class**	**Subsidiary risk**	**Group**
Up to 300 mm briquettes	4.3	6.1	B

"

Under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code"; and replace the sentences "As the density of the cargo is extremely high, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be paid to ensure that the tank top is not overstressed during voyage and during loading by a pile of the cargo." with the following:

> "When the stowage factor of this cargo is equal to or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo.";

and under the section for "Operational requirements" in the appendix, in (vii), after the words "below 18%", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

FERROSILICON 25% to 30% silicon, or 90% or more silicon (including briquettes)

81 In the individual schedule for "FERROSILICON 25% to 30% silicon, or 90% or more silicon (including briquettes)", the Bulk Cargo Shipping Name is replaced with following:

> "FERROSILICON with at least 25% but less than 30% silicon, or 90% or more silicon";

in the table of "Characteristics", under the section for "Size", the words "Diameter: 2.54" are replaced with "Up to 300 mm briquettes". Under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code"; and replace the sentences "As the density of the cargo is extremely high, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be paid to ensure that the tank top is not overstressed during voyage and during loading by a pile of the cargo." with the following:

> "When the stowage factor of this cargo is equal to or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo.";

and under the section for "Operational requirements" in the appendix, in (vii), after the words "below 18%", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

FERROUS METAL BORINGS, SHAVINGS, TURNINGS or CUTTINGS UN 2793 in a form liable to self-heating

82 In the individual schedule for "FERROUS METAL BORINGS, SHAVINGS, TURNINGS or CUTTINGS UN 2793 in a form liable to self-heating", under the section for "Discharge", after the words "appropriate breathing apparatus", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

FERROUS SULPHATE HEPTAHYDRATE

83 In the individual schedule for "FERROUS SULPHATE HEPTAHYDRATE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

FERTILIZERS WITHOUT NITRATES (non-hazardous)

84 In the individual schedule for "FERTILIZERS WITHOUT NITRATES (non-hazardous)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

FISH (IN BULK)

85 In the individual schedule for "FISH (IN BULK)", under the section for "Loading", replace the words "of the Code" with the words "of this Code". Under the section for "Carriage", replace the words "No special requirements" with the following:

> "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."

FISHMEAL (FISHSCRAP), STABILIZED UN 2216 Anti-oxidant treated

86 In the individual schedule for "FISHMEAL (FISHSCRAP), STABILIZED UN 2216 Anti-oxidant treated", in the provision under the Bulk Cargo Shipping Name, delete the term "Group C,"; and under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

FLUORSPAR

87 In the individual schedule for "FLUORSPAR", under the section for "Hazard", replace the first and second sentence with:

> "This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code.";

under the section for "Loading", replace the words "of the Code" with the words "of this Code"; add the following text:

> "When the stowage factor of this cargo is equal to or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo.";

under the section for "Weather precautions", replace paragraphs .1 and .4 with the following sentences, respectively:

> ".1 the moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;"
>
> and
>
> ".4 the cargo may be handled during precipitation under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and";

and under the section for "Carriage", replace the sentence "No special requirements." with the following:

> "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."

FLY ASH, DRY

88 In the individual schedule for "FLY ASH, DRY", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code". Under the section for "Clean-up", replace the words "FLY ASH" with "fly ash".

FLY ASH, WET

89 In the individual schedule for "FLY ASH, WET", under the section for "Hazard", replace the first sentence with:

> "This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code.";

under the section for "Weather precautions", replace paragraphs .1 and .4 with the following sentences, respectively:

> ".1 the moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;"
>
> and
>
> ".4 the cargo may be handled during precipitation under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and";

and under the section for "Loading", replace the words "of the Code" with the words "of this Code".

GLASS CULLET

90 In the existing individual schedule for "GLASS CULLET", at the end of the section for "Description", add the following text:

> "It may also be flint flat glass cullet which may have a grey or ochre appearance caused by adherent glass dust. May have a slight odour caused by organic impurities (plastics, foil). Used for glass production (bottle industry).";

and replace the existing table of "Characteristics", with the following:

"

Angle of repose	**Bulk density (kg/m3)**	**Stowage factor (m3/t)**
Not applicable	600 to 1,330	0.75 to 1.67
Size	**Class**	**Group**
Up to 2,000 mm	Not applicable	C

"

GRAIN SCREENING PELLETS

91 In the individual schedule for "GRAIN SCREENING PELLETS", under the section for "Loading", in the first sentence, replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code", and delete the words "in accordance with the shipper's declaration of the angle of repose".

GRANULAR FERROUS SULPHATE

92 In the individual schedule for "GRANULAR FERROUS SULPHATE", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

GRANULATED NICKEL MATTE (LESS THAN 2% MOISTURE CONTENT)

93 In the individual schedule for "GRANULATED NICKEL MATTE (LESS THAN 2% MOISTURE CONTENT)", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

GRANULATED SLAG

94 In the individual schedule for "GRANULATED SLAG", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

GRANULATED TYRE RUBBER

95 In the individual schedule for "GRANULATED TYRE RUBBER", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

GYPSUM

96 In the individual schedule for "GYPSUM", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

GYPSUM GRANULATED

97 In the individual schedule for "GYPSUM GRANULATED", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

ILMENITE CLAY

98 In the individual schedule for "ILMENITE CLAY", under the section for "Hazard", replace the first sentence with:

> "This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code.";

under the section for "Weather precautions", replace paragraphs .1 and .4 with the following sentences, respectively:

> ".1 the moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;"
>
> and
>
> ".4 the cargo may be handled during precipitation under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and";

and under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

ILMENITE (ROCK)

99 In the individual schedule for "ILMENITE (ROCK)", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

ILMENITE SAND

100 In the existing individual schedule for "ILMENITE SAND", under the Bulk Cargo Shipping Name, delete the sentence "This cargo can be categorized as Group A or C.". Under the section for "Description", delete the sentences "The moisture content of this cargo in Group C is 1% to 2%. When moisture content is above 2%, this cargo is to be categorized in Group A." In the table of "Characteristics", in the column for "Group", delete the words "or C". Replace the text under the section for "Hazard" with following:

> "This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code. This cargo is non-combustible or has a low fire-risk.";

and under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code". Replace the text under the section for "Weather precautions" with the following:

> "When a cargo is carried in a ship other than a 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 loading operations and the 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 under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and

.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."

ILMENITE (UPGRADED)

101 In the individual schedule for "ILMENITE (UPGRADED)", under the section for "Hazard", in the first sentence, add the word "a" before the words "moisture content". Under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

IRON ORE FINES

102 In the individual schedule for "IRON ORE FINES", under the section for "Hazard", add the word "a" before the words "moisture content". Under the section for "Carriage", in the second sentence, delete the words "as far as practicable".

IRON ORE PELLETS

103 In the individual schedule for "IRON ORE PELLETS", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

IRON OXIDE, SPENT or IRON SPONGE, SPENT UN 1376 obtained from coal gas purification

104 In the individual schedule for "IRON OXIDE, SPENT or IRON SPONGE, SPENT UN 1376 obtained from coal gas purification", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

IRON OXIDE TECHNICAL

105 In the individual schedule for "IRON OXIDE TECHNICAL", under the section for "Hazard", add the word "a" before the words "moisture content".

IRONSTONE

106 In the individual schedule for "IRONSTONE", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

LABRADORITE

107 In the individual schedule for "LABRADORITE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

LEAD NITRATE UN 1469

108 In the individual schedule for "LEAD NITRATE UN 1469", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

LEAD ORE

109 In the individual schedule for "LEAD ORE", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code" and replace the text "As the density of the cargo is extremely high, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be paid to ensure that the tank top is not overstressed during voyage and during loading by a pile of the cargo." with the following:

> "When the stowage factor of this cargo is equal to or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo."

LIME (UNSLAKED)

110 In the individual schedule for "LIME (UNSLAKED)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

LIMESTONE

111 In the individual schedule for "LIMESTONE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

LINTED COTTON SEED with not more than 9% moisture and not more than 20.5% oil

112 In the individual schedule for "LINTED COTTON SEED with not more than 9% moisture and not more than 20.5% oil", under the section for "Loading", replace the words "of the Code" with the words "of this Code";

under the section for "Precautions", after the words "concentration of oxygen", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27).";

and under the section for "Carriage", replace the word "should" with the word "shall".

MAGNESIA (DEADBURNED)

113 In the individual schedule for "MAGNESIA (DEADBURNED)", under the section for "Loading", replace the words "of the Code" with the words "of this Code"; and add the following text:

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

MAGNESIA (UNSLAKED)

114 In the individual schedule for "MAGNESIA (UNSLAKED)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

MAGNESITE, natural

115 In the individual schedule for "MAGNESITE, natural", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

MAGNESIUM NITRATE UN 1474

116 In the individual schedule for "MAGNESIUM NITRATE UN 1474", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

MAGNESIUM SULPHATE FERTILIZERS

117 In the individual schedule for "MAGNESIUM SULPHATE FERTILIZERS", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

MANGANESE ORE

118 In the individual schedule for "MANGANESE ORE", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code". Replace the text "As the density of the cargo is extremely high, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be paid to ensure that the tank top is not overstressed during voyage and during loading by a pile of the cargo." with the following:

> "When the stowage factor of this cargo is equal to or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo."

MANGANESE ORE FINES

119 In the individual schedule for "MANGANESE ORE FINES", under the section for "Hazard", in the first sentence, add the word "a" before the words "moisture content".

MARBLE CHIPS

120 In the individual schedule for "MARBLE CHIPS", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

METAL SULPHIDE CONCENTRATES

121 In the individual schedule for "METAL SULPHIDE CONCENTRATES", in the table of "Characteristics", under "Class", after the word "MHB", add "(SH) and/or (CR) and/or (TX)". Under the section for "Hazard", add a first sentence as follows:

> "Some metal sulphide concentrates may have acute and long term health effects.";

add the following text at the beginning of the section:

"This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code.";

under the section for "Weather precautions", replace paragraphs .1 and .4 with the following sentences, respectively:

".1 the moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;"

and

".4 the cargo may be handled during precipitation under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and";

under the section for "Loading", replace the first sentence with the following:

"This cargo shall be trimmed to ensure that the height difference between peaks and troughs does not exceed 5% of the ship's breadth and that the cargo slopes uniformly from the hatch boundaries to the bulkheads to avoid steep surfaces of cargo that could collapse during voyage.";

and under the section for "Precautions", after the words "concentration of oxygen", add "*" with the following footnote:

"* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

Mineral Concentrates

122 In the individual schedule for "Mineral Concentrates", under the section for "Hazard", replace the first and second sentence with:

"The above materials may liquefy if shipped at a moisture content in excess of their transportable moisture limit (TML). See sections 7 and 8 of this Code.";

under the section for "Weather precautions", replace paragraphs .1 and .4 with the following sentences, respectively:

".1 the moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;"

and

".4 the cargo may be handled during precipitation under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and";

and replace the text under the section for "Loading" with the following:

"This cargo shall be trimmed to ensure that the height difference between peaks and troughs does not exceed 5% of the ship's breadth and that the cargo slopes uniformly from the hatch boundaries to the bulkheads to avoid steep surfaces of cargo that could collapse during voyage.

When the stowage factor of this cargo is equal to or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo."

MONOAMMONIUM PHOSPHATE (M.A.P.)

123 In the individual schedule for "MONOAMMONIUM PHOSPHATE (M.A.P.)", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

NICKEL ORE

124 In the individual schedule for "NICKEL ORE", under the section for "Weather precautions", replace paragraph .1 with following:

".1 the moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;"

and under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

PEANUTS (in shell)

125 In the individual schedule for "PEANUTS (in shell)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

PEAT MOSS

126 In the individual schedule for "PEAT MOSS", under the section for "Hazard", add the following text at the beginning:

"This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code.";

and under the section for "Loading", replace the words "of the Code" with the words "of this Code". Under the section for "Precautions", after the words "a normal level", add "*" with the following footnote:

"* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

PEBBLES (sea)

127 In the individual schedule for "PEBBLES (sea)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

PELLETS (concentrates)

128 In the individual schedule for "PELLETS (concentrates)", under the section for "Loading", replace the words "of the Code" with the words "of this Code"; and add the following text at the end of the section:

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

PERLITE ROCK

129 In the individual schedule for "PERLITE ROCK", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

PHOSPHATE (defluorinated)

130 In the individual schedule for "PHOSPHATE (defluorinated)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

PHOSPHATE ROCK (calcined)

131 In the individual schedule for "PHOSPHATE ROCK (calcined)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

PHOSPHATE ROCK (uncalcined)

132 In the individual schedule for "PHOSPHATE ROCK (uncalcined)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

PIG IRON

133 In the individual schedule for "PIG IRON", under the section for "Loading", in the third sentence, replace the words "of the Code" with the words "of this Code".

PITCH PRILL

134 In the individual schedule for "PITCH PRILL", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

POTASH

135 In the individual schedule for "POTASH", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

POTASSIUM CHLORIDE

136 In the individual schedule for "POTASSIUM CHLORIDE", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

POTASSIUM NITRATE UN 1486

137 In the individual schedule for "POTASSIUM NITRATE UN 1486", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

POTASSIUM SULPHATE

138 In the individual schedule for "POTASSIUM SULPHATE", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

PUMICE

139 In the individual schedule for "PUMICE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

PYRITE (containing copper and iron)

140 In the individual schedule for "PYRITE (containing copper and iron)", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

PYRITES, CALCINED (Calcined Pyrites)

141 In the individual schedule for "PYRITES, CALCINED (Calcined Pyrites)", under the section for "Hazard", replace the third sentence with the following:

> "This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code.";

under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

PYROPHYLLITE

142 In the individual schedule for "PYROPHYLLITE", under the section for "Loading", replace the words "of the Code" with the words "of this Code"; add the following text at the end of the section:

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

QUARTZ

143 In the individual schedule for "QUARTZ", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

QUARTZITE

144 In the individual schedule for "QUARTZITE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non-fissile or fissile – excepted UN 2912

145 In the individual schedule for "RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non-fissile or fissile – excepted UN 2912", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I), non-fissile or fissile – excepted UN 2913

146 In the individual schedule for "RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I), non-fissile or fissile – excepted UN 2913", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

RASORITE (ANHYDROUS)

147 In the individual schedule for "RASORITE (ANHYDROUS)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

RUTILE SAND

148 In the individual schedule for "RUTILE SAND", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

SALT

149 In the individual schedule for "SALT", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

SALT CAKE

150 In the individual schedule for "SALT CAKE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

SALT ROCK

151 In the individual schedule for "SALT ROCK", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

SAND

152 In the individual schedule for "SAND", under the section for "Loading", replace the words "of the Code" with the words "of this Code". Add the following text at the end of the section:

> "When the stowage factor of this cargo is equal to or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo."

SAND, HEAVY MINERAL

153 In the individual schedule for "SAND, HEAVY MINERAL", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

SAWDUST

154 In the individual schedule for "SAWDUST", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

SCALE GENERATED FROM THE IRON AND STEEL MAKING PROCESS

155 In the individual schedule for "SCALE GENERATED FROM THE IRON AND STEEL MAKING PROCESS", under the section for "Hazard", add the word "a" before the words "moisture content".

SEED CAKE, containing vegetable oil UN 1386 (a) mechanically expelled seeds, containing more than 10% of oil or more than 20% of oil and moisture combined

156 In the individual schedule for "SEED CAKE, containing vegetable oil UN 1386 (a) mechanically expelled seeds, containing more than 10% of oil or more than 20% of oil and moisture combined", under the section for "Loading", replace the words "of the Code" with the words "of this Code". Under the section for "Precautions", after the words "a normal level", add "*" with the following footnote:

"* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

SEED CAKE, containing vegetable oil UN 1386 (b) solvent extractions and expelled seeds, containing not more than 10% of oil and when the amount of moisture is higher than 10%, not more than 20% of oil and moisture combined

157 In the individual schedule for "SEED CAKE, containing vegetable oil UN 1386 (b) solvent extractions and expelled seeds, containing not more than 10% of oil and when the amount of moisture is higher than 10%, not more than 20% of oil and moisture combined", in the sentence "When, in solvent extracted seed cake, the oil or oil and moisture content exceeds the percentages stated above, guidance should be sought from the competent authorities." after BCSN, replace the word "should" with the word "shall". Under the section for "Loading", in the last sentence, replace the words "of the Code" with the words "of this Code". Under the section for "Ventilation", replace the word "should" with the word "shall". Under the section for "Precautions", after the words "a normal level", add "*" with the following footnote:

"* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

SEED CAKE UN 2217 with not more than 1.5% oil and not more than 11% moisture

158 In the individual schedule for "SEED CAKE UN 2217 with not more than 1.5% oil and not more than 11% moisture", under the section for "Loading", in the second sentence, replace the words "of the Code" with the words "of this Code". Under the section for "Ventilation", replace the word "should" with the word "shall". Under the section for "Precautions", after the words "a normal level", add "*" with the following footnote:

"* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

SEED CAKE (non-hazardous)

159 In the individual schedule for "SEED CAKE (non-hazardous)", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

SILICOMANGANESE (low carbon)

160 In the individual schedule for "SILICOMANGANESE (low carbon)", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code". Under the section for "Precautions", replace the word "should" with the word "shall"; after the words "has been effected", add "*" with the following footnote:

"* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

SILICON SLAG

161 In the individual schedule for "SILICON SLAG", in the table of "Characteristics", under the column "Bulk density (kg/m³)", the numerical value "2,300" is replaced with "1,500"; under the column for "Stowage factor (m³/t)", the numerical value "0.43" is replaced with "0.67". Under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code"; and the second and third sentences are replaced with following:

> "When the stowage factor of this cargo is equal or less than 0.56 m³/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo."

SODA ASH (Dense and light)

162 In the individual schedule for "SODA ASH (Dense and light)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

SODIUM NITRATE UN 1498

163 In the individual schedule for "SODIUM NITRATE UN 1498", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE UN 1499

164 In the individual schedule for "SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE UN 1499", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

SOLIDIFIED FUELS RECYCLED FROM PAPER AND PLASTICS

165 In the individual schedule for "SOLIDIFIED FUELS RECYCLED FROM PAPER AND PLASTICS", under the section for "Loading", in the second sentence, replace the words "of the Code" with the words "of this Code". Under the section for "Precautions", after the words "sufficiently ventilated", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

SPODUMENE (UPGRADED)

166 In the individual schedule for "SPODUMENE (UPGRADED)", under the section for "Hazard", add the word "a" before the words "moisture content".

STAINLESS STEEL GRINDING DUST

167 In the individual schedule for "STAINLESS STEEL GRINDING DUST", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

STONE CHIPPINGS

168 In the individual schedule for "STONE CHIPPINGS", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

SUGAR

169 In the individual schedule for "SUGAR", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

SULPHUR (formed, solid)

170 In the individual schedule for "SULPHUR (formed, solid)", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

SULPHUR UN 1350 (crushed lump and coarse grained)

171 In the individual schedule for "SULPHUR UN 1350 (crushed lump and coarse grained)", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

SUPERPHOSPHATE

172 In the individual schedule for "SUPERPHOSPHATE", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

SUPERPHOSPHATE (triple, granular)

173 In the individual schedule for "SUPERPHOSPHATE (triple, granular)", under the section for "Loading", replace the words "of the Code" with the words "of this Code". Under the sections for "Precautions" and "Clean-up", respectively, replace the word "should" with the word "shall".

TACONITE PELLETS

174 In the individual schedule for "TACONITE PELLETS", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

TALC

175 In the individual schedule for "TALC", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

TANKAGE

176 In the individual schedule for "TANKAGE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

TAPIOCA

177 In the individual schedule for "TAPIOCA", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

UREA

178 In the individual schedule for "UREA", under the section for "Loading", replace the words "under sections 4, 5 and 6 of the Code" with the words "under sections 4 and 5 of this Code".

VANADIUM ORE

179 In the individual schedule for "VANADIUM ORE", under the section for "Loading", replace the words "of the Code" with the words "of this Code"; add the following text at the end of the section:

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

and under the section for "Precautions", replace the word "should" with the word "shall".

VERMICULITE

180 In the individual schedule for "VERMICULITE", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

WHITE QUARTZ

181 In the individual schedule for "WHITE QUARTZ", under the section for "Loading", replace the words "of the Code" with the words "of this Code".

WOODCHIPS

182 In the individual schedule for "WOODCHIPS", under the section for "Loading", replace the words "of the Code" with the words "of this Code". Under the section for "Precautions", in the first and second sentences, respectively, replace the word "should" with the word "shall"; after the words "oxygen level is 20.7%", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

WOOD PELLETS CONTAINING ADDITIVES AND/OR BINDERS

183 In the individual schedule for "WOOD PELLETS CONTAINING ADDITIVES AND/OR BINDERS", under the section for "Description", the fifth sentence is replaced with the following:

> "The raw material is compressed to approximately one-third of its original volume. The finished wood pellets typically have a moisture content of 4% to 8%.";

under the section for "Loading", replace the words "under sections 4, 5 and 6 of this Code" with the words "under sections 4 and 5 of this Code"; and under the section for "Precautions", after the words "carbon monoxide <100 ppm", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

WOOD PELLETS NOT CONTAINING ANY ADDITIVES AND/OR BINDERS

184 In the individual schedule for "WOOD PELLETS NOT CONTAINING ANY ADDITIVES AND/OR BINDERS", under the section for "Description", the fifth sentence is replaced with the following:

> "The raw material is compressed to approximately one-third of its original volume. The finished wood pellets typically have a moisture content of 4% to 8%.";

under the section for "Loading", replace the words "under sections 4, 5 and 6 of this Code" with the words "under sections 4 and 5 of this Code". Under the section for "Precautions", after the words "carbon monoxide <100 ppm", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

Wood Products – General

185 In the individual schedule for "Wood Products – General", under the section for "Precautions", after the words "oxygen level is 21%", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27).";

and under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

WOOD TORREFIED

186 In the individual schedule for "WOOD TORREFIED", under the section for "Loading", replace the words "section 4, 5 and 6 of the Code" with the words "section 4 and 5 of this Code". Under the section for "Precautions", after the words "carbon monoxide < 100 ppm", add "*" with the following footnote:

> "* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

ZINC ASHES UN 1435

187 In the individual schedule for "ZINC ASHES UN 1435", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

ZINC SLAG

188 In the individual schedule for "ZINC SLAG", under the section for "Hazard", add the word "a" before the words "moisture content". Under the section for "Loading", replace the first sentence with the following:

> "This cargo shall be trimmed to ensure that the height difference between peaks and troughs does not exceed 5% of the ship's breadth and that the cargo slopes uniformly from the hatch boundaries to the bulkheads to avoid steep surfaces of cargo that could collapse during the voyage."

and under the section for "Carriage", add the following text at the end of the section:

> "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 the 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."

ZIRCON KYANITE CONCENTRATE

189 In the individual schedule for "ZIRCON KYANITE CONCENTRATE", under the section for "Hazard", add the word "a" before the words "moisture content". Under the section for "Loading", replace the second and the third sentences with the following text:

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

ZIRCONSAND

190 In the individual schedule for "ZIRCONSAND", under the section for "Loading", in the first sentence, replace the words "of the Code" with the words "of this Code".

New individual schedules

191 Insert the following new individual schedules accordingly in alphabetical order:

"**FOAM GLASS GRAVEL**

Description
Foam glass gravel is a lightweight insulation product used in the construction/building industry. This cargo is odourless and of grey anthracite colour.

Characteristics

Angle of repose	Bulk density (kg/m³)	Stowage factor (m³/t)
Not applicable	130 to 250	4.0 to 7.6
Size	**Class**	**Group**
Varies	Not applicable	C

Hazard
Dust may cause skin and eye irritation.
This cargo is non-combustible or has 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 this Code.

Precautions
Persons who may be exposed to the dust of the cargo shall wear goggles or other equivalent dust eye-protection and dust filter masks as well as protective clothing, as necessary. Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

Ventilation
No special requirements.

Carriage
No special requirements.

Discharge
Entry into the cargo spaces containing this cargo shall only be permitted for trained personnel wearing protective clothing and goggles or other equivalent dust eye-protection as well as dust filter masks.

Clean-up
No special requirements."

"**IRON SMELTING BY-PRODUCTS**

Description
This cargo is a by-product from the smelting of iron ore, ilmenite and titanomagnetite. Grey or black, small to large size lumps (up to 45 tonnes), granulated iron included. Depending on the dominant size, Iron by-products from smelting of iron ore, ilmenite and titanomagnetite is called variously:

Iron pan edges
Separation of iron
Granulated iron
Plate iron
Pool iron
Flat iron
K1-K3 bears
Steel bears
Pig iron by-product
Beach iron
Iron skulls

Characteristics

Angle of repose	**Bulk density (kg/m³)**	**Stowage factor (m³/t)**
Not applicable	Varies	Varies
Size	**Class**	**Group**
Varies	Not applicable	C

Hazard
No special hazards.
This cargo is non-combustible or has 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 this Code.

The tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be paid to ensure that the tank top is not overstressed during voyage and during loading by a pile of the cargo. Large pieces shall not be dropped in the cargo hold and placement of very large lumps shall be such that the tank top is not overstressed by point loads. The weight distribution in the hold shall be considered during loading.

Precautions
Bilge wells of the cargo spaces shall be protected from ingress of the cargo.

Ventilation
No special requirements.

Carriage
No special requirements.

Discharge
When this cargo is discharged by magnet or spider grab:

.1 the deck and deck machineries shall be protected from falling cargo; and

.2 damages to the ship shall be checked, after the completion of discharge.

Clean-up
No special requirements."

"**METAL SULPHIDE CONCENTRATES, CORROSIVE UN 1759**
(see also Mineral Concentrates schedule)

This schedule shall only apply to cargoes that would fall under Packing Group (PG) III as specified in the IMDG Code if they were carried in a packaged form.

Description
Mineral concentrates are refined ores in which the valuable components have been enriched by eliminating the bulk of waste materials. Generally the particle size is small, although agglomerates sometimes exist in concentrates which have not been freshly produced.

The most common concentrates in this category are: zinc concentrates, lead concentrates, copper concentrates and low grade middling concentrates.

Characteristics

Angle of repose	Bulk density (kg/m³)	Stowage factor (m³/t)
Not applicable	1,700 to 3,230	0.31 to 0.59
Size	**Class**	**Group**
Various	8*	A and B

*This material may also meet MHB criteria of self-heating solids and/or solids that evolve toxic gas when wet.

Hazard
This cargo may liquefy if shipped at a moisture content in excess of its Transportable Moisture Limit (TML). See sections 7 and 8 of this Code.

Some sulphide concentrates are liable to oxidation and may have a tendency to self-heat, with associated oxygen depletion and emission of toxic fumes. Moisture in the cargo will form sulphurous acid which is corrosive to steel.

Stowage & Segregation
Unless determined by the competent authority, segregation as required for class 4.2 and Class 8 materials.

"Separated from" foodstuffs.

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

Weather precautions
When this cargo is carried in a ship other than a 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 loading operations and the 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 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 under the conditions stated in the procedures required in subsection 4.3.3 of this Code; and

.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 this Code.

When the stowage factor of this cargo is equal or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo forming.

Precautions
Entry into the cargo space for this cargo shall not be permitted until the space has been ventilated and the atmosphere tested for concentration of oxygen*. Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of this cargo. Bilge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo.

Bilge system of a cargo space to which this cargo is to be loaded shall be tested to ensure it is working. Persons who may be exposed to the dust of the cargo shall wear gloves, goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

When a Metal Sulphide Concentrate is considered as presenting a low fire-risk, the carriage of such cargo on a ship not fitted with a fixed gas fire-extinguishing system shall be subject to the Administration's authorization as provided by SOLAS regulation II-2/10.7.1.4.

Ventilation
The cargo shall not be ventilated during the voyage.

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

For quantitative measurements of oxygen and toxic fumes liable to be evolved by the cargo, suitable detectors for each gas and fume or combination of these shall be on board while this cargo is carried. The detectors shall be suitable for use in an atmosphere without oxygen.

The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly during voyage, and the results of the measurements shall be recorded and kept on board.

Discharge
No special requirements.

Clean-up
Ensure that all residues are washed away and the holds thoroughly dried. Wet dust or residues will form corrosive sulphurous acid, which is dangerous to personnel and will corrode steel.

Emergency procedures

Special emergency equipment to be carried
Protective clothing (gloves, boots, coveralls, headgear). Self-contained breathing apparatus.
Emergency procedures Wear protective clothing and self-contained breathing apparatus. **Emergency action in the event of fire** Batten down; use ship's fixed firefighting installation, if fitted. Exclusion of air may be sufficient to control the fire. **Do not use water**. **Medical first aid** Refer to the Medical First Aid Guide (MFAG), as amended.

Remarks
Fire may be indicated by the smell of sulphur dioxide.

***** Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

"**MONOAMMONIUM PHOSPHATE (M.A.P.), MINERAL ENRICHED COATING**

Description
This cargo is monoammonium phosphate (M.A.P.) with a mineral enriched coating. Odourless, brownish-grey granules. It is hygroscopic and can be very dusty.

Characteristics

Angle of repose	**Bulk density (kg/m³)**	**Stowage factor (m³/t)**
35° to 40°	826 to 1,000	1.0 to 1.21
Size	**Class**	**Group**
Up to 4 mm	MHB (CR)	B

Hazard
This cargo has a pH of 4.5 and in the presence of moisture can be highly corrosive to eyes and skin.
This cargo is non-combustible or has a low fire-risk.
This cargo will cake if wet.
This cargo will decompose burlap or canvas cloth covering bilge wells. Continuous carriage of this cargo may have detrimental structural effects over a long period of time.

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 or to be loaded shall be closed.

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

Precautions
Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons who may be exposed to the dust of the cargo shall wear gloves, goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

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

Carriage
Condensation in the cargo spaces carrying this cargo, sweating of this cargo and entering of water from hatch covers to the cargo spaces shall be checked regularly during the voyage. Due attention shall be paid to the sealing of hatches of the cargo spaces.

Discharge
This cargo is hygroscopic and may cake in overhangs, impairing safety during 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, particular attention shall be paid to bilge wells of the cargo spaces.

Emergency procedures

Special emergency equipment to be carried Protective clothing (gloves, boots, coveralls, headgear). Self-contained breathing apparatus.
Emergency procedures Wear protective clothing and self-contained breathing apparatus. **Emergency action in the event of fire** Batten down; use ship's fixed firefighting installation, if fitted. **Medical first aid** Refer to the Medical First Aid Guide (MFAG), as amended.

"

"**MONOCALCIUMPHOSPHATE (MCP)**

Description
The product consists of Monocalciumphosphate, monohydrate. Granulated. Light grey. Odourless.

Characteristics

Angle of repose	Bulk density (kg/m3)	Stowage factor (m3/t)
Approximately 32°	900 to 1,100	0.91 to 1.11
Size	**Class**	**Group**
0.2 to 2 mm	MHB (CR)	A and B

Hazard
This cargo is non-combustible or has a low fire-risk.
Potential inhalation hazard and eye irritation from Monocalciumphosphate dust during handling, placement and transportation.

Stowage & segregation
No special requirements.

Hold cleanliness
No special requirements.

Weather precautions
When a cargo is carried in a ship other than a 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 loading operations and the 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 under the conditions stated in the procedures required in subsection 4.3.3 of this Code; and

.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 this Code.

Precautions
Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo. Persons who may be exposed to the dust of the cargo shall wear protective clothing, gloves, goggles or other equivalent dust eye-protection and dust filter masks, as necessary.

Ventilation
No special requirements.

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
Avoid handling which creates dust.

Emergency procedures

Special emergency equipment to be carried
Protective clothing (gloves, boots, coveralls, headgear). Self-contained breathing apparatus.
Emergency procedures Wear protective clothing and self-contained breathing apparatus. **Emergency action in the event of fire** Batten down; use ship's fixed firefighting installation, if fitted. Exclusion of air may be sufficient to control the fire. **Medical first aid** Refer to the Medical First Aid Guide (MFAG), as amended.

"

"**OLIVINE SAND**

Description
Olivine sand is a naturally occurring mineral and the colour can be pale greenish-grey to brownish.

Characteristics

Angle of repose	**Bulk density (kg/m3)**	**Stowage factor (m3/t)**
30° to 45°	1,600 to 1,900	0.53 to 0.63
Size	**Class**	**Group**
Up to 20 mm	Not applicable	A

Hazard
This cargo may liquefy if shipped at a moisture content in excess of its Transportable Moisture Limit (TML). See sections 7 and 8 of this Code.

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

Stowage & segregation
No special requirements.

Hold cleanliness
No special requirements.

Weather precautions
When a cargo is carried in a ship other than a 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 loading operations and the 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 under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and

.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 this Code.

When the stowage factor of this cargo is equal to or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo.

Precautions
No special requirements.

Ventilation
No special requirements.

Carriage
The appearance of the surface of the cargo shall be checked regularly during the voyage. If free water above the cargo or fluid state of the cargo is observed during the 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
No special requirements."

"**OLIVINE GRANULAR AND GRAVEL AGGREGATE PRODUCTS**

This schedule shall only apply to cargoes containing less than 5% of fine particles less than 0.5 mm.

Description
Olivine granular and gravel aggregate products are naturally occurring minerals and the colour can be pale greenish-grey to brownish.

Characteristics

Angle of repose	Bulk density (kg/m3)	Stowage factor (m3/t)
30° to 45°	1,600 to 1,900	0.53 to 0.63
Size	**Class**	**Group**
Up to 100 mm	Not applicable	C

Hazard
No special hazards.
This cargo is non-combustible or has 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 this Code.

When the stowage factor of this cargo is equal to or less than 0.56 m^3/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo.

Precautions
No special requirements.

Ventilation
No special requirements.

Carriage
No special requirements.

Discharge
No special requirements.

Clean-up
No special requirements."

"**SAND, MINERAL CONCENTRATE, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I) UN 2912**

Description
This cargo is generally a concentrate stream resulting from the processing of heavy mineral sands. Such mineral sand concentrates are characterized by their heavy bulk density and relatively fine grain size. This schedule includes concentrates of sands containing natural or depleted uranium and thorium, including metals, mixtures and compounds.

Abrasive. May be dusty. This cargo is cohesive if moisture content is above 1%.

Characteristics

Angle of repose	Bulk density (kg/m³)	Stowage factor (m³/t)
Approximately 35°	2,200 to 3,225	0.31 to 0.45
Size	**Class**	**Group**
Fine Particles up to 2 mm	7*	A and B

***** This material also meets MHB criteria of toxic solids and corrosive solids.

Hazard
This cargo may liquefy if shipped at a moisture content in excess of its Transportable Moisture Limit (TML). See sections 7 and 8 of this Code.
Low radiotoxicity.
May cause long-term health effects and skin irritation.
Prolonged and repeated exposure to silica dust can result in respiratory disease.
This cargo is non-combustible or has a low fire-risk.

Stowage & segregation
"Separated from" foodstuffs.

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

Weather precautions
When a cargo is carried in a ship other than a 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 loading operations and the 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 under the conditions stated in the procedures required in subsection 4.3.3 of this Code; and

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

Precautions
Personnel shall not be unnecessarily exposed to dust of this cargo. Persons who may be exposed to the dust of the cargo shall wear protective clothing, goggles or other equivalent dust eye-protection and facemasks. There shall be no leakage outside the cargo space in which this cargo is stowed.

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

Carriage
All instructions provided by the shipper shall be followed for the carriage of this cargo. 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
All instructions provided by the shipper shall be followed for the discharge of this cargo.

Clean-up
Cargo spaces used for this cargo shall not be used for other goods until decontaminated. Refer to subsection 9.3.2.3 of this Code.

Emergency procedures

Special emergency equipment to be carried Protective clothing (gloves, boots, coveralls, headgear). Self-contained breathing apparatus.
Emergency procedures Wear protective clothing and self-contained breathing apparatus. **Emergency action in the event of fire** Batten down; use ship's fixed firefighting installation, if fitted. Use water spray to control spread of dust, if necessary. **Medical first aid** Refer to the Medical First Aid Guide (MFAG), as amended.

Remarks
Most materials are likely to be non-combustible. Speedily collect and isolate potentially contaminated equipment and cover. Seek expert advice."

"**SILICOMANGANESE (carbo-thermic)**

Description
This material is a result of a carbo-thermic reduction process. A ferroalloy comprising principally manganese and silicon, mainly used as a deoxidizer and alloying element in the steel-making process. Particles or lumps of metallic-silver to dark-grey colour metal.

Characteristics

Angle of repose	Bulk density (kg/m³)	Stowage factor (m³/t)
Not applicable	3,100 to 4,000	0.25 to 0.32
Size	**Class**	**Group**
Fines up to 80 mm	Not applicable	C

Hazard
No special hazards.
This cargo is non-combustible or has a low fire-risk.

Stowage & segregation
"Separated from" acids, alkalis, oxidizing and reducing agents and foodstuffs.

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

Precautions
No special requirements.

Ventilation
No special requirements.

Carriage
No special requirements.

Discharge
No special requirements.

Clean-up
No special requirements."

"**SUGARCANE BIOMASS PELLETS**

Description
Sugarcane Biomass Pellets are light blonde to chocolate brown in colour; very hard and cannot be easily squashed. Sugarcane Biomass Pellets are made of bagasse, straw and leaves left over from industrial and agricultural activities. Normally there are no additives or binders blended into the pellet. This schedule is also applicable to Sugarcane Biomass Pellets produced with the use of up to 2% of oxide-based mineral additives such as calcium, magnesium and aluminium oxides. The raw material is fragmented, dried and extruded into pellet form. The raw material is compressed to approximately one-third of its original volume and the finished Sugarcane Biomass Pellets typically have a moisture content of 6 to 10%.

Characteristics

Angle of repose	Bulk density (Kg/m³)	Stowage factor (m³/t)
Approximately 30°	600 to 700	1.43 to 1.67
Size	**Class**	**Group**
Cylindrical with Diameter: 6 to 12 mm. Length: 10 to 50 mm.	MHB (CB, WT, WF and OH)	B

Hazard
Shipments are subject to oxidation leading to depletion of oxygen and increase of carbon monoxide and carbon dioxide in cargo and communicating spaces (also see Weather precautions).

Swelling occurs if exposed to moisture. Sugarcane Biomass Pellets may ferment over time if moisture content is over 15% leading to generation of asphyxiating and flammable gases which may cause spontaneous combustion. Handling of Sugarcane Biomass Pellets may cause dust to develop. Risk of explosion at high dust concentration.

Stowage & segregation
Segregation as required for class 4.1 materials.

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 or to be loaded shall be closed. There is a high risk of renewed oxygen depletion and carbon monoxide formation in previously ventilated adjacent spaces after closure of the hatch covers.

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

Precautions
Entry of personnel into the cargo spaces containing this cargo or the connecting spaces shall not be permitted until tests have been carried out and it has been established that the oxygen content and carbon monoxide levels have been restored to the following levels: oxygen 21% and carbon monoxide <100 ppm.* Close or direct contact of this cargo and cargo hold lighting such as hot halogen lamps shall be avoided. Fuses to such lights shall be removed or secured while this cargo is present in the cargo space. Precautions shall be taken to prevent generation of high concentrations of dust during handling and cleaning of this cargo.

Ventilation
Cargo spaces carrying this cargo shall not be ventilated during voyage. 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
Hatches of the cargo spaces carrying this cargo shall be weathertight to prevent the ingress of water.

Discharge
No special requirements.

Clean-up
No special requirements.

Emergency Procedures

Special emergency equipment to be carried Self-contained breathing apparatus and combined or individual oxygen and carbon monoxide meters should be available.
Emergency procedures Nil **Emergency action in the event of fire** Batten down; use ship's fixed firefighting installation, if fitted. Exclusion of air may be sufficient to control fire. Extinguish fire with carbon dioxide, foam or water. **Medical first aid** Refer to the Medical First Aid Guide (MFAG), as amended.

* Refer to the *Revised recommendations for entering enclosed spaces aboard ships*, adopted by the Organization by resolution A.1050(27)."

"**SYNTHETIC CALCIUM FLUORIDE**

Description
Odourless white-light brown material containing up to 70-80% calcium fluoride, 5-10% aluminium fluoride and 10-20% silicon dioxide.

The product consists of large particles and lumps which may break up during transport generating powder.

The product is insoluble in water.

Characteristics

Angle of repose	Bulk density (kg/m3)	Stowage factor (m3/t)
Not applicable	700 to 900	1.11 to 1.43
Size	**Class**	**Group**
Up to 30 mm	Not applicable	A

Hazard
This cargo may liquefy if shipped at a moisture content in excess of its Transportable Moisture Limit (TML). See sections 7 and 8 of this Code.

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

Stowage & segregation
"Separated from" hydrofluoric acid, chlorine fluoride, manganese fluoride and oxygen difluoride.

Hold cleanliness
No special requirements.

Weather precautions
When a cargo is carried in a ship other than a 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 loading operations and the 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 under the conditions stated in the procedures required in subsection 4.3.3 of this Code; and

.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 this Code.

Precautions
Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be paid to protect equipment from the dust of the cargo.

Ventilation
No special requirements.

Carriage
The appearance of the surface of the cargo shall be checked regularly during the voyage. If free water above the cargo or fluid state of the cargo is observed during the voyage, the master shall take appropriate action 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
No special requirements."

"**SYNTHETIC SILICON DIOXIDE**

Description:
Odourless white powder containing up to 85% silicon dioxide, about 7% aluminium fluoride and up to 8% crystal water in dry weight.
The product has very low solubility in water.

Characteristics:

Angle of repose	Bulk density (kg/m3)	Stowage factor (m3/t)
Approximately 40°	300 to 500	2.00 to 3.33
Size	**Class**	**Group**
Up to 0.1 mm	Not applicable	A

Hazard
This cargo may liquefy if shipped at a moisture content in excess of its Transportable Moisture Limit (TML). See sections 7 and 8 of this Code.
This cargo is non-combustible or has a low fire-risk.

Stowage & segregation
"Separated from" hydrofluoric acid, chlorine fluoride, manganese fluoride and oxygen difluoride.

Hold cleanliness
No special requirements.

Weather precautions
When a cargo is carried in a ship other than a 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 loading operations and the 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 under the conditions stated in the procedures required in subsection 4.3.3 of this Code; and

.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 this Code.

Precautions
Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo.

Due consideration shall be paid to protect equipment from the dust of the cargo.

Ventilation
No special requirements.

Carriage
The appearance of the surface of the cargo shall be checked regularly during the voyage. If free water above the cargo or fluid state of the cargo is observed during the voyage, the master shall take appropriate action 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
No special requirements."

"**TITANOMAGNETITE SAND**

Description
Titanomagnetite Sand has a nominal iron content of 57%.

Characteristics

Angle of repose	Bulk density (kg/m3)	Stowage factor (m3/t)
Not Applicable	2,740 to 2,820	0.35 to 0.36
Size	**Class**	**Group**
Up to 0.4 mm	Not applicable	A

Hazard
This cargo may liquefy if shipped at a moisture content in excess of its Transportable Moisture Limit (TML). See sections 7 and 8 of this Code.
This cargo is non-combustible or has a low fire-risk.

Stowage & Segregation
No special requirements.

Hold Cleanliness
No special requirements.

Weather Precautions
When a cargo is carried in a ship other than a 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 loading operations and the 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 under the conditions stated in the procedures required in paragraph 4.3.3 of this Code; and

.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
Cargo shall be trimmed to avoid steep surfaces of cargo that could collapse during voyage. As the density of the cargo is extremely high, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo.

Precautions
Bilge wells shall be clean, dry and covered to prevent ingress of cargo. Bilge covers shall not significantly degrade the capacity or operation of the bilge system. Bilges shall be sounded and pumped out, as necessary, throughout the voyage.

Ventilation
No special requirements.

Carriage
Unless this cargo is carried in a ship complying with the requirements in subsection 7.3.2 of this Code, the appearance of the surface of the cargo shall be checked regularly during the voyage. If free water above the cargo or fluid state of the cargo is observed during the voyage, the master shall take appropriate action 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 shall be checked and any blockage shall be removed. If the ship is fitted with a de-watering system of the cargo spaces, after discharge of this cargo, the system shall be checked and any blockage in the systems shall be removed."

APPENDIX 2

Laboratory test procedures, associated apparatus and standards

1 Test procedures for materials which may liquefy and associated apparatus

192 In the beginning of the first sentence, replace the term "Three" with "Five". After the sentence "As each method has its advantages, the selection of the test method should be determined by local practices or by the appropriate authorities", add two new sub-paragraphs as follows:

.4 Modified Proctor/Fagerberg test procedure for Iron Ore Fines; and

.5 Modified Proctor/Fagerberg test procedure for Coal.

193 Add a new paragraph 1.5 as follows:

"**1.5 Modified Proctor/Fagerberg test procedure for Coal**

1.5.1 Scope

This procedure details the laboratory determination of Transportable Moisture Limit (TML) for coals up to a nominal top size of 50 mm. The procedure is based on a modification of the Proctor/Fagerberg test described in section 1.3 of this appendix.

Key modifications to the original test procedure contained in section 1.3 of this appendix are:

.1 Sample preparation to facilitate the testing of 0 x 50 mm coal through reconstitution to -25 mm;

.2 Use of a 150 mm diameter compaction cylinder; and

.3 Sample compaction using a hammer equivalent to the Proctor/Fagerberg "D" energy hammer.

The Transportable Moisture Limit is the moisture content corresponding to the intersection of the 70% degree saturation curve and the test sample compaction curve.

In the case of coals where moisture freely drains from the sample such that the test sample compaction curve does not extend to or beyond 70% saturation, the test is taken to indicate a cargo where water passes through the spaces between particles and there is no increase in pore water pressure. Therefore, the cargo is not liable to liquefy. (See subsection 7.2.2 of this Code).

The procedure commences with a drum of coal containing a sample of not less than 170 kg delivered to the testing laboratory and terminates with the laboratory reporting the test result for the coal. Details of the sample collection process are excluded from this procedure. However it is important that the sample accurately represents the size distribution of the cargo and reference should be made to the normative reference list below.

1.5.2 Normative references

The following documents are referenced in this procedure. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

– AS 1289.3.5.1:2006, Methods of testing soils for engineering purposes. Method 3.5.1: Soil classification tests – Determination of the soil particle density of a soil – Standard method;

– ISO 589:2008, Hard Coal – Determination of total moisture;

– ISO 3319-2:2013, Test requirements and testing – Part 2: Test sieves of perforated metal plate; and

– ISO 13909-4:2001, Hard coal and coke – Mechanical sampling – Part 4 – Coal – Preparation of test samples.

1.5.3 Definitions

(1) Transportable Moisture Limit (TML)

The Transportable Moisture Limit (TML) of a cargo which may liquefy means the maximum moisture content of the cargo which is considered safe for carriage in a ship not complying with the requirements in subsection 7.3.2 of this Code.

(2) Test outcomes

The Transportable Moisture Limit determined by this procedure is the moisture content corresponding to the intersection of the 70% degree saturation curve and the test sample compaction curve. This is also referred to as the PFD70 value (Proctor/Fagerberg – D energy hammer – 70% saturation).

Where moisture freely drains from the sample or the cylindrical mould at moisture content such that the test sample compaction curve does not extend to or beyond 70% saturation (as described in paragraph 1.5.5.3(4)), the test is taken to indicate a cargo where water passes through the spaces between particles and there is no increase in pore water pressure. Therefore, the cargo is not liable to liquefy. (See subsection 7.2.2 of this Code).

(3) Optimum Moisture Content (OMC)

The Optimum Moisture Content is the moisture content corresponding to the maximum compaction (maximum dry density) under the specified compaction condition.

(4) Gross water content or total moisture (W^1)

The moisture content of a sample is calculated as the mass of water divided by the total mass of solids plus water and is referred to as either the gross water content or the total moisture content. Gross water content is to be determined using the method for determining total moisture defined in the standard ISO 589:2008.

1.5.4 Determination of the TML of blends of two or more coals

In circumstances where a shipper intends to load a cargo consisting of a blend of two or more coals, the shipper may:

.1 determine the TML of the blend by direct application of the test method described within this procedure to a representative sample of the blended product; or

.2 declare the TML of the blend based on TML determinations on each of the component coals.

.1 Where all component coals in the blend are known to be Group A and B coals:

.1.1 The blended cargo should be declared as Group A and B, and

.1.2 The TML of the blended cargo should be determined as the lowest TML value of any of the component coals.

.2 Where a Group A and B cargo component is blended with a coal which is designated as Group B only:

.2.1 The blended cargo should be declared as Group A and B, and

.2.2 The TML should be taken as the lowest TML of the Group A and B component coals contained within the blend.

.3 Where all component coals are determined to be Group B only coals, the blended cargo may be declared as a Group B only cargo.

1.5.5 Modified Proctor/Fagerberg test procedure for coal

1.5.5.1 Apparatus

(1) Work area

The work area should be located where the samples are protected from excessive temperatures, air currents and humidity variations. All samples should be stored in suitable sample containers, including plastic sample bags, and the containers should be sealed.

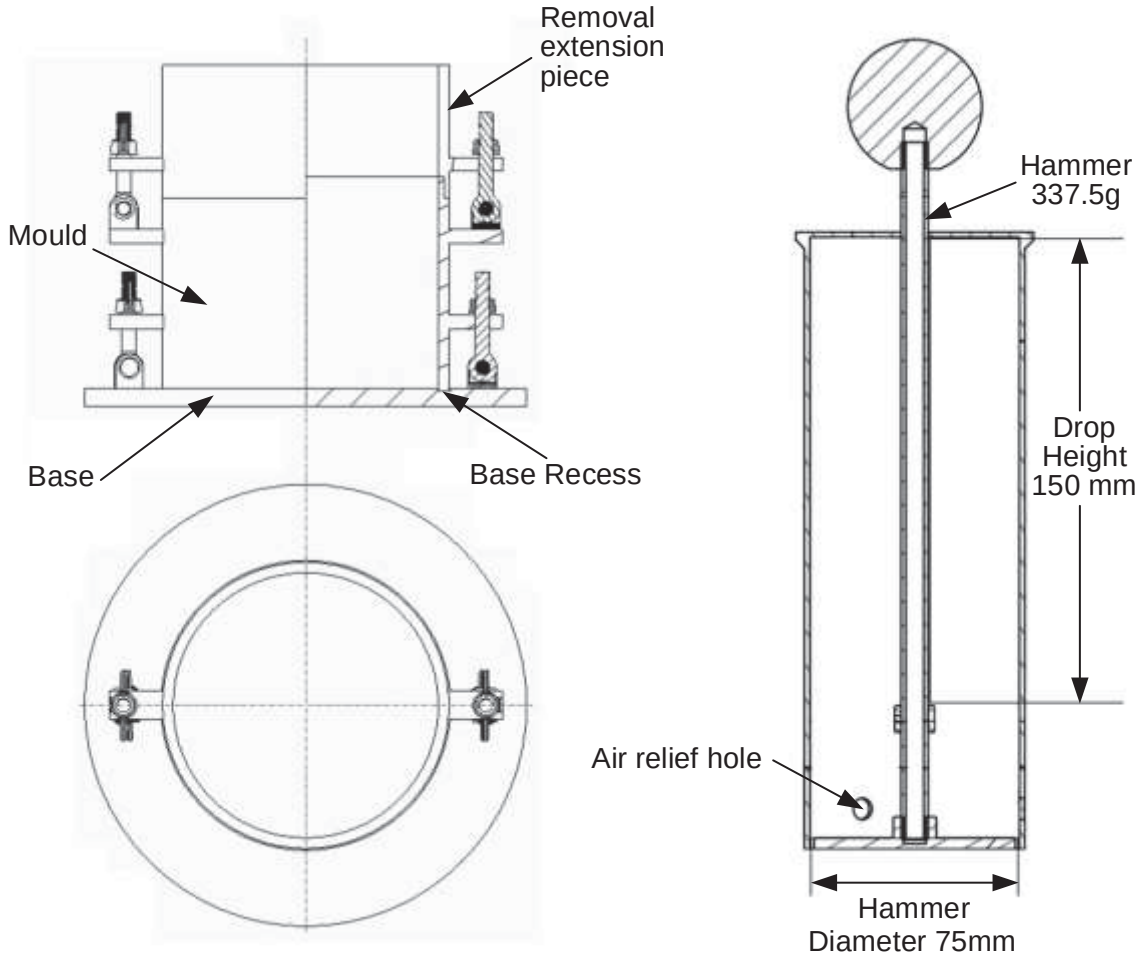
(2) Standard sieves

Square aperture laboratory sieves of 16 mm and 25 mm aperture as nominated in ISO 3319-2:2013 are required for reconstitution of the sample at 25 mm top size. A 2.36 mm sieve is required for generation of + 2.36 mm and –2.36 mm fractions for particle density determination. Optionally a 2 mm sieve may be used for this purpose.

(3) Proctor/Fagerberg apparatus

The Proctor/Fagerberg apparatus consists of a cylindrical stainless steel mould having 150 mm diameter and 120 mm height with a removable extension piece (the compaction cylinder) and a compaction tool guided by a pipe at its lower end (the compaction hammer), which are shown in figure 1.5.1. A schematic diagram of the Proctor/Fagerberg apparatus is shown in figure 1.5.2 with dimensions and tolerances indicated in table 1.5.5.

Figure 1.5.1 Example of Proctor/Fagerberg test apparatus, hammer and hammer guide



Compaction Cylinder **Compaction Hammer**

Figure 1.5.2 Schematic of a Proctor/Fagerberg apparatus

(4) Compaction hammer

A "D" energy equivalent compaction hammer is used for this test. Dimensions are shown in figure 1.5.2 and table 1.5.5. (Note: the compaction hammer has been modified to match the mould used.)

(5) Drying oven

The drying oven should be ventilated, with forced circulation of air or inert gas, typically with a stainless steel interior and capable of maintaining a temperature within the range of 105°C ± 5°C.

(6) Weighing balance

The weighing balance should be capable of weighing the sample and the container, as received, with an accuracy of better than ± 5 g.

(7) Pycnometer

Water pycnometry equipment is used to determine the density of the full sized coal (non-crushed) in accordance with AS 1289.3.5.1:2006. Specific equipment required is as follows:

- a conical flask or density bottle of 250 ml capacity;
- a vacuum desiccator or other vacuum equipment;
- a drying oven set to 105°C to 110°C;
- balances – one with ± 0.05 g accuracy and the second with ± 1 g accuracy;
- a 0°C to 100°C thermometer;
- a 2.36 mm sieve (as noted in paragraph 1.5.5.1(2))
- a vacuum source;
- a water bath set at 60°C;
- distilled, demineralized or deionized water;
- a wash bottle containing water;
- a wire basket to hold the + 2.36 mm sample;
- a container filled with water to hold the wire basket without interference; and
- a scale to weigh the basket both suspended in water and drained.

(8) Containers for hand mixing and sample preparation

Sufficient heavy-duty plastic buckets with lids of not less than 10 litres capacity are required for storage and handling. Heavy-duty plastic bags (200 micron thick or greater) are required for storage and hand mixing of samples.

(9) Flat scraping device

A thin steel scraper is required for separating the remnant sample formed in the extension piece lying above the top level of the mould. For ease of use, the scraper should have dimensions of 160 mm wide, 200 mm long and 3 mm to 5 mm thick, such as that shown in figure 1.5.3.

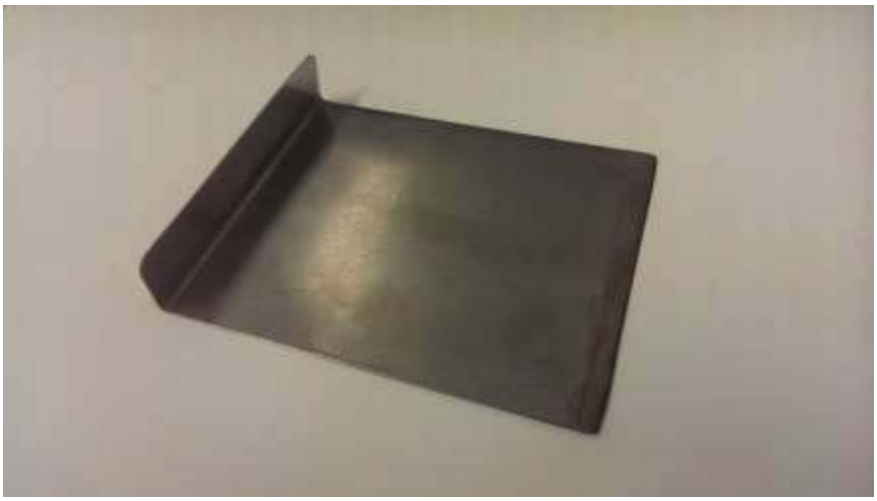


Figure 1.5.3 Typical scraping device

(10) Drying trays

Drying trays or pans should have a smooth surface, be free from contamination and heat resistant, for example stainless steel or enamel. Dimensions should be suitable to fit in the drying oven and ensure that the total sample can be contained at a loading of about 1 g/cm^2 of surface area.

(11) Spray bottle

A suitable plastic bottle is required to add a mist spray of water to the sample.

(12) Gloves

Heat resistant gloves are required for removal of hot trays and dishes.

(13) Sample divider

A suitable sample divider as specified in ISO 13909-4:2001 is required for sub-sampling the primary sample and blending the reconstituted sample for testing.

1.5.5.2 Sampling and sample preparation

(1) General

This procedure commences with receipt of sample of not less than 170 kg, sealed in a heavy duty (200 micron thick) plastic bag and contained in a suitable drum (e.g. 220 litres). This packaging ensures the sample does not dry prior to TML determination.

(2) Sample preparation

Representative samples are required that have been obtained using ISO 13909-4:2001 and if required may be partially air dried or partially dried at a temperature of 40°C or less to reduce the water content to a starting point suitable for dry sieving the coal with minimal fines adhering to the oversize fraction. For this purpose, samples should not be dried below 6% total moisture. The representative subsamples for the test should not be fully dried, except in the case of gross water content determination.

(2.1) Sample homogenization and division

Take the as-received sample and divide into individual sub-samples using a sample dividing apparatus as specified in ISO 13909-4:2001. Place these subsamples into heavy-duty plastic bags.

(2.2) Reconstituted sample preparation procedure

When the sample contains particles above 25 mm, the reconstitution process below should be applied.

In this process, particles above 25 mm are removed from the sample and replaced by an equivalent mass of particles in the range 16 mm to 25 mm. Through this process a final reconstituted sample of sufficient mass for TML testing is generated which contains a maximum particle size of 25 mm.

One of two methods may be selected to generate the reconstituted sample:

.1 Split the entire as-received sample and then reconstitute; or

.2 Scalping off particles above 25 mm and substituting particles between 16 mm and 25 mm from a separate sub-sample.

Method 1 Splitting the full as received sample and reconstitution

(i) Take the full as-received sample;

(ii) Screen at 25 mm, 16 mm and 2.36 mm. If a 2.36 mm screen is not available, a 2 mm screen may be used;

(iii) Weigh each of the four size fractions and calculate the percentage represented by each size fraction;

(iv) Sub-divide from each size fraction below 25 mm the required mass to create a 25 kg reconstituted sample using the sample size components specified in table 1.5.1:

Table 1.5.1 Reconstitution size proportions (Method 1)

Size fraction	Quantity
-2.36 mm (or -2 mm)	percentage of this fraction in the original sample
2.36 mm (or 2 mm) to 16 mm	percentage of this fraction
16 mm to 25 mm	percentage of this fraction plus the percentage of + 25 mm coal

(v) Combine each size fraction;

(vi) Fully mix the reconstituted sample;

(vii) Split the sample into approximately eight representative sub-samples and place each into a heavy duty plastic bag. These bags now contain the sample for Proctor/Fagerberg testing.

(viii) A sample of particles passing a 2.36 mm screen (or 2.0 mm if 2.36 mm is not available) is required for particle density pycnometry.

Method 2 Scalping particles above 25 mm and replacement with 16 mm to 25 mm particles

This method is described in figure 1.5.4 and table 1.5.2. The reconstitution process commences where the coal is initially sieved into particle sizes larger than 25 mm and smaller than 25 mm. Coal particles in the size range of 16 mm to 25 mm are extracted from separate subsamples and reconstituted back into the original -25 mm screened coal based on a mass equivalent to the + 25 mm sized coal removed from the initial sample to provide a final reconstituted sample of sufficient mass for TML testing.

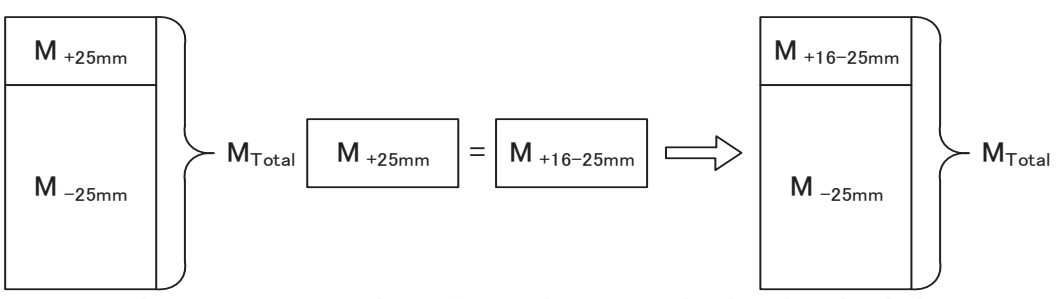


Figure 1.5.4 Overview of sample reconstitution (Method 2)

Table 1.5.2 Sample reconstitution (Method 2)

Step		Example
a)	Generate a sample of approximately 25 kg which is sufficient to complete approximately eight Proctor/Fagerberg tests.	Assumes each subsample bag contains 8 kg to 10 kg.
b)	Screen this sample at 25 mm, ensuring minimal adhering fines on the +25 mm fraction. Weigh the +25 mm coal.	For a coal containing 20% +25 mm material, approximately 5 kg of initial sample is removed.
c)	Create sufficient 16 mm to 25 mm coal by screening one or more further subsample bags of coal at 16 mm and 25 mm.	In the above example, 5 kg of 16 mm to 25 mm coal is required.
d)	Extract an amount of 16 mm to 25 mm coal of mass equal to the mass of +25 mm removed in step b) within ± 0.05 kg using a rotary sample divider or similar device, recombining sector trays as required to obtain the required mass.	5 kg in the above case.
e)	Add the mass of 16 mm to 25 mm coal from step d) to the -25 mm coal from step b). Blend and divide into approximately eight test portions using a rotary sample divider or similar device.	
f)	Place each reconstituted test portion in heavy duty plastic bags, label and seal. **These now become the test portions used for Proctor/Fagerberg testing.**	Each bag should contain approximately 2.5 kg to 3 kg of reconstituted -25 mm coal.
g)	Discard the +25 mm and -16 mm coal.	

(3) Initial moisture

Initial moisture is to be determined on a test portion from table 1.5.2 step e) using the method provided in ISO 589:2008. This moisture value provides a guide to the moisture steps required to develop the Proctor/Fagerberg compaction curve.

(4) Particle density measurement

In accordance with water pycnometer standard AS 1289.3.5.1:2006, measure the density of solids on the full size range (non-crushed) coal. The density of solids is used for determining the void ratio for plotting compaction curves. The recommended methodology is described below:

(a) Generate a full particle size sample of approximately 10 kg, weigh and then screen the entire contents at 2.36 mm. If a 2.36 mm screen is not available, a 2 mm screen may be substituted. Record the following:

(i) The total mass of the material;

(ii) The mass of +2.36 mm material; and

(iii) The mass of -2.36 mm material.

(b) Calculate the percentage of -2.36 mm coal in the sample.

(c) Divide the +2.36 mm coal into two test portions using sample dividing apparatus as specified in ISO 13909-4:2001 such as a rotary sample divider. Place each test portion in a heavy duty plastic bag and label.

(d) Divide the -2.36 mm coal into two test portions, place each test portion in a heavy duty plastic bag and label.

(e) Determine the density of solids of the +2.36 mm fraction following the method described in Section 5.2 of AS 1289.3.5.1:2006. As noted in the standard, duplicate determinations are required.

(f) Determine the density of solids of the -2.36 mm fraction using the method described in Section 5.1 of the above standard with the following clarifications:

(i) Use of 250 mm conical or pycnometry flasks is recommended.

(ii) From the sample bag pour 1 litre of coal into a beaker of known tare weight.

(iii) Weigh the 1 litre sample and calculate the approximate bulk density of the material.

(iv) Remove a portion of the sample (nominally a mass in kilograms of 0.18 x bulk density) and place into the flask, and complete the pycnometry analysis.

(v) A water bath temperature of 60°C is recommended.

(g) Calculate the density of solids using the method in Section 6 of AS 1289.3.5.1:2006.

1.5.5.3 Test procedure

(1) Variables and definitions

The variables and definitions used in the determination of TML are summarized in table 1.5.3 with some key variables as illustrated in figure 1.5.5.

Table 1.5.3 Summary of variables and definitions

Variable	Unit	Symbol / value used in calculations
Mass of empty cylinder and base	g	A
Mass of cylinder, base and tamped test portion	g	B
Wet mass of test portion in the mould	g	$C = B - A$
Wet mass of test portion removed from the mould	g	C_1
Dry mass of test portion removed from the mould	g	D_1
Gross water content	%	W^1
Dry mass of test portion in the mould	g	D
Mass of water in the mould	g	E
Volume of cylinder	cm^3	V
Density of solids	g/cm^3	d
Density of water	g/cm^3	ρ_w

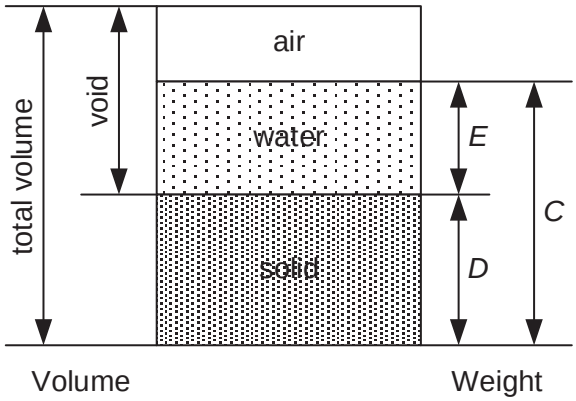


Figure 1.5.5 Illustration of key variables

(2) Establishment of the initial compaction point

The initial compaction point is obtained using the first test portion of the reconstituted material at the initial moisture content. For each compaction point determination, all steps in the procedure from packing the mould to weighing the mould and sample are to be completed at the same time without breaks. In any case, coal should not be left in the mould for longer than thirty minutes prior to weighing.

The test procedure is as follows:

(a) Clean the mould, collar and base plate. Inspect and clean the hammer and ensure that it moves freely in the guide tube.

(b) Determine the mass, *A*, of the empty cylinder, comprising the mould plus base plate.

(c) Assemble the mould, collar and base plate and place the assembly on a stable bench.

(d) Place approximately 0.5 litre (one fifth of the full 2.5 litres) of the test portion into the mould, level, and then tamp uniformly over the surface by dropping the hammer 25 times vertically through the full height of the guide pipe, moving the guide pipe to a new position after each drop. The required pattern for even compaction of each layer in the mould is shown in figure 1.5.6.

(e) Repeat step (d) four more times so that there are 5 layers of material in the mould. Ensure that the compacted test portion with the final layer is above the top of the compaction mould whilst the extension piece is still attached.

(f) When the last layer has been tamped, remove the extension piece taking care not to disturb the compacted test portion inside. Level the compacted test portion to the top of the mould using the flat scraping device, ensuring that any large particles that may hinder levelling of the test portion are removed and replaced with material contained in the extension piece and re-level. If any holes in the surface are still observed after levelling, they should be manually filled with finer material contained in the extension piece. Care should be taken to avoid any further compaction of the test portion.

(g) Determine the mass, *B*, of the mould and compacted coal and then calculate the mass, *C*, of the wet test portion using the equation:

$$C = B - A \quad (1)$$

(h) When the weight of the cylinder with the tamped test portion has been determined, remove the test portion from the mould, determine the mass of the wet test portion, C_1, and dry the entire test portion in an oven at 105°C until constant mass is achieved. After drying, determine the weight, D_1, of the dried test portion and then calculate the percentage gross water content, W^1, as follows:

$$W^1 = (C_1 - D_1)/C_1 \times 100\% \quad (2)$$

(i) Using the calculated gross water content, calculate the mass of the dry test portion in the mould, D, using the equation:

$$D = C - C \times W^1/100 \quad (3)$$

(j) Calculate the mass, E, of water in the mould using the equation:

$$E = C - D \quad (4)$$

(k) Discard the used coal sample. Coal from a previously compacted test portion should not be reused.

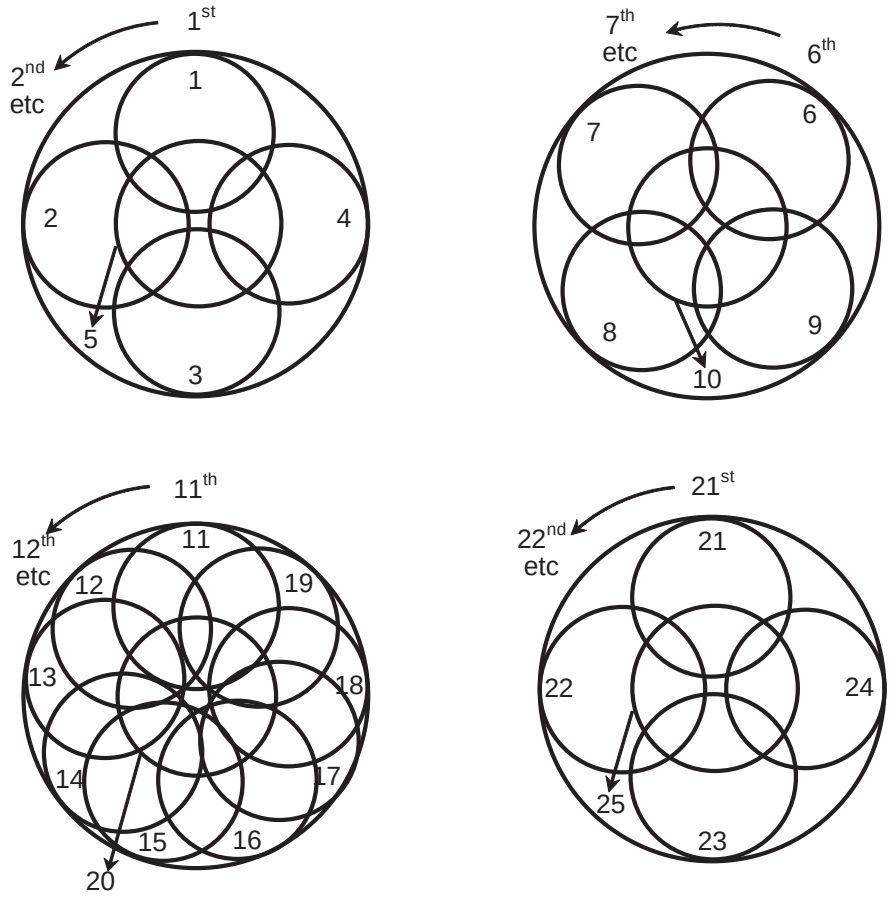


Figure 1.5.6 Recommended compaction patterns

(3) Establishment of complete compaction curve

The range of water contents should be adjusted so that partially dry to almost saturated test portions are obtained. Care should be taken to follow the precaution in paragraph 1.5.5.3(2) above regarding prompt completion of each point in the compaction curve.

The test procedure is as follows:

(a) For each compaction test, a predetermined amount of water is added to the test portion (approximately 2.5 kg) in a heavy duty plastic bag. The water quantity added is that required to increase the moisture content to the target value for the next test. The water should be added as a mist spray to the surface of the individual test portions. The water at this point should be added slowly and in small quantities, as the introduction of large amounts of water may induce localized compaction behaviour.

(b) After the calculated water addition, the test portion should then be mixed thoroughly in the plastic bag by sealing the bag and turning it over repeatedly for 5 minutes.

(c) The test portion should then be allowed to equilibrate for a minimum of 12 hours prior to compaction testing.

(d) Repeat steps (a) to (k) from paragraph 1.5.5.3(2).

(e) Repeat the test between four and seven times using the other prepared test portions with different water contents to obtain at least five points on the compaction curve. The water contents should be chosen so that:

.1 at least one point corresponds to moisture content higher than the Optimum Moisture Content (OMC) or than the value corresponding to 70% of degree of saturation (S), in order to satisfactorily define the compaction curve; and

.2 at least one point corresponds to the degree of saturation (S) between 70% and 80%, in order to effectively assess the PFD70 value.

A point close to a degree of saturation (S) of 80% will also assist accurate assessment if the OMC is greater than 70%.

(4) Visual appearance of coal in the cylindrical mould

In order for the test to obtain a PFD70 value, all tests conducted at or below the PFD70 moisture value should have an even moisture distribution throughout the cylindrical mould.

Two examples of tests using samples of the same coal at different moisture contents are shown in figure 1.5.7. The left hand photograph shows a coal specimen at a relatively low degree of saturation. Note that the coal remains in place following removal of the collar. The right hand photograph shows a specimen near or possibly above 70% degree of saturation. Once again the coal remains in place following removal of the collar. Both tests provided valid points on the compaction curve.

Figure 1.5.7 Photographs showing valid tests for a partially saturated test portion (left) and a near fully saturated test portion (right)

Coals where water passes through the spaces between particles exhibit moisture migration within the Proctor/Fagerberg cylindrical mould. Moisture migration may take place when the degree of saturation of the specimen is less than 70%.

Evidence of moisture migration is from visual observation at the completion of each test as follows:

.1 Moisture leakage from the base of the mould is evident as shown in figure 1.5.8; and

.2 The portion above the top of the cylindrical mould appears unsaturated and the test portion maintains its structure without deformation or movement.

In this case, moisture migration has occurred and hence for this coal water passes through the spaces between particles.

Figure 1.5.8 Test showing water leakage from the base of the cylindrical mould indicating moisture migration

(5) Calculation of key parameters for determination of compaction curve

Carry out the following calculations for each compaction test:

d = density of solids, g/cm^3 (t/m^3) by pycnometry (see 1.5.5.2(4)).

γ = dry bulk density, g/cm^3 (t/m^3)
= D/V

e_v = net water content (percentage by volume)
= $(E/D) \times 100 \times d/\rho_w$

where ρ_w= density of water, g/cm^3 (t/m^3)

e = void ratio (volume of voids divided by volume of solids)
= $(d/\gamma) - 1$

S = degree of saturation (percentage by volume)
= e_v/e

W[1] = gross (total) water content (percentage by mass) (see 1.5.5.3(2)(h)).

(6) Presentation of compaction results

Record all the compaction test results in a suitable spreadsheet (such as that shown in table 1.5.4) and from this spreadsheet create a compaction curve as shown in figure 1.5.9 by plotting the calculated void ratio (e) for each compaction test on the ordinate against either the net or gross water content plotted on the abscissa.

The lines in figure 1.5.9 correspond to plots of void ratio (*e*) versus net water content (e_v) at 20%, 40%, 60%, 70%, 80% and 100% degree of saturation (*S*). These lines are calculated at five values of void ratio using the formulae in section 1.5.5.3(7). (Note: These lines corresponding to degree of saturation will be curved in the case of plotting gross water content on the abscissa.)

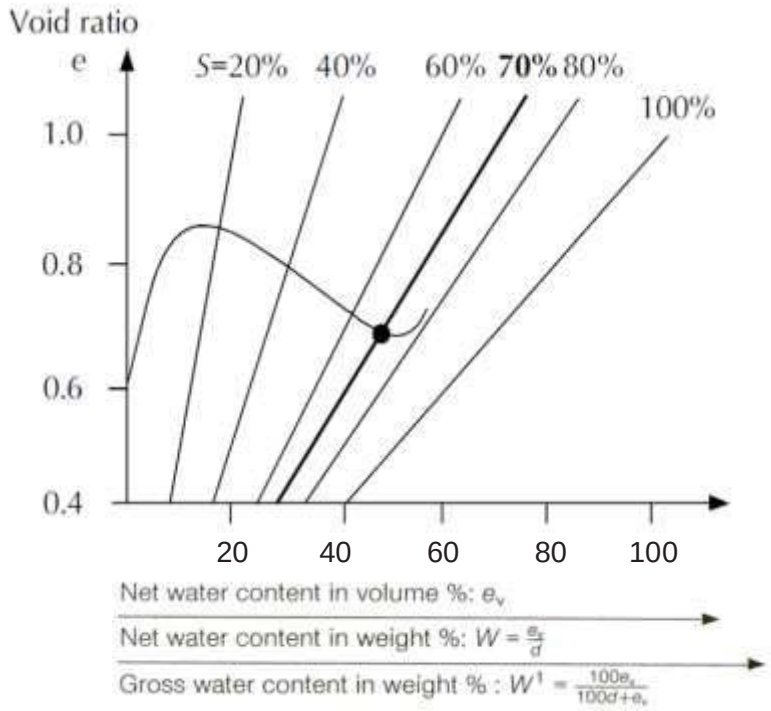


Figure 1.5.9 Typical compaction curve

(7) Sample compaction curve

An example of the results obtained when applying the Modified Proctor/Fagerberg test to a coal sample is provided in table 1.5.4, with the corresponding compaction curve and the 70% degree of saturation line plotted as described below.

The preferred approach to presenting the results is to plot the void ratio (*e*) against the gross water content (W^1) allowing moisture for any saturation level to be read directly from the plot as gross water content. This approach is shown in figure 1.5.10. The saturation lines are plotted according to the equation:

$$e = W^1/(100 - W^1) \times 100 \times d / S$$

The intercept of the compaction curve with the 70% degree of saturation line in figure 1.5.10 occurs at a gross water content of 15.4%, which is the Transportable Moisture Limit (TML). For this example, the Optimum Moisture Content (OMC) occurs at a degree of saturation of about 85%.

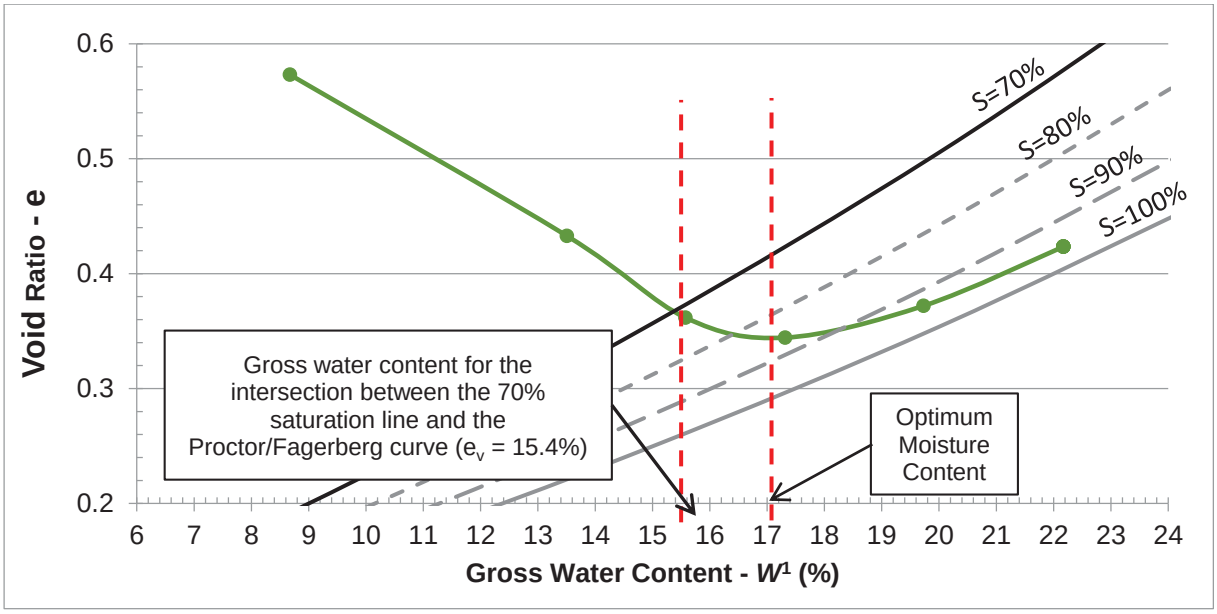


Figure 1.5.10 Example of a measured compaction curve for void ratio versus gross water content with the 70%, 80%, 90% and 100% degree of saturation lines plotted

(8) Determination of transportable moisture limit

(8.1) Determination of PFD70 moisture content

The PFD70 value is determined as the gross (total) water content corresponding to the intersection of the compaction curve and the line S = 70% saturation. The Optimum Moisture Content (OMC) is the gross (total) moisture content corresponding to the maximum compaction (maximum dry density and minimum void ratio) under the specified compaction condition.

The test procedure is applicable for determination of coal TML where the degree of saturation corresponding to the OMC of the coal is at or greater than 70%. Where the OMC lies below 70% degree of saturation, this test is not applicable for the specific coal and the PFD70 may overstate the TML. In such cases, the certificate of analysis should state that the OMC is below 70% saturation and the shipper should consult with an appropriate authority.

(8.2) Cases where the highest determinable point on the compaction curve lies below 70% saturation

In coals where there is visual evidence that water passes through the spaces between particles and the compaction curve does not extend to or beyond the 70% degree of saturation line, the coal is deemed to be free-draining and a TML value is not applicable. By reference to section 7.2.2 of this Code, such coals are cargoes which are not liable to liquefy, and hence are classified as Group B only.

1.5.6 Test report

The test report from application of the Modified Proctor/Fagerberg test procedure should include the following information:

(a) Identification of the sample;

(b) A unique reference to this test procedure;

(c) Reference to the appropriate standard adopted for determining the density of the solids:

(d) Either:

(i) The Transportable Moisture Limit (TML) of the sample, expressed as the gross water content as a percentage of the sample by mass;

(ii) The OMC lies below 70% degree of saturation and this test procedure is not applicable; or

(iii) A statement that the test indicated that water passes through the spaces between particles at moisture content below the value corresponding to 70% degree of saturation, and the coal is therefore Group B only.

(e) The solids density *d* in g/cm^3.

Table 1.5.4 Example of TML determination for a coal sample using the Modified Proctor/Fagerberg test procedure for coal

Date		Diameter of cylinder	150 mm
Product		Height of cylinder	120 mm
Sample		Volume of cylinder	2121 ml
Initial gross water content (%)	5.6	TML	15.4%
Density of solids	1416 kg/m^3		
Laboratory temperature	25°C	Size fraction	
Mass of mould (***A***)	7271 g	Operator	
Initial Dry density	899 kg/m^3	Tamper	337.5 g

Test number	Water added	Mass of mould + sample	Tray No.	Mass of tray	Mass of wet sample + tray	Mass of dry sample + tray	Measured gross water content	Gross water content	Net water content	Void ratio	Dry density	Degree of saturation	Wet bulk density	Mass of wet sample	Mass of dry sample	Mass of water
	(ml)	(g)		(g)	(g)	(g)	(%)	(%)	(%v)		(g/cm^3)	(%)	(g/cm^3)	(g)	(g)	(g)
		B						W^1	e_V	***e***	γ	***S***		***C***	***D***	***E***
1	0.00	9360.00	T1	602.5	1656.8	1565.7	8.64	8.67	13.437	0.573	0.899	23.4	0.985	2089.0	1907.8	181.2
			T2	602.3	1643.1	1552.5	8.70									
2	150.00	9692.70	T3	630.7	1811.7	1649.6	13.73	13.51	22.097	0.433	0.988	51.1	1.142	2421.7	2094.6	327.1
			T4	882.9	2126.9	1961.6	13.29									
3	250.00	9881.60	T5	638.7	2081.4	1849.7	16.06	15.58	26.104	0.362	1.039	72.2	1.231	2610.6	2204.0	406.6
			T6	632.4	1822.6	1643.0	15.09									
4	350.00	9971.00	T7	882.2	2349.9	2095.4	17.34	17.31	29.630	0.344	1.053	86.1	1.273	2700.0	2232.5	467.5
			T8	637.9	1868.8	1656.0	17.29									
5	450.00	9996.20	T9	654.3	2013.2	1746.5	19.63	19.73	34.780	0.372	1.031	93.5	1.285	2725.2	2187.5	537.7
			T10	639.6	1999.4	1729.7	19.83									
6	550.00	9980.00	T11	885.0	2251.5	1931.6	23.41	22.17	40.311	0.423	0.994	95.2	1.277	2709.0	2108.4	600.6
			T12	883.5	2181.9	1910.1	20.93									
7																
8																
9																
10																

Note: The example above uses two drying trays for each test.

Table 1.5.5 Specifications and tolerances for Proctor/Fagerberg cylindrical mould and hammer

Parameter	Units	Dimension	Tolerance
Hammer mass	g	337.5	± 2
Hammer diameter	mm	75	± 0.2
Drop height	mm	150	± 2
Tube ID	mm	78	± 0.2
Tube OD	mm	82	± 0.2
Tube wall thickness	mm	2	± 0.2
Tube clearance	mm	1.5	± 0.2
Mould inner diameter	mm	150	± 0.5
Mould inner height	mm	120	± 1
Mould inner volume	cm^3	2121	± 18
Removable extension piece height	mm	75	± 1
Depth of recess into base to seat	mm	1	± 0.2
Gap between mould and base	mm	≤ 0.1	
Gap between mould and extension piece	mm		(0 to + 0.1)
Clearance between mould and hammer	mm	≤ 6	

"

APPENDIX 3

Properties of solid bulk cargoes

1 Non-cohesive cargoes

1.1 The following cargoes are non-cohesive when dry:

194 In the list, add the following new entries in alphabetical order:

"MONOAMMONIUM PHOSPHATE (M.A.P.), MINERAL ENRICHED COATING"
"MONOCALCIUMPHOSPHATE (MCP)"
"OLIVINE SAND"
"OLIVINE GRANULAR AND GRAVEL AGGREGATE PRODUCTS"
"SAND, MINERAL CONCENTRATE, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I) UN 2912"
"SUGARCANE BIOMASS PELLETS"
"SYNTHETIC SILICON DIOXIDE"

APPENDIX 4

INDEX

195 In the entry for "ILMENITE SAND", in the column of "Group", delete the words "or C".

196 Insert the following new entries in alphabetical order:

Material	Group	References
Beach iron	C	*see* IRON SMELTING BY-PRODUCTS
Bottom ash	A and B	*see* CLINKER ASH
Flat iron	C	*see* IRON SMELTING BY-PRODUCTS
Flint flat glass cullet	C	*see* GLASS CULLET
FOAM GLASS GRAVEL	C	
Granulated iron	C	*see* IRON SMELTING BY-PRODUCTS
K1-K3 bears	C	*see* IRON SMELTING BY-PRODUCTS
Iron pan edges	C	*see* IRON SMELTING BY-PRODUCTS
Iron skulls	C	*see* IRON SMELTING BY-PRODUCTS
IRON SMELTING BY-PRODUCTS	C	
METAL SULPHIDE CONCENTRATES, CORROSIVE UN 1759	A and B	
MONOAMMONIUM PHOSPHATE (M.A.P.), MINERAL ENRICHED COATING	B	
MONOCALCIUMPHOSPHATE (MCP)	A and B	
OLIVINE SAND	A	
OLIVINE GRANULAR AND GRAVEL AGGREGATE PRODUCTS	C	
Pig iron by-product	C	*see* IRON SMELTING BY-PRODUCTS
Plate iron	C	*see* IRON SMELTING BY-PRODUCTS
Pool iron	C	*see* IRON SMELTING BY-PRODUCTS
SAND, MINERAL CONCENTRATE, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I) UN 2912	A and B	
Separation of iron	C	*see* IRON SMELTING BY-PRODUCTS
Silicon dross	C	*see* SILICON SLAG
Steel bears	C	*see* IRON SMELTING BY-PRODUCTS
SUGARCANE BIOMASS PELLETS	B	
SYNTHETIC CALCIUM FLUORIDE	A	
SYNTHETIC SILICON DIOXIDE	A	
TITANOMAGNETITE SAND	A	

"

APPENDIX 5

Bulk Cargo Shipping Names in three languages (English, Spanish and French)

197 In Appendix 5 insert the following new entries in the corresponding alphabetical order:
"

ENGLISH	FRENCH	SPANISH
Beach iron	Fer de type grès dits "beach iron"	Hierro de tipo arenisco conocido como ("beach iron")
Bottom ash	Cendres résiduelles	Cenizas de fondo
Flat iron	Fer plat	Hierro plano
Flint flat glass cullet	Calcin de verre de silex plat	Desperdicios gruesos de vidrio flint
FOAM GLASS GRAVEL	GRANULAT DE VERRE CELLULAIRE	GRAVA DE VIDRIO CELULAR
Granulated iron	Granulats ferreux	Hierro granulado
K1-K3 bears	Pièces en forme d'ours des groupes K1-K3 dites "bears"	Cuescos K1 – K3
Iron pan edges	Fer en forme de poêles dits "Iron pan edges"	Hiero en forma de sartenes denominado ("Iron pan edges")
Iron skulls	Fer en forme de crânes ("iron skulls")	Hierro en forma de cráneos conocido como ("iron skulls")
IRON SMELTING BY-PRODUCTS	PRODUITS DE LA FUSION DU FER	PRODUCTOS DERIVADOS DE LA FUNDICIÓN DEL HIERRO
METAL SULPHIDE CONCENTRATES, CORROSIVE UN 1759	CONCENTRÉS DE SULFURES MÉTALLIQUES, CORROSIFS, ONU 1759	CONCENTRADOS DE SULFUROS METÁLICOS, CORROSIVOS (ONU 1759)
MONOAMMONIUM PHOSPHATE (M.A.P.), MINERAL ENRICHED COATING	MONOPHOSPHATE D'AMMONIUM, REVÊTEMENT ENRICHI EN MINÉRAUX	FOSFATO MONOAMÓNICO CON RECUBRIMIENTO DE MINERAL ENRIQUECIDO
MONOCALCIUMPHOSPHATE (MCP)	PHOSPHATE MONOCALCIQUE EN VRAC	FOSFATO MONOCÁLCICO (MCP)
OLIVINE SAND	SABLE D'OLIVINE	ARENA DE OLIVINO
OLIVINE GRANULAR AND GRAVEL AGGREGATE PRODUCTS	OLIVINE GRANULEUX ET PRODUITS D'AGREGATS DE GRAVIER	PRODUCTOS AGREGADOS GRANULARES Y DE GRAVA DE OLIVINO
Pig iron by-product	Sous-produits de la fonte brute	Productos derivados del hierro en lingotes
Plate iron	Plaques de fer	Placas de hierro
Pool iron	Résidus de hauts fourneaux	Residuos de altos hornos

ENGLISH	FRENCH	SPANISH
SAND, MINERAL CONCENTRATE, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I) UN 2912	MATIÈRES RADIOACTIVES DE FAIBLE ACTIVITÉ SPÉCIFIQUE (LSA-I), ONU 2912, SABLES, CONCENTRÉS DE MINÉRAUX	ARENAS DE CONCENTRADOS DE MINERALES (MATERIAL RADIACTIVO DE BAJA ACTIVIDAD ESPECÍFICA (BAE-I), ONU 2912)
Separation of iron	Résidus du processus de séparation	Residuos del proceso de separación
Steel bears	Pièces d'acier en forme d'ours dites "steel bears"	Cuescos de acero
SILICOMANGANESE (carbo-thermic)	SILICOMANGANÈSE (carbothermique)	SILICOMANGANESO (CARBOTÉRMICO)
SUGARCANE BIOMASS PELLETS	Biomasse de la canne à sucre en pellets	Pellets de biomasa de caña de azúcar
SYNTHETIC CALCIUM FLUORIDE	FLUORURE DE CALCIUM DE SYNTHÈSE	FLUORURO DE CALCIO SINTÉTICO
SYNTHETIC SILICON DIOXIDE	DIOXYDE DE SILICIUM DE SYNTHÈSE	DIÓXIDO DE SILICIO SINTÉTICO
TITANOMAGNETITE SAND	SABLE TITANOMAGNÉTITE	ARENA DE TITANOMAGNETITA

"

***

ANNEX 10

RESOLUTION MSC.428(98)
(adopted on 16 June 2017)

MARITIME CYBER RISK MANAGEMENT IN SAFETY MANAGEMENT SYSTEMS

THE MARITIME SAFETY COMMITTEE,

RECOGNIZING the urgent need to raise awareness on cyber risk threats and vulnerabilities to support safe and secure shipping, which is operationally resilient to cyber risks,

RECOGNIZING ALSO that Administrations, classification societies, shipowners and ship operators, ship agents, equipment manufacturers, service providers, ports and port facilities, and all other maritime industry stakeholders should expedite work towards safeguarding shipping from current and emerging cyber threats and vulnerabilities,

BEARING IN MIND MSC-FAL.1/Circ.3 on *Guidelines on maritime cyber risk management* approved by the Facilitation Committee, at its forty-first session (4 to 7 April 2017), and by the Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), which provides high-level recommendations for maritime cyber risk management that can be incorporated into existing risk management processes and are complementary to the safety and security management practices established by this Organization,

RECALLING resolution A.741(18) by which the Assembly adopted the International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management (ISM) Code) and recognized, inter alia, the need for appropriate organization of management to enable it to respond to the need of those on board ships to achieve and maintain high standards of safety and environmental protection,

NOTING the objectives of the ISM Code which include, inter alia, the provision of safe practices in ship operation and a safe working environment, the assessment of all identified risks to ships, personnel and the environment, the establishment of appropriate safeguards, and the continuous improvement of safety management skills of personnel ashore and aboard ships,

1 AFFIRMS that an approved safety management system should take into account cyber risk management in accordance with the objectives and functional requirements of the ISM Code;

2 ENCOURAGES Administrations to ensure that cyber risks are appropriately addressed in safety management systems no later than the first annual verification of the company's Document of Compliance after 1 January 2021;

3 ACKNOWLEDGES the necessary precautions that could be needed to preserve the confidentiality of certain aspects of cyber risk management;

4 REQUESTS Member States to bring this resolution to the attention of all stakeholders.

***

ANNEX 13

DRAFT AMENDMENTS TO SOLAS REGULATIONS II-1/1 AND II-1/8-1*

Regulation 1 – Application

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

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

.1 for which the building contract is placed on or after 1 January 2020; or

.2 in the absence of a building contract, the keel of which is laid or which are at a similar stage of construction on or after 1 July 2020; or

.3 the delivery of which is on or after 1 January 2024.

1.1.2 Unless expressly provided otherwise, for ships not subject to the provisions of subparagraph 1.1.1 but constructed on or after 1 January 2009, the Administration shall:

.1 ensure that the requirements for parts B, B-1, B-2 and B-4 which are applicable under chapter II-1 of the International Convention for the Safety of Life at Sea, 1974, as amended by resolutions MSC.216(82), MSC.269(85) and MSC.325(90) are complied with; and

.2 ensure that the requirements of regulations 8-1.3 and 19-1 are complied with."

2 The existing paragraph 1.3.4 is deleted.

3 The existing paragraph 2 is replaced with the following:

"2 Unless expressly provided otherwise, for ships constructed before 1 January 2009, the Administration shall:

.1 ensure that the requirements which are applicable under chapter II-1 of the International Convention for the Safety of Life at Sea, 1974, as amended by resolutions MSC.1(XLV), MSC.6(48), MSC.11(55), MSC.12(56), MSC.13(57), MSC.19(58), MSC.26(60), MSC.27(61), Resolution 1 of the 1995 SOLAS Conference, MSC.47(66), MSC.57(67), MSC.65(68), MSC.69(69), MSC.99(73), MSC.134(76), MSC.151(78) and MSC.170(79) are complied with; and

.2 ensure that the requirements of regulations 8-1.3 and 19-1 are complied with."

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

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

4 The existing text of regulation 8-1 is amended to read as follows:

"**1 Application**

Passenger ships having length, as defined in regulation II-1/2.5, of 120 m or more or having three or more main vertical zones shall comply with the provisions of this regulation.

2 Availability of essential systems in case of flooding damage[*]

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

3 Operational information after a flooding casualty

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

.1 onboard stability computer; or

.2 shore-based support,

based on the guidelines developed by the Organization.[**]

3.2 Passenger ships constructed before 1 January 2014 shall comply with the provisions in paragraph 3.1 not later than the first renewal survey after [*X years after the date of entry into force*].

---

[*] Refer to the *Interim Explanatory Notes for the assessment of passenger ship systems' capabilities after a fire or flooding casualty* (MSC.1/Circ.1369).

[**] Refer to the *Guidelines on operational information for Masters of passenger ships for safe return to port by own power or under tow* (MSC.1/Circ.1400) for ships constructed on or after 1 January 2014 but before 13 May 2016, or the *Revised Guidelines on operational information for masters of passenger ships for safe return to port* (MSC.1/Circ.1532) for ships constructed on or after 13 May 2016, or the guidelines to be developed by the Organization for passenger ships constructed before 1 January 2014."

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MSC.1/Circ.1570
9 June 2017

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

1 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), with a view to improving the damage control information on board passenger ships and to positively impacting survivability of those ships in the event of flooding, approved amendments to the *Guidelines for damage control plans and information to the master* (MSC.1/Circ.1245), as prepared by the Sub-Committee on Ship Design and Construction at its fourth session (13 to 17 February 2017), as set out in the annex.

2 Member States are invited to use MSC.1/Circ.1245 in conjunction with the annexed amendments when applying the requirements of SOLAS regulation II-1/19 to passenger ships built on or after 9 June 2017 and to passenger ships which undergo significant alterations on or after 9 June 2017, that necessitate amending the damage control information, and to bring these amendments to the attention of all parties concerned.

***

ANNEX

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

1 After the existing paragraph 3.2.7, the following new paragraphs 3.3 and 3.4 are inserted as follows:

"3.3 In addition to the provisions of paragraph 3.2 above, damage control plans of passenger ships should be prepared as follows:

.1 provide the plan in colour and ensure that it is legible when printed;

.2 provide a legend describing each symbol used within the plan;

.3 clearly identify the location of damage control equipment and damage equipment lockers on the plan;

.4 provide compartment identification consistent with the damage control booklet and the stability computer information, as applicable;

.5 highlight access points (stairways and ladders) as follows:

.1 indicate the compartment and deck to be accessed;

.2 indicate whether an access point represents both up and down or only one way transit (at the bottom of the stair or ladder); and

.3 indicate all hatches;

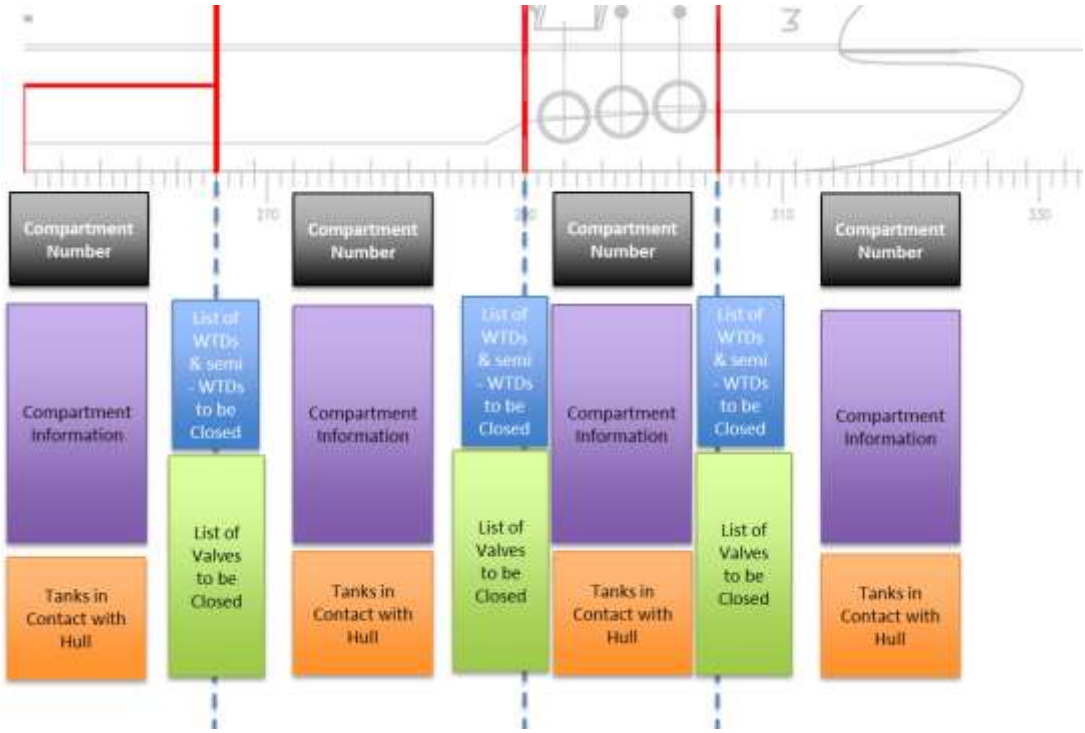
.6 shading of key features may be used on the damage control plan to clearly depict essential information regarding the ship's watertight subdivision and related equipment;

.7 depict watertight doors and semi-watertight doors;

.8 indicate the locations of sounding pipes for all spaces with a sounding pipe, including void spaces;

.9 in addition to the bilge and ballast pumps, indicate the location of any other relevant pumps referred to in the damage control booklet; and

.10 the inboard profile plan should indicate the compartment boundaries with the list of watertight closing appliances necessary to ensure the watertight integrity of the compartment and the list of tanks and description of spaces within the compartment (see the example below).



3.4 Where fittings or equipment are common in both fire and damage control plans of passenger ships, the graphical symbols used in damage control plans should be in accordance with the *Graphical symbols for shipboard fire control plans* (resolution A.952(23))."

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MSC.1/Circ.1571
9 June 2017

UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-1

1 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), with a view to providing more specific guidance on special requirements for vehicle ferries, ro-ro ships and other ships of similar type, and on the drainage of enclosed spaces situated on the bulkhead deck, approved the unified interpretations of SOLAS chapter II-1, prepared by the Sub-Committee on Ship Design and Construction, at its fourth session (13 to 17 February 2017), as set out in the annex.

2 Member States are invited to use the annexed unified interpretations as guidance when applying SOLAS regulations II-1/17-1, II-1/20-2 and II-1/35-1, and to bring the unified interpretations to the attention of all parties concerned.

***

ANNEX

UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-1

Regulations II-1/17-1.1.1 and II-1/20-2

1 Stern, bow and side doors of large dimensions, when manual devices would not be readily accessible, should be normally secured by means of power systems.

2 Alternative means of securing should also be provided for emergency use in case of failure of the power systems.

3 In ro-ro passenger ships constructed before 1 July 1997, all access doors or hatchways to spaces below the ro-ro deck, which may be used at sea, should have sills or coamings not less than 380 mm in height above the ro-ro deck, and should be provided with doors or covers considered weathertight in relation to their position; refer to SOLAS regulation II-1/20-2.

4 For ro-ro passenger ships constructed on or after 1 July 1997 but before 1 January 2009, refer to SOLAS regulation II-1/20-2.

5 The ro-ro deck, referred to in paragraph 3 above, is the deck above which the stern, bow or side doors are fitted, or the first deck above the load waterline.

Regulation II-1/35-1.2.6.1

The drainage of enclosed spaces situated on the bulkhead deck to suitable spaces below the bulkhead deck is also permitted provided such drainage is arranged in accordance with the provisions of regulation 22(2) of the Protocol of 1988 relating to the International Convention on Load Lines, 1966.

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MSC.1/Circ.1572
9 June 2017

UNIFIED INTERPRETATIONS OF SOLAS CHAPTERS II-1 AND XII, OF THE TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS (RESOLUTION MSC.158(78)) AND OF THE PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS (RESOLUTION MSC.188(79))

1 The Maritime Safety Committee, at its ninety-second session (12 to 21 June 2013), approved unified interpretations of the provisions of SOLAS chapters II-1 and XII, of the *Technical provisions for means of access for inspections* (resolution MSC.158(78)) and of the *Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers* (resolution MSC.188(79)), as set out in the annex to MSC.1/Circ.1464/Rev.1 and in Corr.1, following the recommendations made by the Sub-Committee on Ship Design and Equipment at its fifty-seventh session, with a view to ensuring a uniform approach towards the application of the provisions of SOLAS chapters II-1 and XII.

2 The Maritime Safety Committee, at its ninety-fifth session (3 to 12 June 2015), with a view to providing more specific guidance on the application of SOLAS regulation II-1/3-6.3.1, as amended, and the revised *Technical provisions for means of access for inspections* (resolution MSC.158(78)), approved amendments to the *Unified interpretations of the provisions of SOLAS chapters II-1 and XII, of the Technical provisions for means of access for inspections (resolution MSC.158(78)) and of the Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers (resolution MSC.188(79))* (MSC.1/Circ.1464/Rev.1), as prepared by the Sub-Committee on Ship Design and Construction, at its second session (16 to 20 February 2015), as set out in the annex to MSC.1/Circ.1507.

3 The Maritime Safety Committee, at its ninety-sixth session (11 to 20 May 2016), approved the Unified interpretations relating to the application of SOLAS regulation II-1/3-6, as amended, and the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78)), prepared by the Sub-Committee on Ship Design and Construction, at its third session (18 to 22 January 2016), as set out in the annex to MSC.1/Circ.1545, with a view to ensuring a uniform approach towards the application of the provisions of SOLAS regulation II-1/3-6. Having approved MSC.1/Circ.1545 and considered the need to consequentially amend MSC.1/Circ.1464/Rev.1 and its Corr.1, as amended by MSC.1/Circ.1507, the Committee requested the Secretariat to prepare a consolidated MSC circular containing the provisions of MSC.1/Circ.1464/Rev.1 and Corr.1, as amended by MSC.1/Circ.1507, and MSC.1/Circ.1545.

4 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), approved the Unified interpretations of the provisions of SOLAS chapters II-1 and XII, of the *Revised technical provisions for means of access for inspections* (resolution MSC.158(78)) and of the *Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers* (resolution MSC.188(79)), containing the provisions of MSC.1/Circ.1464/Rev.1 and Corr.1, as amended by MSC.1/Circ.1507, and MSC.1/Circ.1545, as set out in the annex.

5 Member States are invited to use the annexed interpretations when applying relevant provisions of SOLAS chapters II-1 and XII to ships constructed on or after 9 June 2017, and to bring them to the attention of all parties concerned.

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ANNEX

UNIFIED INTERPRETATIONS OF SOLAS CHAPTERS II-1 AND XII, OF THE TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS (RESOLUTION MSC.158(78)) AND OF THE PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS (RESOLUTION MSC.188(79))

Table of contents

1 SOLAS REGULATION II-1/3-6 – ACCESS TO AND WITHIN SPACES IN, AND FORWARD OF, THE CARGO AREA OF OIL TANKERS AND BULK CARRIERS

1.1 SOLAS REGULATION II-1/3-6, SECTION 1

Interpretation

Oil tankers

This regulation is only applicable to oil tankers having integral tanks for carriage of oil in bulk, which is contained in the definition of oil in Annex I of MARPOL. Independent oil tanks can be excluded. Regulation II-1/3-6 should not normally be applied to FPSO or FSU unless the Administration decides otherwise.

Technical background

Means of access specified in the Technical provisions contained in resolution MSC.158(78) are not specific with respect to the application to integral cargo oil tanks or also to independent cargo oil tanks. Enhanced survey programme (ESP) requirements of oil tankers have been established assuming the target cargo oil tanks are integral tanks. The means of access regulated under regulation II-1/3-6 is for overall and close-up inspections as defined in regulation IX/1. Therefore it is assumed that the target cargo oil tanks are those of ESP, i.e. integral cargo tanks. Regulation II-1/3-6 is applicable to new, purpose-built FPSO or FSU if they are subject to the scope of the 2011 ESP Code (resolution A.1049(27), as amended). Considering that the principles of the *Technical provisions for means of access for inspections* (resolution MSC.158(78)) recognize that permanent means of access should be considered and provided for at the design stage so that, to the maximum extent possible, they can be made an integral part of the designed structural arrangement, regulation II-1/3-6 is not considered applicable to an FPSO/FSU that is converted from an existing tanker.

Reference

SOLAS regulation IX/1 and the 2011 ESP Code, as amended.

1.2 SOLAS REGULATION II-1/3-6, PARAGRAPH 2.1

Interpretation

Each space for which close-up inspection is not required such as fuel oil tanks and void spaces forward of cargo area, may be provided with a means of access necessary for overall survey intended to report on the overall conditions of the hull structure.

1.3 SOLAS REGULATION II-1/3-6, PARAGRAPH 2.2

Interpretation

Some possible alternative means of access are listed under paragraph 3.9 of the Technical provisions for means of access for inspections. Always subject to acceptance as equivalent by the Administration, alternative means such as an unmanned robot arm, ROVs and dirigibles with necessary equipment of the permanent means of access for overall and close-up inspections and thickness measurements of the deck head structure such as deck transverses and deck longitudinals of cargo oil tanks and ballast tanks, should be capable of:

.1 safe operation in ullage space in gas-free environment; and

.2 introduction into the place directly from a deck access.

Technical background

Innovative approaches, in particular the development of robots in place of elevated passageways, are encouraged and it is considered worthwhile to provide the functional requirement for the innovative approach.

1.4 SOLAS REGULATION II-1/3-6, PARAGRAPH 2.3

Interpretation

Inspection

The means of access arrangements, including portable equipment and attachments, should be periodically inspected by the crew or competent inspectors as and when it is going to be used to confirm that the means of access remain in serviceable condition.

Procedures

1 Any Company authorized person using the means of access should assume the role of inspector and check for obvious damage prior to using the access arrangements. Whilst using the means of access, the inspector should verify the condition of the sections used by close-up examination of those sections and note any deterioration in the provisions. Should any damage or deterioration be found, the effect of such deterioration should be assessed as to whether the damage or deterioration affects the safety for continued use of the access. Deterioration found that is considered to affect safe use should be determined as "substantial damage" and measures should be put in place to ensure that the affected section(s) are not to be further used prior to effective repair.

2 Statutory survey of any space that contains means of access should include verification of the continued effectiveness of the means of access in that space. Survey of the means of access should not be expected to exceed the scope and extent of the survey being undertaken. If the means of access is found deficient the scope of survey should be extended if this is considered appropriate.

3 Records of all inspections should be established based on the requirements detailed in the ship's Safety Management System. The records should be readily available to persons using the means of access and a copy attached to the Ship Structure Access Manual. The latest record for the portion of the means of access inspected should include as a minimum the date of the inspection, the name and title of the inspector, a confirmation signature, the sections of means of access inspected, verification of continued serviceable condition or details of any deterioration or substantial damage found. A file of permits issued should be maintained for verification.

Technical background

It is recognized that means of access may be subject to deterioration in the long term due to corrosive environment and external forces from ship motions and sloshing of liquid contained in the tank. Means of access therefore should be inspected at every opportunity of tank/space entry. The above interpretation should be contained in a section of the Ship Structure Access Manual.

1.5 SOLAS REGULATION II-1/3-6, PARAGRAPH 3.1

Interpretation

1 Access to a double-side skin space of bulk carriers may be either from a topside tank or double-bottom tank or from both.

2 The wording "not intended for the carriage of oil or hazardous cargoes" applies only to "similar compartments", i.e. safe access can be through a pump-room, deep cofferdam, pipe tunnel, cargo hold or double-hull space.

Technical background

Unless used for other purposes, the double-side skin space should be designed as a part of a large U-shaped ballast tank and such space should be accessed through the adjacent part of the tank, i.e. topside tank or double-bottom/bilge hopper tank. Access to the double-side skin space from the adjacent part rather than direct from the open deck is justified. Any such arrangement should provide a directly routed, logical and safe access that facilitates easy evacuation of the space.

1.6 SOLAS REGULATION II-1/3-6, PARAGRAPH 3.2

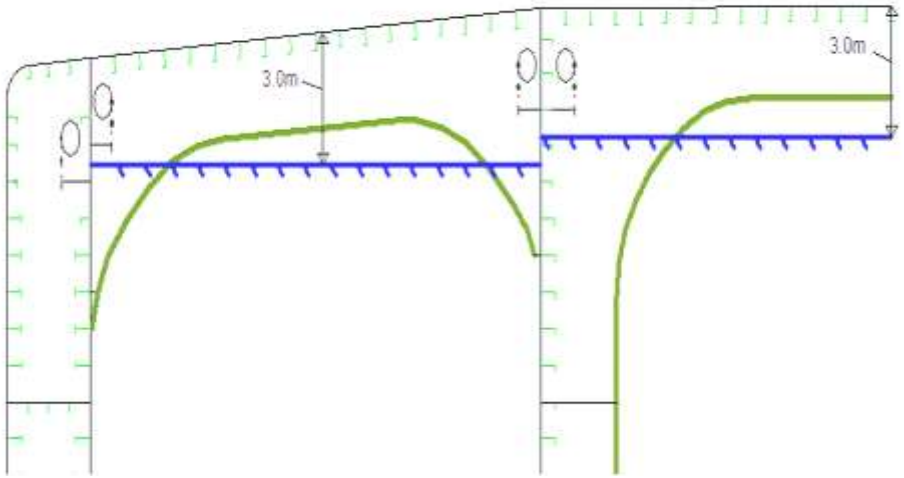
Interpretation

1 A cargo oil tank of less than 35 m length without a swash bulkhead requires only one access hatch.

2 Where rafting is indicated in the ship structures access manual as the means to gain ready access to the under-deck structure, the term "*similar obstructions*" referred to in the regulation includes internal structures (e.g. webs > 1.5 m deep) which restrict the ability to raft (at the maximum water level needed for rafting of under-deck structure) directly to the nearest access ladder and hatchway to deck. When rafts or boats alone, as an alternative means of access, are allowed under the conditions specified in the 2011 ESP Code, permanent means of access are to be provided to allow safe entry and exit. This means:

.1 access direct from the deck via a vertical ladder and small platform fitted approximately 2 m below the deck in each bay; or

.2 access to the deck from a longitudinal permanent platform having ladders to the deck in each end of the tank. The platform should, for the full length of the tank, be arranged in level with, or above, the maximum water level needed for rafting of the under-deck structure. For this purpose, the ullage corresponding to the maximum water level should not be assumed more than 3 m from the deck plate measured at the midspan of deck transverses and in the middle length of the tank (see figure below). A permanent means of access from the longitudinal permanent platform to the water level indicated above should be fitted in each bay (e.g. permanent rungs on one of the deck webs inboard of the longitudinal permanent platform).



1.7 SOLAS REGULATION II-1/3-6, PARAGRAPH 4.1

Interpretation

1 The access manual should address spaces listed in paragraph 3 of regulation II-1/3-6. As a minimum the English version should be provided. The ship structure access manual should contain at least the following two parts:

Part 1: Plans, instructions and inventory required by paragraphs 4.1.1 to 4.1.7 of regulation II-1/3-6. This part should be approved by the Administration or the organization recognized by the Administration.

Part 2: Form of record of inspections and maintenance, and change of inventory of portable equipment due to additions or replacement after construction. This part should be approved for its form only at new building.

2 The following matters should be addressed in the ship structure access manual:

.1 the access manual should clearly cover scope as specified in the regulations for use by crews, surveyors and port State control officers;

.2 approval/re-approval procedure for the manual, i.e. any changes of the permanent, portable, movable or alternative means of access within the scope of the regulation and the Technical provisions are subject to review and approval by the Administration or by the organization recognized by the Administration;

.3 verification of means of access should be part of the safety construction survey for continued effectiveness of the means of access in that space which is subject to the statutory survey;

.4 inspection of means of access by the crew and/or a competent inspector of the company as a part of regular inspection and maintenance (see interpretation of paragraph 2.3 of regulation II-1/3-6);

.5 actions to be taken if means of access is found unsafe to use; and

.6 in case of use of portable equipment plans showing the means of access within each space indicating from where and how each area in the space can be inspected.

1.8 SOLAS REGULATION II-1/3-6, PARAGRAPH 4.2

Interpretation

1 Critical structural areas should be identified by advanced calculation techniques for structural strength and fatigue performance, if available, and feedback from the service history and design development of similar or sister ships.

2 Reference should be made to the following publications for critical structural areas, where applicable:

.1 Oil tankers: Guidance Manual for Tanker Structures by TSCF;

.2 Bulk carriers: Bulk Carriers Guidelines for Surveys, Assessment and Repair of Hull Structure by IACS; and

.3 Oil tankers and bulk carriers: the 2011 ESP Code (resolution A.1049(27), as amended).

Technical background

These documents contain the relevant information for the present ship types. However, identification of critical areas for new double-hull tankers and double-side skin bulk carriers of improved structural design should be made by structural analysis at the design stage, this information should be taken into account to ensure appropriate access to all identified critical areas.

1.9 SOLAS REGULATION II-1/3-6, PARAGRAPH 5.1

Interpretation

The minimum clear opening of 600 mm x 600 mm may have corner radii up to 100 mm maximum. The clear opening is specified in MSC/Circ.686/Rev.1 to keep the opening fit for passage of personnel wearing a breathing apparatus. In such a case where as a consequence of structural analysis of a given design the stress should be reduced around the opening, it is considered appropriate to take measures to reduce the stress such as making the opening larger with increased radii, e.g. 600 x 800 with 300 mm radii, in which a clear opening of 600 x 600 mm with corner radii up to 100 mm maximum fits.

Technical background

The interpretation is based upon the established Guidelines in MSC/Circ.686/Rev.1.

Reference

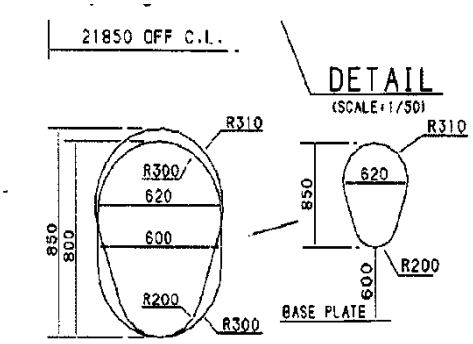
Paragraph 9 of the annex to MSC/Circ.686/Rev.1.

1.10 SOLAS REGULATION II-1/3-6, PARAGRAPH 5.2

Interpretation

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

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



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

Technical background

The interpretation is based upon the established Guidelines in MSC/Circ.686/Rev.1 and an innovative design is considered for easy access by humans through the opening.

Reference

Paragraph 11 of the annex to MSC/Circ.686/Rev.1.

2 TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS (RESOLUTION MSC.158(78))

2.1 PARAGRAPH 1.3

Interpretation

A "combined chemical/oil tanker complying with the provisions of the IBC Code" is a tanker that holds both a valid IOPP certificate as a tanker and a valid certificate of fitness for the carriage of dangerous chemicals in bulk, i.e. a tanker that is certified to carry both oil cargoes under MARPOL Annex I and Chemical cargoes in chapter 17 of the IBC Code either as full or part cargoes. The Technical provisions should be applied to ballast tanks of combined chemical/oil tankers complying with the provisions of the IBC Code.

2.2 PARAGRAPH 1.4

Interpretation

1 In the context of the above requirement, the deviation should be applied only to distances between integrated permanent means of access that are the subject of paragraph 2.1.2 of table 1.

2 Deviations should not be applied to the distances governing the installation of under-deck longitudinal walkways and dimensions that determine whether permanent access is required or not, such as height of the spaces and height to elements of the structure (e.g. cross-ties).

2.3 PARAGRAPH 3.1

Interpretation

The permanent means of access to a space can be credited for the permanent means of access for inspection.

Technical background

The Technical provisions specify means of access to a space and to hull structure for carrying out overall and close-up surveys and inspections. Requirements of means of access to hull structure may not always be suitable for access to a space. However, if the means of access to a space can also be used for the intended surveys and inspections such means of access can be credited for the means of access for use for surveys and inspections.

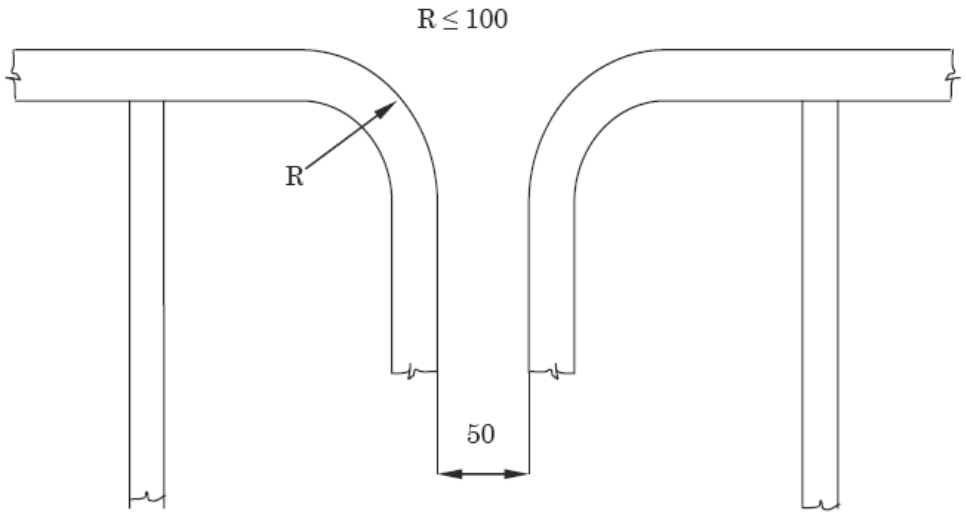
2.4 PARAGRAPH 3.3

Interpretation

1 Sloping structures are structures that are sloped by 5 or more degrees from horizontal plane when a ship is in an upright position at even-keel.

2 Guard rails should be fitted on the open side and should be at least 1,000 mm in height. For stand-alone passageways guard rails should be fitted on both sides of these structures. Guardrail stanchions are to be attached to the permanent means of access. The distance between the passageway and the intermediate bar and the distance between the intermediate bar and the top rail should not be more than 500 mm.

3 Discontinuous top handrails are allowed, provided the gap does not exceed 50 mm. The same maximum gap is to be considered between the top handrail and other structural members (i.e. bulkhead, web frame, etc.). The maximum distance between the adjacent stanchions across the handrail gaps is to be 350 mm where the top and mid handrails are not connected together and 550 mm when they are connected together. The maximum distance between the stanchion and other structural members is not to exceed 200 mm where the top and mid handrails are not connected together and 300 mm when they are connected together. When the top and mid handrails are connected by a bent rail, the outside radius of the bent part is not to exceed 100 mm (see figure below).



4 Non-skid construction is such that the surface on which personnel walks provides sufficient friction to the sole of boots even if the surface is wet and covered with thin sediment.

5 "Substantial construction" is taken to refer to the as-designed strength as well as the residual strength during the service life of the vessel. Durability of passageways together with guard rails should be ensured by the initial corrosion protection and inspection and maintenance during services.

6 For guard rails, use of alternative materials such as GRP should be subject to compatibility with the liquid carried in the tank. Non-fire resistant materials should not be used for means of access to a space with a view to securing an escape route at a high temperature.

7 Requirements for resting platforms placed between ladders should be equivalent to those applicable to elevated passageways.

Reference

Paragraph 10 of the annex to MSC/Circ.686/Rev.1.

2.5 PARAGRAPH 3.4

Interpretation

Where the vertical manhole is at a height of more than 600 mm above the walking level, it should be demonstrated that an injured person can be easily evacuated.

2.6 PARAGRAPH 3.5

Interpretation

Means of access to ballast tanks, cargo tanks and spaces other than fore peak tanks:

For oil tankers:

1 Tanks and subdivisions of tanks having a length of 35 m or more with two access hatchways:

First access hatchway: Inclined ladder or ladders should be used.

Second access hatchway:

.1 A vertical ladder may be used. In such a case where the vertical distance is more than 6 m, vertical ladders should comprise one or more ladder-linking platforms spaced not more than 6 m apart vertically and displaced to one side of the ladder.

The uppermost section of the vertical ladder, measured clear of the overhead obstructions in the way of the tank entrance, should not be less than 2.5 m but not exceed 3.0 m and should comprise a ladder-linking platform which should be displaced to one side of a vertical ladder. However, the vertical distance of the uppermost section of the vertical ladder may be reduced to 1.6 m, measured clear of the overhead obstructions in the way of the tank entrance, if the ladder lands on a longitudinal or athwartship permanent means of access fitted within that range. Adjacent sections of the ladder should be laterally offset from each other by at least the width of the ladder (see paragraph 20 of MSC/Circ.686/Rev.1 and refer to the interpretation of paragraphs 3.13.2 and 3.13.6 of the Technical provisions (resolution MSC.158(78))); or

.2 Where an inclined ladder or combination of ladders is used for access to the space, the uppermost section of the ladder, measured clear of the overhead obstructions in the way of the tank entrance, should be vertical for not less than 2.5 m but not exceed 3.0 m and should comprise a landing platform continuing with an inclined ladder. However, the vertical distance of the uppermost section of the vertical ladder may be reduced to 1.6 m, measured clear of the overhead obstructions in the way of the tank entrance, if the ladder lands on a longitudinal or athwartship permanent means of access fitted within that range. The flights of the inclined ladders are normally to be not more than 6 m in vertical height. The lowermost section of the ladders may be vertical for the vertical distance not exceeding 2.5 m.

2 Tanks less than 35 m in length and served by one access hatchway: an inclined ladder or combination of ladders should be used to the space as specified in 1.2 above.

3 In spaces of less than 2.5 m in width the access to the space may be by means of vertical ladders that comprise one or more ladder-linking platforms spaced not more than 6 m apart vertically and displaced to one side of the ladder. The uppermost section of the vertical ladder, measured clear of the overhead obstructions in the way of the tank entrance, should not be less than 2.5 m but not exceed 3.0 m and should comprise a ladder-linking platform which should be displaced to one side of a vertical ladder. However, the vertical distance of the uppermost section of the vertical ladder may be reduced to 1.6 m, measured clear of the overhead obstructions in the way of the tank entrance, if the ladder lands on a longitudinal or athwartship permanent means of access fitted within that range. Adjacent sections of the ladder should be laterally offset from each other by at least the width of the ladder (see paragraph 20 of MSC/Circ.686/Rev.1 and refer to the interpretation of paragraphs 3.13.2 and 3.13.6 of the Technical provisions (resolution MSC.158(78))).

4 Access from the deck to a double-bottom space may be by means of vertical ladders through a trunk. The vertical distance from deck to a resting platform, between resting platforms, or a resting platform and the tank bottom should not be more than 6 m, unless otherwise approved by the Administration.

Means of access for inspection of the vertical structure of oil tankers:

Vertical ladders provided for means of access to the space may be used for access for inspection of the vertical structure.

Unless stated otherwise in table 1 of the Technical provisions, vertical ladders that are fitted on vertical structures for inspection should comprise one or more ladder-linking platforms spaced not more than 6 m apart vertically and displaced to one side of the ladder. Adjacent sections of ladder should be laterally offset from each other by at least the width of the ladder (see paragraph 20 of MSC/Circ.686/Rev.1 and refer to the interpretation of paragraphs 3.13.2 and 3.13.6 of the Technical provisions (resolution MSC.158(78))).

Obstruction distances

The minimum distance between the inclined ladder face and obstructions, i.e. 750 mm and, in the way of openings, 600 mm specified in paragraph 3.5 of the Technical provisions, should be measured perpendicular to the face of the ladder.

Technical background

It is common practice to use a vertical ladder from the deck to the first landing to clear overhead obstructions before continuing to an inclined ladder or a vertical ladder displaced to one side of the first vertical ladder.

Reference

For vertical ladders: paragraph 20 of the annex to MSC/Circ.686/Rev.1.

2.7 PARAGRAPH 3.6

Interpretation

1 The vertical height of handrails should not be less than 890 mm from the centre of the step and two course handrails need only be provided where the gap between the stringer and the top handrail is greater than 500 mm.

2 The requirement of two square bars for treads specified in paragraph 3.6 of the Technical provisions is based upon the specification of the construction of ladders in paragraph 3(e) of annex 1 to resolution A.272(VIII), which addresses inclined ladders. Paragraph 3.4 of the Technical Provisions allows for single rungs fitted to vertical surfaces, which is considered a safe grip. For vertical ladders, when steel is used, the rungs should be formed of single square bars of not less than 22 mm by 22 mm for the sake of safe grip.

3 The width of inclined ladders for access to a cargo hold should be at least 450 mm to comply with the Australian AMSA Marine Orders part 32, appendix 17.

4 The width of inclined ladders other than an access to a cargo hold should be not less than 400 mm.

5 The minimum width of vertical ladders should be 350 mm and the vertical distance between the rungs should be equal and should be between 250 mm and 350 mm.

6 A minimum climbing clearance in width should be 600 mm other than the ladders placed between the hold frames.

7 The vertical ladders should be secured at intervals not exceeding 2.5 m apart to prevent vibration.

Technical background

1 Paragraph 3.6 of the Technical provisions is a continuation of paragraph 3.5 of the Technical Provisions, which addresses inclined ladders. Interpretations for vertical ladders are needed based upon the current standards of IMO, AMSA or the industry.

2 Interpretations 2 and 5 address vertical ladders based upon the current standards.

3 Double square bars for treads become too large for a grip for vertical ladders and single rungs facilitate a safe grip.

4 Interpretation 7 is introduced consistently with the requirement and the interpretation of paragraph 3.4 of the Technical provisions.

Reference

1 Annex 1 to resolution A.272(VIII).

2 Australian AMSA Marine Orders part 32, appendix 17.

3 ILO Code of Practice *Safety and health in dock work* – section 3.6, Access to ship's hold.

2.8 PARAGRAPH 3.9.6

Interpretation

A mechanical device such as hooks for securing at the upper end of a ladder should be considered as an appropriate securing device if a movement fore/aft and sideways can be prevented at the upper end of the ladder.

Technical background

Innovative design should be accepted if it fits the functional requirement with due consideration for safe use.

2.9 PARAGRAPHS 3.10 AND 3.11

Interpretation

See interpretation for paragraphs 5.1 and 5.2 of SOLAS regulation II-1/3-6.

2.10 PARAGRAPH 3.13.1

Interpretation

1 Either a vertical or an inclined ladder or a combination of them may be used for access to a cargo hold where the vertical distance is 6 m or less from the deck to the bottom of the cargo hold.

2 Deck is defined as "weather deck".

2.11 PARAGRAPHS 3.13.2 AND 3.13.6

Adjacent sections of vertical ladder should to be installed so that the following provisions are complied with:

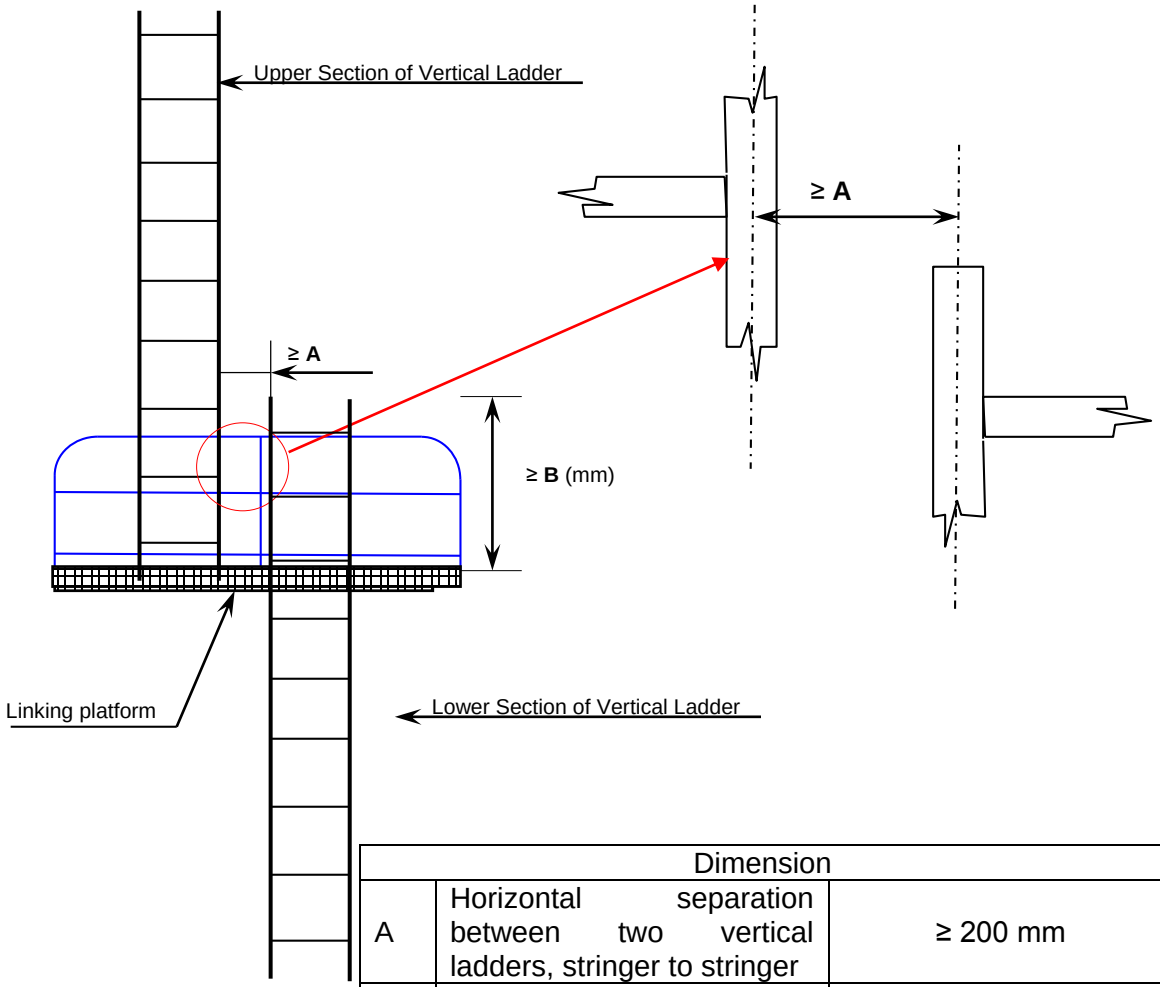
- the minimum "lateral offset" between two adjacent sections of vertical ladder, is the distance between the sections, upper and lower, so that the adjacent stringers are spaced of at least 200 mm, measured from half thickness of each stringer.

- adjacent sections of vertical ladder should be installed so that the upper end of the lower section is vertically overlapped, in respect to the lower end of the upper section, to a height of 1,500 mm in order to permit a safe transfer between ladders.

- no section of the access ladder should be terminated directly or partly above an access opening.

Figure "A"

Vertical Ladder – Ladder through the linking platform



Dimension		
A	Horizontal separation between two vertical ladders, stringer to stringer	≥ 200 mm
B	Stringer height above landing or intermediate platform	≥ 1,500* mm
C	Horizontal separation between ladder and platform	100 mm ≤ C < 300 mm
*	The minimum height of the handrail of resting platform is 1,000 mm (paragraph 3.3 of the Technical provisions (resolution MSC.158(78)))	

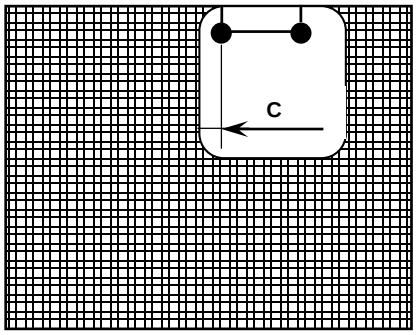
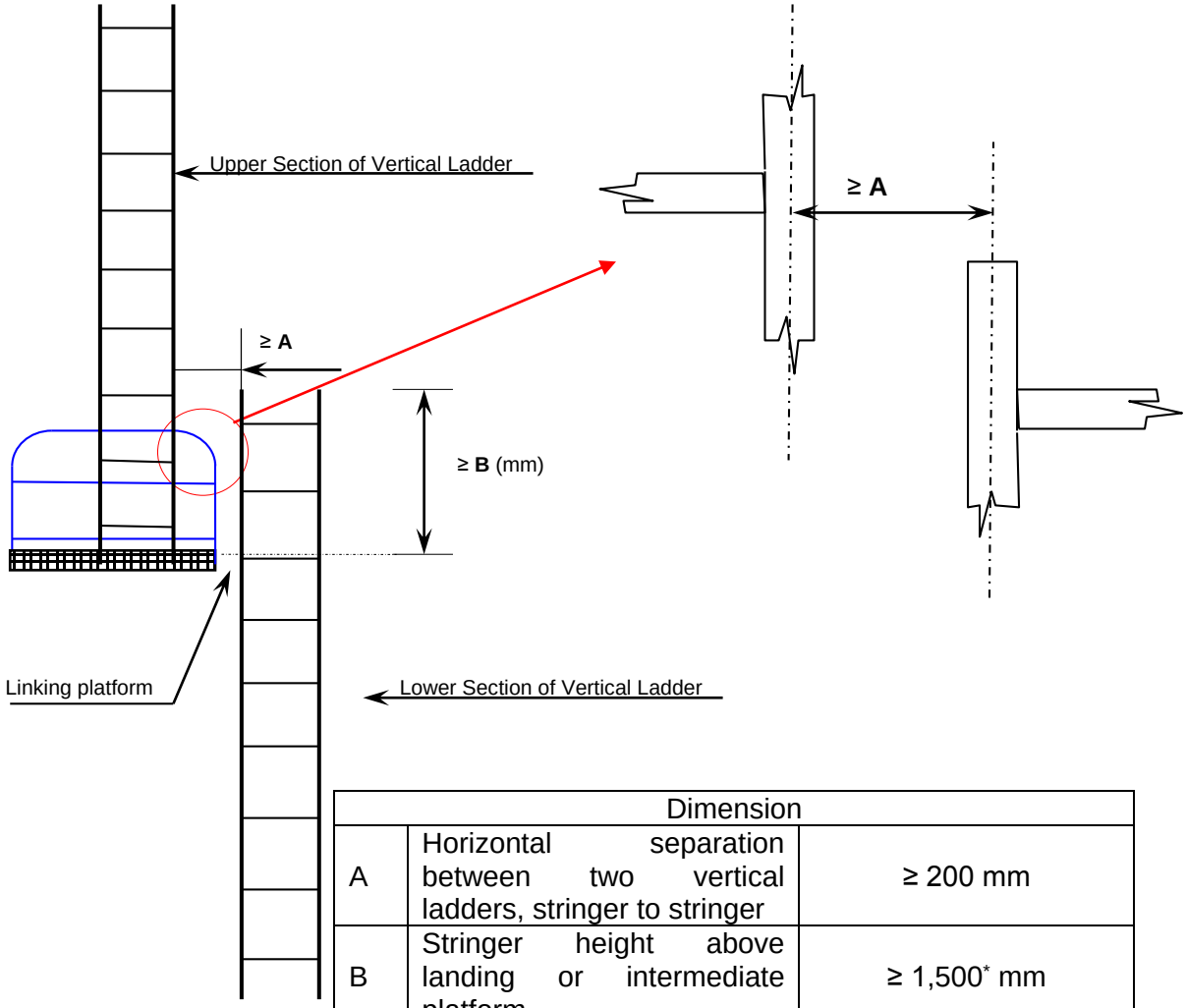
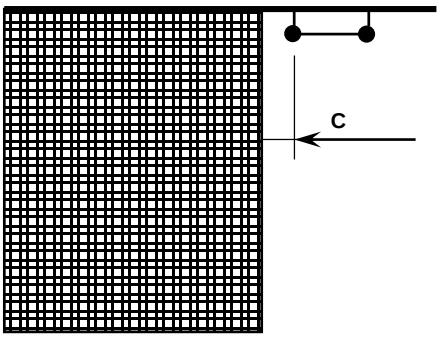


Figure "B"

Vertical Ladder – Side mount



Dimension		
A	Horizontal separation between two vertical ladders, stringer to stringer	≥ 200 mm
B	Stringer height above landing or intermediate platform	≥ 1,500* mm
C	Horizontal separation between ladder and platform	100 mm ≤ C < 300 mm
*	The minimum height of the handrail of resting platform is 1,000 mm (paragraph 3.3 of the Technical provisions, (resolution MSC.158(78)))	



2.12 TABLE 1 – MEANS OF ACCESS FOR BALLAST AND CARGO TANKS OF OIL TANKERS, PARAGRAPH 1.1

Interpretation

1 Subparagraphs .1 to .3 define access to under-deck structures, access to the uppermost sections of transverse webs and connection between these structures.

2 Subparagraphs .4 to .6 define access to vertical structures only and are linked to the presence of transverse webs on longitudinal bulkheads.

3 If there are no under-deck structures (deck longitudinals and deck transverses) but there are vertical structures in the cargo tank supporting transverse and longitudinal bulkheads, access in accordance with subparagraphs .1 to .6 should be provided for inspection of the upper parts of vertical structure on transverse and longitudinal bulkheads.

4 If there is no structure in the cargo tank, section 1.1 of table 1 should not be applied.

5 Section 1 of table 1 should also be applied to void spaces in the cargo area, comparable in volume to spaces covered by SOLAS regulation II-1/3-6, except those spaces covered by section 2.

6 The vertical distance below the overhead structure should be measured from the underside of the main deck plating to the top of the platform of the means of access at a given location.

7 The height of the tank should be measured at each tank. For a tank the height of which varies at different bays, item 1.1 should be applied to such bays of a tank that have a height of 6 m and over.

Technical background

Interpretation 7, if the height of the tank is increasing along the length of a ship, the permanent means of access should be provided locally where the height is above 6 m.

Reference

Paragraph 10 of the annex to MSC/Circ.686/Rev.1.

2.13 TABLE 1 – MEANS OF ACCESS FOR BALLAST AND CARGO TANKS OF OIL TANKERS, PARAGRAPH 1.1.2

Interpretation

There is a need to provide a continuous longitudinal permanent means of access when the deck longitudinals and deck transverses are fitted on deck but supporting brackets are fitted under the deck.

2.14 TABLE 1 – MEANS OF ACCESS FOR BALLAST AND CARGO TANKS OF OIL TANKERS, PARAGRAPH 1.1.3

Interpretation

Means of access to tanks may be used for access to the permanent means of access for inspection.

Technical background

As a matter of principle, in such a case where the means of access can be utilized for the purpose of accessing structural members for inspection there is no need of duplicated installation of the means of access.

2.15 TABLE 1 – MEANS OF ACCESS FOR BALLAST AND CARGO TANKS OF OIL TANKERS, PARAGRAPH 1.1.4

Interpretation

The permanent fittings required to serve alternative means of access such as wire lift platform, that should be used by crew and surveyors for inspection should provide at least an equal level of safety as the permanent means of access stated by the same paragraph. These means of access should be carried on board the ship and be readily available for use without filling of water in the tank. Therefore, rafting should not be acceptable under this provision. Alternative means of access should be part of the Ship Structure Access Manual which should be approved on behalf of the flag State. For water ballast tanks of 5 m or more in width, such as on an ore carrier, side shell plating should be considered in the same way as "longitudinal bulkhead".

2.16 TABLE 1 – MEANS OF ACCESS FOR BALLAST AND CARGO TANKS OF OIL TANKERS, PARAGRAPH 2.1

Interpretation

Section 2 of table 1 should also be applied to wing tanks designed as void spaces. Paragraph 2.1.1 represents requirements for access to under-deck structures, while paragraph 2.1.2 is a requirement for access for survey and inspection of vertical structures on longitudinal bulkheads (transverse webs).

Technical background

SOLAS regulation II-1/3-6.2.1 requires each space to be provided with means of access. Though void spaces are not addressed in the technical provisions contained in resolution MSC.158(78), it is arguable whether means of access are not required in void spaces. Means of access or portable means of access are necessary arrangements to facilitate inspection of the structural condition of the space and the boundary structure. Therefore, the requirements of section 2 of table 1 should be applied to double-hull spaces even when designed as void spaces.

2.17 TABLE 1 – MEANS OF ACCESS FOR BALLAST AND CARGO TANKS OF OIL TANKERS, PARAGRAPH 2.1.1

Interpretation

1 For a tank, the vertical distance between horizontal upper stringer and deck head of which varies at different sections, paragraph 2.1.1 should be applied to such sections that fall under the criteria.

2 The continuous permanent means of access may be a wide longitudinal, which provides access to critical details on the opposite side by means of platforms as necessary on web frames. In case the vertical opening of the web frame is located in the way of the open part between the wide longitudinal and the longitudinal on the opposite side, platforms should be provided on both sides of the web frames to allow safe passage through the web frame.

3 Where two access hatches are required by SOLAS regulation II-1/3-6.3.2, access ladders at each end of the tank should lead to the deck.

Technical background

Interpretation 1: The interpretation of varied tank height in column 1 of table 1 is applied to the vertical distance between horizontal upper stringer and deck head for consistency.

2.18 TABLE 1 – MEANS OF ACCESS FOR BALLAST AND CARGO TANKS OF OIL TANKERS, PARAGRAPH 2.1.2

Interpretation

The continuous permanent means of access may be a wide longitudinal, which provides access to critical details on the opposite side by means of platforms as necessary on web frames. In case the vertical opening of the web is located in the way of the open part between the wide longitudinal and the longitudinal on the opposite side, platforms should be provided on both sides of the web to allow safe passage through the web. A "reasonable deviation", as noted in paragraph 1.4 of the Technical provisions, of not more than 10% may be applied where the permanent means of access is integral with the structure itself.

2.19 TABLE 1 – MEANS OF ACCESS FOR BALLAST AND CARGO TANKS OF OIL TANKERS, PARAGRAPH 2.2

Interpretation

1 Permanent means of access between the longitudinal continuous permanent means of access and the bottom of the space should be provided.

2 The height of a bilge hopper tank located outside of the parallel part of the ship should be taken as the maximum of the clear vertical distance measured from the bottom plating to the hopper plating of the tank.

3 The foremost and aftmost bilge hopper ballast tanks with raised bottom, of which the height is 6 m and over, a combination of transverse and vertical means of access to the upper knuckle point for each transverse web, should be accepted in place of the longitudinal permanent means of access.

Technical background

Interpretation 2: The bilge hopper tanks at fore and aft of cargo area narrow due to raised bottom plating and the actual vertical distance from the bottom of the tank to hopper plating of the tank is more appropriate to judge if a portable means of access could be utilized for the purpose.

Interpretation 3: In the foremost or aftmost bilge hopper tanks where the vertical distance is 6 m or over but installation of longitudinal permanent means of access is not practicable, permanent means of access of combination of transverse and vertical ladders provides an alternative means of access to the upper knuckle point.

2.20 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 1.1

Interpretation

1 Means of access should be provided to the cross-deck structures of the foremost and aftermost part of each cargo hold.

2 Interconnected means of access under the cross deck for access to three locations at both sides and in the vicinity of the centreline should be acceptable as the three means of access.

3 Permanent means of access fitted at three separate locations accessible independently, one at each side and one in the vicinity of the centreline, should be acceptable.

4 Special attention should be paid to the structural strength where any access opening is provided in the main deck or cross deck.

5 The requirements for a bulk carrier cross-deck structure should also be considered applicable to ore carriers.

Technical background

Pragmatic arrangements of the means of access are provided.

2.21 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 1.3

Interpretation

Particular attention should be paid to preserve the structural strength in way of access opening provided in the main deck or cross deck.

2.22 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 1.4

Interpretation

"Full upper stools" are understood to be stools with a full extension between topside tanks and between hatch end beams.

2.23 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 1.5

Interpretation

1 The movable means of access to the under-deck structure of cross deck need not necessarily be carried on board the ship. It should be sufficient if it is made available when needed.

2 The requirements for a bulk carrier cross-deck structure should also be considered applicable to ore carriers.

2.24 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 1.6

Interpretation

The maximum vertical distance of the rungs of vertical ladders for access to hold frames should be 350 mm. If a safety harness is to be used, means should be provided for connecting the safety harness in suitable places in a practical way.

Technical background

The maximum vertical distance of the rungs of 350 mm is applied with a view to reducing trapping cargoes.

2.25 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 1.7

Interpretation

Portable, movable or alternative means of access should also be applied to corrugated bulkheads.

2.26 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 1.8

Interpretation

Readily available means able to be transported to location in cargo hold and safely erected by ships' crew.

2.27 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 2.3

Interpretation

If the longitudinal structures on the sloping plate are fitted outside of the tank, a means of access should be provided.

2.28 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 2.5

Interpretation

1 The height of a bilge hopper tank located outside of the parallel part of the vessel should be taken as the maximum of the clear vertical height measured from the bottom plating to the hopper plating of the tank.

2 It should be demonstrated that portable means for inspection can be deployed and made readily available in the areas where needed.

2.29 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 2.5.2

Interpretation

A wide longitudinal frame of at least 600 mm clear width may be used for the purpose of the longitudinal continuous permanent means of access. The foremost and aftermost bilge hopper ballast tanks with raised bottom, of which the height is 6 m and over, a combination of transverse and vertical means of access to the sloping plate of hopper tank connection with side shell plating for each transverse web can be accepted in place of the longitudinal permanent means of access.

2.30 TABLE 2 – MEANS OF ACCESS FOR BULK CARRIERS, PARAGRAPH 2.6

Interpretation

The height of web frame rings should be measured in way of side shell and tank base.

Technical background

In the bilge hopper tank the sloping plating is above the opening, while the movement of the surveyor is along the bottom of the tank. Therefore the measurement of 1 m should be taken from the bottom of the tank.

3 SOLAS CHAPTER II-1, PARTS B-2 – SUBDIVISION, WATERTIGHT AND WEATHERTIGHT INTEGRITY AND B-4 – STABILITY MANAGEMENT

DOORS IN WATERTIGHT BULKHEADS OF PASSENGER SHIPS AND CARGO SHIPS

Interpretation

This interpretation pertains to doors[1] located in way of the internal watertight subdivision boundaries and the external watertight boundaries necessary to ensure compliance with the relevant subdivision and damage stability regulations.

This interpretation does not apply to doors located in external boundaries above equilibrium or intermediate waterplanes.

The design and testing requirements for watertight doors vary according to their location relative to the equilibrium waterplane or intermediate waterplane at any stage of assumed flooding.

1 DEFINITIONS

For the purpose of this interpretation the following definitions apply:

1.1 Watertight: Capable of preventing the passage of water in any direction under a design head. The design head for any part of a structure should be determined by reference to its location relative to the bulkhead deck or freeboard deck, as applicable, or to the most unfavourable equilibrium/intermediate waterplane, in accordance with the applicable subdivision and damage stability regulations, whichever is the greater. A watertight door is thus one that will maintain the watertight integrity of the subdivision bulkhead in which it is located.

[1] Doors in watertight bulkheads of small cargo ships, not subject to any statutory subdivision and damage stability requirements, may be hinged quick-acting doors arranged to open out of the major space protected. They should be constructed in accordance with the requirements of the Administration and have notices affixed to each side stating: "To be kept closed at sea".

1.2 ***Equilibrium waterplane***: The waterplane in still water when, taking account of flooding due to an assumed damage, the weight and buoyancy forces acting on a ship are in balance. This relates to the final condition when no further flooding takes place or after cross flooding is completed.

1.3 ***Intermediate waterplane***: The waterplane in still water, which represents the instantaneous floating position of a ship at some intermediate stage between commencement and completion of flooding when, taking account of the assumed instantaneous state of flooding, the weight and buoyancy forces acting on a ship are in balance.

1.4 ***Sliding door or rolling door***: A door having a horizontal or vertical motion generally parallel to the plane of the door.

1.5 ***Hinged door***: A door having a pivoting motion about one vertical or horizontal edge.

2 STRUCTURAL DESIGN

Doors and their frames should be of approved design and substantial construction in accordance with the requirements of the Administration and should preserve the strength of the subdivision bulkheads in which they are fitted.

3 OPERATION MODE, LOCATION AND OUTFITTING

Doors should be fitted in accordance with all requirements regarding their operation mode, location and outfitting, i.e. provision of controls, means of indication, etc., as shown in table 1 below. This table should be read in conjunction with paragraphs 3.1 to 5.4 below.

3.1 Frequency of use whilst at sea

3.1.1 Normally closed*:* Kept closed at sea but may be used if authorized. To be closed again after use.

3.1.2 Permanently closed: The time of opening such doors in port and of closing them before the ship leaves port should be entered in the logbook. Should such doors be accessible during the voyage, they should be fitted with a device to prevent unauthorized opening.

3.1.3 Normally open*:* May be left open provided it is always ready to be immediately closed.

3.1.4 Used*:* In regular use, may be left open provided it is ready to be immediately closed.

3.2 Type

Power operated, sliding or rolling[2]	POS
Power operated, hinged	POH
Sliding or rolling	S
Hinged	H

[2] Rolling doors are technically identical to sliding doors.

3.3 Control

3.3.1 Local

3.3.1.1 All doors, except those which should be permanently closed at sea, should be capable of being opened and closed by hand locally,[3] from both sides of the doors, with the ship listed to either side.

3.3.1.2 For passenger ships, the angle of list at which operation by hand should be possible is 15º or 20º if the ship is allowed to heel up to 20º during intermediate stages of flooding.

3.3.1.3 For cargo ships, the angle of list at which operation by hand should be possible is 30º.

3.3.2 Remote

Where indicated in table 1, doors should be capable of being remotely closed by power from the bridge.[4] Where it is necessary to start the power unit for operation of the watertight door, means to start the power unit is also to be provided at remote control stations. The operation of such remote control should be in accordance with regulations II-1/13.8.1 to II-1/13.8.3.

3.4 Indication

3.4.1 Where shown in table 1, position indicators should be provided at all remote operating positions[5] as well as locally, on both sides of the doors,[6] to show whether the doors are open or closed and, if applicable, with all dogs/cleats fully and properly engaged.

3.4.2 The door position indicating system should be of self-monitoring type and the means for testing of the indicating system should be provided at the position where the indicators are fitted.

3.4.3 An indication (i.e. red light) should be placed locally showing that the door is in remote control mode ("doors closed mode"). Refer also to regulation II-1/13.8.1. Special care should be taken in order to avoid potential danger when passing through the door. Signboard/instructions should be placed in way of the door advising how to act when the door is in "doors closed" mode.

3.5 Alarms

3.5.1 Doors which should be capable of being remotely closed should be provided with an audible alarm, distinct from any other alarm in the area, which will sound whenever such a door is remotely closed. For passenger ships the alarm should sound for at least 5 seconds but not more than 10 seconds before the door begins to move and should continue sounding until the door is completely closed. In the case of remote closure by hand operation, an alarm is required to sound only while the door is actually moving.

3.5.2 In passenger areas and areas of high ambient noise, the audible alarms should be supplemented by visual signals at both sides of the doors.

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3 Arrangements for passenger ships should be in accordance with regulation II-1/13.7.1.4.

4 Arrangements for passenger ships should be in accordance with regulation II-1/13.7.1.5.

5 Indication at all remote control positions (regulation II-1/13.6).

6 Refer to regulation II-1/13-1.3.

3.6 Notices

As shown in table 1, doors which are normally closed at sea, but are not provided with means of remote closure, should have notices fixed to both sides of the doors stating: "To be kept closed at sea". Doors which should be permanently closed at sea should have notices fixed to both sides stating: "Not to be opened at sea".

3.7 Location

For passenger ships the watertight doors and their controls should be located in compliance with regulations II-1/13.5.3 and II-1/13.7.1.2.2.

4 FIRE DOORS

4.1 Watertight doors may also serve as fire doors but need not be fire tested when intended for use below the bulkhead deck. Where such doors are used at locations above the bulkhead deck they should, in addition to complying with the provisions applicable to fire doors at the same locations, also comply with means of escape provisions of regulation II-2/13.

4.2 Where a watertight door is located adjacent to a fire door, both doors should be capable of independent operation, remotely if required by regulations II-1/13.8.1 to II-1/13.8.3 and from both sides of each door.

5 TESTING

5.1 Doors which become immersed by an equilibrium or intermediate waterplane or are below the freeboard or bulkhead deck should be subjected to a hydrostatic pressure test.

5.2 For large doors intended for use in the watertight subdivision boundaries of cargo spaces, structural analysis may be accepted in lieu of pressure testing. Where such doors utilize gasket seals, a prototype pressure test to confirm that the compression of the gasket material is capable of accommodating any deflection, revealed by the structural analysis, should be carried out.

5.3 Doors above freeboard or bulkhead deck, which are not immersed by an equilibrium or intermediate waterplane but become intermittently immersed at angles of heel in the required range of positive stability beyond the equilibrium position, should be hose tested.

5.4 Pressure testing

5.4.1 The head of water used for the pressure test should correspond at least to the head measured from the lower edge of the door opening, at the location in which the door should be fitted in the ship, to the bulkhead deck or freeboard deck, as applicable, or to the most unfavourable damage waterplane, if that be greater. Testing may be carried out at the factory or other shore-based testing facility prior to installation in the ship.

5.4.2 Leakage criteria

5.4.2.1 The following acceptable leakage criteria should apply:

Doors with gaskets	No leakage
Doors with metallic sealing	Maximum leakage 1 //min

5.4.2.2 Limited leakage may be accepted for pressure tests on large doors located in cargo spaces employing gasket seals or guillotine doors located in conveyor tunnels, in accordance with the following:[7]

$$\text{Leakage rate (l/min)} = \frac{(P+4.572)\ h^3}{6568}$$

where P = perimeter of door opening (metres)
h = test head of water (metres)

5.4.2.3 However, in the case of doors where the water head taken for the determination of the scantling does not exceed 6.1 m, the leakage rate may be taken equal to 0.375 l/min if this value is greater than that calculated by the above-mentioned formula.

5.4.3 For doors of passenger ships which are normally open and used at sea and which become submerged by the equilibrium or intermediate waterplane, a prototype test should be conducted, on each side of the door, to check the satisfactory closing of the door against a force equivalent to a water height of at least 1 m above the sill on the centre line of the door.[8]

5.5 Hose testing after installation

All watertight doors should be subject to a hose test[9] after installation in a ship. Hose testing should be carried out from each side of a door unless, for a specific application, exposure to floodwater is anticipated only from one side. Where a hose test is not practicable because of possible damage to machinery, electrical equipment insulation, or outfitting items, it may be replaced by means such as an ultrasonic leak test or an equivalent test.

7 Published in the ATM F 1196, Standard Specification for Sliding Watertight Door Assemblies and referenced in the Title 46 US Code of Federal Regulations 170.270 Door design, operation installation and testing.

8 Arrangements for passenger ships should be in accordance with regulation II-1/13.5.2.

9 Refer to IACS URS 14.2.3 IACS Reg. 1996/Rev.2, 2001.

Table 1 – Internal doors in watertight bulkheads in cargo ships and passenger ships

Position relative to equilibrium or intermediate waterplane	1 Frequency of use whilst at sea	2 Type	3 Remote control[6]	4 Indication locally and on bridge[6]	5 Audible alarm[6]	6 Notice	7 Comments	8 Regulation
I. Passenger ships								
A. At or below	Normally closed	POS	Yes	Yes	Yes	No	Certain doors may be left open, see regulation II-1/22.4	II-1/22.1 to II-1/22.4
	Permanently closed	S, H	No	No	No	Yes	See Notes 1 + 4	II-1/13.9.1 and II-1/13.9.2
B. Above	Normally open	POS, POH	Yes	Yes	Yes	No		II-1/22.4 II-1/17.1 MSC/Circ.541
	Normally closed	S, H	No	Yes	No	Yes	See Note 2	
		S, H	No	Yes	No	Yes	Doors giving access to ro-ro deck	II-1/17-1
II. Cargo ships								
A. At or below	Used	POS	Yes	Yes	Yes	No		II-1/13-1.2
	Normally closed	S, H	No	Yes	No	Yes	see Notes 2 + 3 + 5	II-1/13-1.3
	Permanently closed	S, H	No	No	No	Yes	see Notes 1 + 4	II-1/13-1.4 II-1/15-1
B. Above	Used	POS	Yes	Yes	Yes	No		II-1/13-1.2
	Normally closed	S, H	No	Yes	No	Yes	See Notes 2 + 5	II-1/13-1.3 II-1/15-1

Notes:

1 Doors in watertight bulkheads subdividing cargo spaces.

2 If hinged, this door should be of quick-acting or single-action type.

3 SOLAS requires remotely operated watertight doors to be sliding doors.

4 The time of opening such doors in port and closing them before the ship leaves port should be entered in the logbook.

5 The use of such doors should be authorized by the officer of the watch.

6 Cables for control and power systems to power-operated watertight doors and their status indication should comply with the requirements of IACS UR E15.

4 SOLAS REGULATION II-1/26 – GENERAL

4.1 PARAGRAPH 4

Interpretation

1 Dead ship condition for the purpose of regulation II-1/26.4 should be understood to mean a condition under which the main propulsion plant, boilers and auxiliaries are not in operation and in restoring the propulsion, no stored energy for starting and operating the propulsion plant, the main source of electrical power and other essential auxiliaries is assumed to be available.

2 Where the emergency source of power is an emergency generator which complies with regulation II-1/44, IACS SC185 and IACS SC124, this generator may be used for restoring operation of the main propulsion plant, boilers and auxiliaries where any power supplies necessary for engine operation are also protected to a similar level as the starting arrangements.

3 Where there is no emergency generator installed or an emergency generator does not comply with regulation II-1/44, the arrangements for bringing main and auxiliary machinery into operation should be such that the initial charge of starting air or initial electrical power and any power supplies for engine operation can be developed on board ships without external aid. If for this purpose an emergency air compressor or an electric generator is required, these units should be powered by a hand-starting oil engine or a hand-operated compressor. The arrangements for bringing main and auxiliary machinery into operation should have capacity such that the starting energy and any power supplies for engine operation are available within 30 min of a dead ship condition.

4.2 PARAGRAPH 11

Interpretation

1 Arrangements complying with this regulation and acceptable "equivalent arrangements", for the most commonly utilized fuel systems, are shown below.

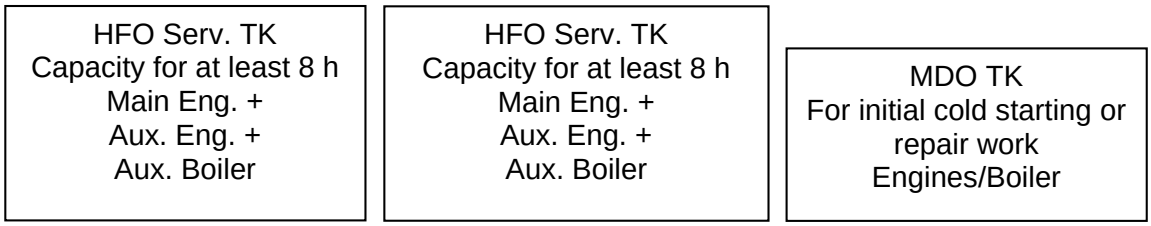
2 A service tank is a fuel oil tank which contains only fuel of a quality ready for use, i.e. fuel of a grade and quality that meets the specification required by the equipment manufacturer. A service tank should be declared as such and not be used for any other purpose.

3 Use of a setting tank with or without purifiers, or purifiers alone, and one service tank is not acceptable as an "equivalent arrangement" to two service tanks.

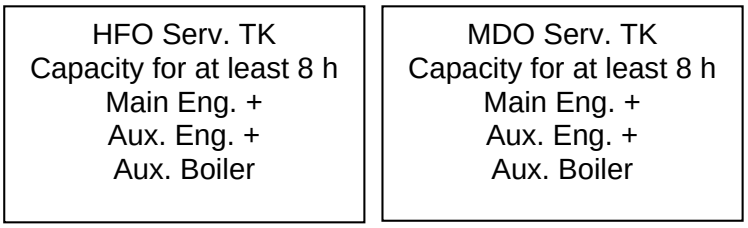
Examples of application for the most common systems

1 Example 1

1.1 Requirement according to SOLAS – Main and auxiliary engines and boiler(s) operating with heavy fuel oil (HFO) (one fuel ship)



1.2 Equivalent arrangement

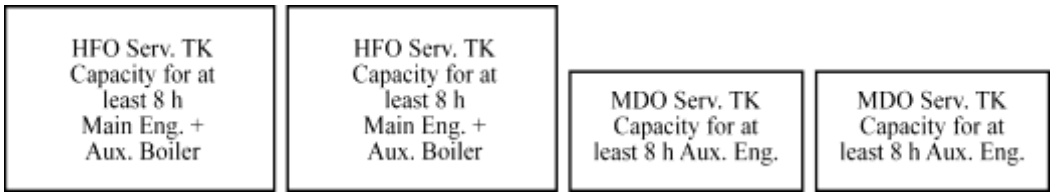


This interpretation only applies where main and auxiliary engines can operate with heavy fuel oil under all load conditions and, in the case of main engines, during manoeuvring.

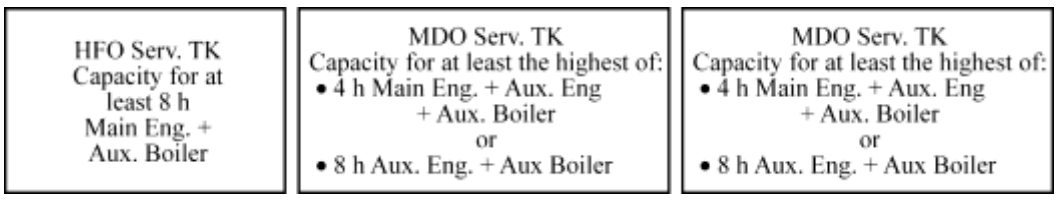
For pilot burners of auxiliary boilers if provided, an additional MDO tank for eight hours may be necessary.

2 Example 2

2.1 Requirement according to SOLAS – Main engine(s) and auxiliary boiler(s) operating with HFO and auxiliary engine operating with marine diesel oil (MDO)



2.2 Equivalent arrangement



The arrangements in paragraphs 1.2 and 2.2 apply, provided the propulsion and vital systems which use two types of fuel support rapid fuel changeover and are capable of operating in all normal operating conditions at sea with both types of fuel (MDO and HFO).

5 SOLAS REGULATIONS II-1/40 – GENERAL – AND II-1/41 – MAIN SOURCE OF ELECTRICAL POWER AND LIGHTING SYSTEMS

Interpretation

Essential services and arrangements of sources of power, supply, control and monitoring to the different categories of essential services

1 Classification of essential services

1.1 Essential services are those services essential for propulsion and steering, and safety of the ship, which are made up of "Primary Essential Services" and "Secondary Essential Services". Definitions and examples of such services are given in 2 and 3 below.

1.2 Services to ensure minimum comfortable conditions of habitability are those services defined in 4 below.

2 Primary Essential Services

Primary Essential Services are those services which need to be in continuous operation to maintain propulsion and steering. Examples of equipment for "Primary Essential Services" are as follows:

- steering gears;
- pumps for controllable pitch propellers;
- scavenging air blower, fuel oil supply pumps, fuel valve cooling pumps, lubricating oil pumps and cooling water pumps for main and auxiliary engines and turbines necessary for propulsion;
- forced draught fans, feed water pumps, water circulating pumps, vacuum pumps and condensate pumps for steam plants on steam turbine ships, and also for auxiliary boilers on ships where steam is used for equipment supplying primary essential services;
- oil burning installations for steam plants on steam turbine ships and for auxiliary boilers where steam is used for equipment supplying primary essential services;
- azimuth thrusters, which are the sole means for propulsion/steering with lubricating oil pumps, cooling water pumps;
- electrical equipment for electric propulsion plant with lubricating oil pumps and cooling water pumps;
- electric generators and associated power sources supplying the above equipment;
- hydraulic pumps supplying the above equipment;
- viscosity control equipment for heavy fuel oil;
- control, monitoring, and safety devices/systems for equipment to primary essential services;
- fire pumps and other fire extinguishing medium pumps;
- navigation lights, aids and signals;
- internal safety communication equipment; and
- lighting system.

3 Secondary Essential Services

Secondary Essential Services are those services which need not necessarily be in continuous operation to maintain propulsion and steering but which are necessary for maintaining the vessel's safety. Examples of equipment for secondary essential services are as follows:

- windlass;
- fuel oil transfer pumps and fuel oil treatment equipment;
- lubrication oil transfer pumps and lubrication oil treatment equipment;
- pre-heaters for heavy fuel oil;
- starting air and control air compressors;
- bilge, ballast and heeling pumps;
- ventilating fans for engine and boiler rooms;
- services considered necessary to maintain dangerous spaces in a safe condition;
- fire detection and alarm system;
- electrical equipment for watertight closing appliances;
- electric generators and associated power sources supplying the above equipment;
- hydraulic pumps supplying the above equipment;
- control, monitoring, and safety systems for cargo containment systems; and
- control, monitoring, and safety devices/systems for equipment to secondary essential services.

4 Services for habitability

Services for habitability are those services which need to be in operation for maintaining the ship's minimum comfort conditions for the crew and passengers. Examples of equipment for maintaining conditions of habitability are as follows:

- cooking;
- heating;
- domestic refrigeration;
- mechanical ventilation;
- sanitary and fresh water; and
- electrical generators and associated power sources supplying the above equipment.

5 Regulations II-1/40.1.1 and II-1/41.1.1 – For the purposes of these regulations, the services as included in paragraphs 2 to 4 should be considered.

6 Regulation II-1/40.1.2 – For the purposes of this regulation, the services as included in paragraphs 2 and 3 and the services in regulations II-1/42 or II-1/43, as applicable, should be considered.

7 Regulation II-1/41.1.2 – For the purposes of this regulation, the services as included in paragraphs 2 to 4, except for those also listed in the interpretation set out in section 6.1 below, should be considered.

8 Regulation II-1/41.1.5 – For the purposes of this regulation, the services as included in paragraphs 2, 3 and 4 should be considered.[10]

[10] See also IACS UI SC83.

9 Regulation II-1/41.5.1.2 – For the purposes of this regulation, the following interpretations are applicable:

.1 services in paragraph 2 should not be included in any automatic load shedding or other equivalent arrangements;

.2 services in paragraph 3 may be included in the automatic load shedding or other equivalent arrangement provided disconnection will not prevent services required for safety being immediately available when the power supply is restored to normal operating conditions; and

.3 services for habitability in paragraph 4 may be included in the load shedding or other equivalent arrangement.

6 SOLAS REGULATION II-1/41 – MAIN SOURCE OF ELECTRICAL POWER AND LIGHTING SYSTEMS

6.1 PARAGRAPH 1.2

Interpretation

Those services necessary to provide normal operational conditions of propulsion and safety do not include services such as:

.1 thrusters not forming part of the main propulsion;

.2 moorings;

.3 cargo handling gear;

.4 cargo pumps; and

.5 refrigerators for air conditioning (those which are not necessary to establish a minimum condition of habitability).

6.2 PARAGRAPH 1.3

Interpretation

Generators and generator systems, having the ship's main propulsion machinery as their prime mover, may be accepted as part of the ship's main source of electrical power, provided that:

.1 they are capable of operating under all weather conditions during sailing and during manoeuvring, also when the ship is stopped, within the specified limits for the voltage variation in IEC 60092-301 and the frequency variation in IACS UR E5;

.2 their rated capacity is safeguarded during all operations given under 1, and is such that in the event of any other one of the generators failing, the services given under regulation II-1/41.1.2 (see section 6.1 above) can be maintained;

.3 the short circuit current of the generator/generator system is sufficient to trip the generator/generator system circuit-breaker taking into account the selectivity of the protective devices for the distribution system. Protection should be arranged in order to safeguard the generator/generator system in case of a short circuit in the main busbar. The generator/generator system should be suitable for further use after fault clearance; and

.4 standby sets are started in compliance with paragraph 2 of the interpretation of regulation II-1/41.5.1.1 (see section 6.3 below).

6.3 PARAGRAPH 5

Interpretation of paragraph 5.1.1

1 Where the electrical power is normally supplied by more than one generator set simultaneously in parallel operation, provision of protection, including automatic disconnection of sufficient non-essential services and, if necessary, secondary essential services as defined in the unified interpretation of SOLAS regulations II-1/40 and II-1/41 (see chapter 5 above) and those provided for habitability, should be made to ensure that, in case of loss of any of these generating sets, the remaining ones are kept in operation to permit propulsion and steering and to ensure safety.

2 Where Administrations permit electrical power to be normally supplied by one generator, provision should be made, upon loss of power, for automatic starting and connecting to the main switchboard of stand-by generator(s) of sufficient capacity with automatic restarting of the essential auxiliaries, in sequential operation if required. Starting and connection to the main switchboard of one generator should be as rapid as possible, preferably within 30 seconds after loss of power. Where prime movers with longer starting time are used, this starting and connection time may be exceeded upon approval from the Administration.

Interpretation of paragraph 5.1.2

3 The load shedding should be automatic.

4 The non-essential services, service for habitable conditions, may be shed and, where necessary, additionally the Secondary Essential Services, sufficient to ensure the connected generator set(s) is/are not overloaded.

Interpretation of paragraph 5.1.3

1 Other approved means can be achieved by:

.1 circuit breaker without tripping mechanism; or

.2 disconnecting link or switch by which busbars can be split easily and safely.

2 Bolted links, for example bolted busbar sections, should not be accepted.

7 SOLAS REGULATIONS II-1/42 AND II-1/43 – EMERGENCY SOURCE OF ELECTRICAL POWER IN PASSENGER AND CARGO SHIPS

Interpretation

1 "Blackout" as used in regulations II-1/42.3.4 and II-1/43.3.4 should be understood to mean a "dead ship" condition-initiating event.

2 "Dead ship" condition, for the purpose of regulations II-1/42.3.4 and II-1/43.3.4, should be understood to mean a condition under which the main propulsion plant, boilers and auxiliaries are not in operation and in restoring the propulsion, no stored energy for starting the propulsion plant, the main source of electrical power and other essential auxiliaries should be assumed available. It is assumed that means are available to start the emergency generator at all times.

3 Emergency generator stored starting energy is not to be directly used for starting the propulsion plant, the main source of electrical power and/or other essential auxiliaries (emergency generator excluded).

4 For steam ships, the 30-min time limit given in SOLAS can be interpreted as time from blackout defined above to light-off of the first boiler.

5 Exceptionally is understood to mean conditions such as:

.1 blackout situation;

.2 dead ship situation;

.3 routine use for testing;

.4 short-term parallel operation with the main source of electrical power for the purpose of load transfer; and

.5 use of the emergency generator during lay time in port for the supply of the ship's main switchboard, provided the requirements of 6 (Suitable measures for the exceptional use of the emergency generator for power-supply of non-emergency circuits in port) are achieved and unless instructed otherwise by the Administration.

6 Suitable measures for the exceptional use of the emergency generator for power-supply of non-emergency circuits in port:

.1 To prevent the generator or its prime mover from becoming overloaded when used in port, arrangements should be provided to shed sufficient non-emergency loads to ensure its continued safe operation.

.2 The prime mover should be arranged with fuel oil filters and lubrication oil filters, monitoring equipment and protection devices as required for the prime mover for main power generation and for unattended operation.

.3 The fuel oil supply tank to the prime mover should be provided with a low-level alarm, arranged at a level ensuring sufficient fuel oil capacity for the emergency services for the period of time as required by SOLAS.

.4 The prime mover should be designed and built for continuous operation and should be subjected to a planned maintenance scheme ensuring that it is always available and capable of fulfilling its role in the event of an emergency at sea.

.5 Fire detectors should be installed in the location where the emergency generator set and emergency switchboard are installed.

.6 Means should be provided to readily change over to emergency operation.

.7 Control, monitoring and supply circuits, for the purpose of the use of emergency generator in port should be so arranged and protected that any electrical fault will not influence the operation of the main and emergency services.

.8 When necessary for safe operation, the emergency switchboard should be fitted with switches to isolate the circuits.

.9 Instructions should be provided on board to ensure that when the ship is under way all control devices (e.g. valves, switches) are in a correct position for the independent emergency operation of the emergency generator set and emergency switchboard.

8 SOLAS REGULATION II-1/44 – STARTING ARRANGEMENTS FOR EMERGENCY GENERATING SETS

8.1 PARAGRAPH 1

Interpretation (from MSC/Circ.736)

Emergency generating sets should be capable of being readily started in their cold condition at a temperature of 0ºC. If this is impracticable, or if lower temperatures are likely to be encountered, heating should be provided to ensure ready starting of the generating sets.

8.2 PARAGRAPH 2

Interpretation (from MSC/Circ.736)

Each emergency generating set arranged to be automatically started should be equipped with starting devices with a stored energy capability of at least three consecutive starts. A second source of energy should be provided for an additional three starts within 30 min unless manual starting can be demonstrated to be effective.

9 SOLAS REGULATION XII/12 – HOLD, BALLAST AND DRY SPACE WATER INGRESS ALARMS

When water level detectors are installed on bulk carriers in compliance with regulation XII/12, the *Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers*, annexed to resolution MSC.188(79) adopted on 3 December 2004, should be applied, taking into account the following interpretations to the paragraphs of the Performance standards.

9.1 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, PARAGRAPH 3.2.3

Interpretation

Detection equipment includes the sensor and any filter and protection arrangements for the detector installed in cargo holds and other spaces as required by regulation XII/12.1.

9.2 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, PARAGRAPH 3.2.5

Interpretation

1 In general, the construction and type testing should be in accordance with publication IEC 60079: Electrical Equipment for Explosive Gas Atmospheres to a minimum requirement of EX(ia). Where a ship is designed only for the carriage of cargoes that cannot create a combustible or explosive atmosphere then the requirement for intrinsically safe circuitry should not be insisted upon, provided the operational instructions included in the Manual required by 4.1 of the appendix to the annex specifically exclude the carriage of cargoes that could produce a potential explosive atmosphere. Any exclusion of cargoes identified in the annex should be consistent with the ship's Cargo Book and any Certification relating to the carriage of specifically identified cargoes.

2 The maximum surface temperature of equipment installed within cargo spaces should be appropriate for the combustible dusts and/or explosive gases likely to be encountered. Where the characteristics of the dust and gases are unknown, the maximum surface temperature of equipment should not exceed 85ºC.

3 Where intrinsically safe equipment is installed, it should be of a certified safe type.

4 Where detector systems include intrinsically safe circuits, plans of the arrangements should be appraised/approved by individual classification societies.

9.3 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, PARAGRAPH 3.3.2

Interpretation

The pre-alarm, as a primary alarm, should indicate a condition that requires prompt attention to prevent an emergency condition and the main alarm, as an emergency alarm should indicate that immediate actions must be taken to prevent danger to human life or to the ship.

9.4 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, PARAGRAPH 3.3.7

Interpretation

Fault monitoring should address faults associated with the system that include open circuit, short circuit, as well as arrangement details that would include loss of power supplies and CPU failure for computer based alarm/monitoring system, etc.

9.5 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, PARAGRAPH 3.3.8

Interpretation

1 The electrical power supply should be from two separate sources, one should be the main source of electrical power and the other should be the emergency source, unless a continuously charged dedicated accumulator battery is fitted, having arrangement, location and endurance equivalent to that of the emergency source (18 hours). The battery supply may be an internal battery in the water level detector system.

2 The changeover arrangement of supply from one electrical source to another need not be integrated into the water level detector system.

3 Where batteries are used for the secondary power supply, failure alarms for both power supplies should be provided.

9.6 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, FOOTNOTE TO PARAGRAPH 3.4.1

Interpretation

1 IACS UR E10 may be used as an equivalent test standard to IEC 60092-504.

2 The range of tests should include the following:

For alarm/monitoring panel:

.1 functional tests in accordance with resolution MSC.188(79) on the *Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers*;

.2 electrical power supply failure test;

.3 power supply variation test;

.4 dry heat tests;

.5 damp heat tests;

.6 vibration test;

.7 EMC tests;

.8 insulation resistance test;

.9 high-voltage test; and

.10 static and dynamic inclinations tests, if moving parts are contained.

For IS barrier unit, if located in the wheelhouse: in addition to the certificate issued by a competent independent testing laboratory, EMC tests should also be carried out.

For water ingress detectors:

.1 functional tests in accordance with resolution MSC.188(79) on the *Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers*;

.2 electrical power supply failure test;

.3 power supply variation test;

.4 dry-heat test;

.5 damp-heat test;

.6 vibration test;

.7 enclosure class in accordance with resolution MSC.188(79) on the *Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers*;

.8 insulation resistance test;

.9 high-voltage test; and

.10 static and dynamic inclinations tests (if the detectors contain moving parts).

9.7 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, APPENDIX, PARAGRAPH 2.1.1

Interpretation

The test procedure should satisfy the following criteria:

.1 the type tests should be witnessed by a classification society surveyor if the tests are not carried out by a competent independent test facility;

.2 type tests should be carried out on a prototype or randomly selected item(s) which are representative of the manufactured item that is being type tested; and

.3 type tests should be documented (type test reports) by the manufacturer and submitted for review by classification societies.

9.8 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, APPENDIX, PARAGRAPH 2.1.1.1

Interpretation

1 The submerged test period for electrical components intended to be installed in ballast tanks and cargo tanks used as ballast tanks should be not less than 20 days.

2 The submerged test period for electrical components intended to be installed in dry spaces and cargo holds not intended to be used as ballast tanks should be not less than 24 hours.

3 Where a detector and/or cable connecting device (e.g. junction box, etc.) is installed in a space adjacent to a cargo hold (e.g. lower stool, etc.) and the space is considered to be flooded under damage stability calculations, the detectors and equipment should satisfy the requirements of IP68 for a water head equal to the hold depth for a period of 20 days or 24 hours on the basis of whether or not the cargo hold is intended to be used as a ballast tank as described in the previous paragraphs.

9.9 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, APPENDIX, PARAGRAPH 2.1.1.2

Interpretation

1 The type test required for the sensor should be in accordance with the following:

.1 The test container for the cargo/water mixture should be dimensioned so that its height and volume are such that the sensor and any filtration fitted can be totally submerged for the repeated functionality tests required by paragraph 2.1.1.2 and the static and dynamic inclination tests identified in the previous interpretation.

.2 The sensor and any filtration fitted that should be submerged and should be arranged in the container as they would be installed in accordance with the installation instructions required by paragraph 4.4.

.3 The pressure in the container for testing the complete detector should be not more than 0.2 bar at the sensor and any filter arrangement. The pressure may be realized by pressurization or by using a container of sufficient height.

.4 The cargo/water mixture should be pumped into the test container and suitable agitation of the mixture provided to keep the solids in suspension. The effect of pumping the cargo/water mixture into the container should not affect the operation of the sensor and filter arrangements.

.5 The cargo/water mixture should be pumped into the test container to a predetermined level that submerges the detector and the operation of the alarm observed.

.6 The test container should then be drained and the deactivation of the alarm condition observed.

.7 The test container and sensor with any filter arrangement should be allowed to dry without physical intervention.

.8 The test procedure should be repeated consecutively ten times without cleaning any filter arrangement that may be fitted in accordance with the manufacturer's installation instructions (see also 2.1.1.2).

.9 Satisfactory alarm activation and deactivation at each of the 10 consecutive tests will demonstrate satisfactory type testing.

2 The cargo/water mixture used for type testing should be representative of the range of cargoes within the following groups and should include the cargo with the smallest particles expected to be found from a typical representative sample:

.1 iron ore particles and seawater;

.2 coal particles and seawater;

.3 grain particles and seawater; and

.4 aggregate (sand) particles and seawater.

The smallest and largest particle size together with the density of the dry mixture should be ascertained and recorded. The particles should be evenly distributed throughout the mixture. Type testing with representative particles will in general qualify all types of cargoes within the four groupings shown above.

The following provides guidance on the selection of particles for testing purposes:

.1 Iron ore particles should mainly consist of small loose screenings of iron ore and not lumps of ore (dust with particle size < 0.1 mm).

.2 Coal particles should mainly consist of small loose screenings of coal and not lumps of coal (dust with particle size < 0.1 mm).

.3 Grain particles should mainly consist of small loose grains of free-flowing grain (grain having a size > 3 mm, such as wheat).

.4 Aggregate particles should mainly consist of small loose grains of free-flowing sand and without lumps (dust with particle size < 0.1 mm).

9.10 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, APPENDIX, PARAGRAPH 3.1.1

Interpretation

The test procedure should satisfy the following criteria:

.1 type tests should be witnessed by a classification society surveyor if the tests are not carried out by a competent independent test facility;

.2 type tests should be carried out on a prototype or randomly selected item(s) which are representative of the manufactured item that is being type tested; and

.3 type tests should be documented (type test reports) by the manufacturer and submitted for review by classification societies.

9.11 PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS, APPENDIX, SECTION 4 – MANUALS

Interpretation

For each ship, a copy of the manual should be made available to the surveyor at least 24 hours prior to survey of the water-level detection installation. Each classification society should ensure that any plans required for classification purposes have been appraised/approved as appropriate.

10 SOLAS REGULATION XII/13 – AVAILABILITY OF PUMPING SYSTEMS

SOLAS REGULATION XII/13.1 AND MSC/CIRC.1069

Dewatering of forward spaces of bulk carriers

Interpretation

1 Where the piping arrangements for dewatering closed dry spaces are connected to the piping arrangements for the drainage of water ballast tanks, two non-return valves should be provided to prevent the ingress of water into dry spaces from those intended for the carriage of water ballast. One of these non-return valves should be fitted with a shut-off isolation arrangement. The non-return valves should be located in readily accessible positions. The shut-off isolation arrangement should be capable of being controlled from the navigation bridge, the propulsion machinery control position or enclosed space which is readily accessible from the navigation bridge or the propulsion machinery control position without travelling exposed freeboard or superstructure decks. In this context, a position which is accessible via an under-deck passage, a pipe trunk or other similar means of access should not be taken as being in the "readily accessible enclosed space".

2 Under regulation XII/13.1:

.1 the valve specified under SOLAS regulation II-1/12.5.1 should be capable of being controlled from the navigation bridge, the propulsion machinery control position or enclosed space which is readily accessible from the navigation bridge or the propulsion machinery control position without travelling exposed freeboard or superstructure decks. In this context, a position which is accessible via an under-deck passage, a pipe trunk or other similar means of access should not be taken as being in the "readily accessible enclosed space";

.2 the valve should not move from the demanded position in the case of failure of the control system power or actuator power;

.3 positive indication should be provided at the remote control station to show that the valve is fully open or closed; and

.4 local hand-powered valve operation from above the freeboard deck, as permitted under SOLAS regulation II-1/12.5.1, is required. An acceptable alternative to such arrangement may be remotely operated actuators as specified in regulation XII/13.1, on the condition that all of the provisions of regulation XII/13.1 are met.

3 The dewatering arrangements should be such that any accumulated water can be drained directly by a pump or eductor.

4 The dewatering arrangements should be such that when they are in operation, other systems essential for the safety of the ship, including firefighting and bilge systems, remain available and ready for immediate use. The systems for normal operation of electric power supplies, propulsion and steering should not be affected by the operation of the dewatering systems. It should also be possible to immediately start fire pumps and have a readily available supply of firefighting water, and to be able to configure and use the bilge system for any compartment when the dewatering system is in operation.

5 Bilge wells should be provided with gratings or strainers that will prevent blockage of the dewatering system with debris.

6 The enclosures of electrical equipment for the dewatering system installed in any of the forward dry spaces should provide protection to IPX8 standard as defined in publication IEC 60529 for a water head equal to the height of the space in which the electrical equipment is installed for a time duration of at least 24 hours.

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MSC.1/Circ.1573
9 June 2017

UNIFIED INTERPRETATION OF SOLAS REGULATIONS II-1/2.20 AND II-2/3.21

1 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), with a view to providing more specific guidance on the deadweight to be stated on certificates, approved the unified interpretation of SOLAS regulations II-1/2.20 and II-2/3.21, prepared by the Sub-Committee on Ship Design and Construction, at its fourth session (13 to 17 February 2017), as set out in the annex.

2 Member States are invited to use the annexed unified interpretation as guidance when applying SOLAS regulations II-1/2.20 and II-2/3.21 to determine the regulatory deadweight to be entered on relevant statutory certificates, and to bring the unified interpretations to the attention of all parties concerned.

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ANNEX

UNIFIED INTERPRETATION OF SOLAS REGULATIONS II-1/2.20 AND II-2/3.21

Deadweight to be stated on certificates

Even-keel hydrostatics should be used to determine the regulatory deadweight to be entered on relevant statutory certificates.

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MSC.1/Circ.1576
16 June 2017

UNIFIED INTERPRETATION OF THE PROVISIONS OF SOLAS RELATING TO THE ANNUAL TESTING OF THE VDR, S-VDR, AIS AND EPIRB

1 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), approved the unified interpretation of SOLAS regulations V/18.8, V/18.9 and IV/15.9 relating to the annual testing of VDR, S-VDR, AIS and EPIRB, prepared by the Sub-Committee on Navigation, Communications and Search and Rescue at its fourth session (6 to 10 March 2017), as set out in the annex.

2 Member States are invited to use the annexed unified interpretation as guidance when applying SOLAS regulations V/18.8, V/18.9 and IV/15.9, and to bring the unified interpretation to the attention of all parties concerned.

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ANNEX

UNIFIED INTERPRETATION OF THE PROVISIONS OF SOLAS RELATING TO THE ANNUAL TESTING OF THE VDR, S-VDR, AIS AND EPIRB

SOLAS regulation V/18.8 – Annual performance test of voyage data recorder (VDR) and simplified voyage data recorder (S-VDR)

Interpretation

The annual performance test of VDR (or S-VDR) shall be carried out within the "time window" of the annual / periodical / renewal survey under the Harmonized System of Survey and Certification (HSSC), but not later than the date of completion of the survey for endorsement / renewal of the relevant Certificate.

SOLAS regulation V/18.9 – Annual performance test of automatic identification system (AIS)

Interpretation

The annual performance test of the AIS shall be carried out within the "time window" of the annual / periodical / renewal survey under the Harmonized System of Survey and Certification (HSSC), but not later than the date of completion of the survey for endorsement / renewal of the relevant Certificate.

SOLAS regulation IV/15.9 – Annual test of EPIRB

Interpretation

The annual test of the EPIRBs shall be carried out within the "time window" of the prescribed survey, but not later than the date of completion of the survey for endorsement / renewal of the relevant Certificate.

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MSC.1/Circ.1578
19 June 2017

GUIDELINES ON SAFETY DURING ABANDON SHIP DRILLS USING LIFEBOATS

1 The Maritime Safety Committee, at its eighty-first session (10 to 19 May 2006), recalled that, at its seventy-ninth session (1 to 10 December 2004), it had endorsed the intention of the Sub-Committee on Ship Design and Equipment, in cooperation with the Sub-Committee on Standards of Training and Watchkeeping, to develop further guidance as envisioned in the *Accidents with lifeboats* (MSC/Circ.1049) and, accordingly, approved the *Guidance on safety during abandon ship drills using lifeboats* (MSC/Circ.1136).

2 The Committee also recalled that the guidance developed for lifeboats has relevance, in general, for emergency drills related to other life-saving systems and should be taken into account when such drills are conducted. In connection with MSC/Circ.1136, and recognizing the need to provide a basic outline of essential steps to safely carry out simulated launching of free-fall lifeboats in accordance with SOLAS regulation III/19.3.4.4, and having considered the proposals made by the Sub-Committee on Ship Design and Equipment, at its forty-seventh session, the Committee also approved the *Guidelines for simulated launching of free-fall lifeboats* (MSC/Circ.1137).

3 Having considered the need to update the above Guidance and Guidelines, and having considered the proposals made by the Sub-Committee on Fire Protection, at its fiftieth session, to consolidate the numerous circulars on the subject of measures to prevent accidents with lifeboats in order to better serve the mariner, the Committee, at its eighty-first session, approved the *Guidelines on safety during abandon ship drills using lifeboats*, as set out in annex 2 to the *Measures to prevent accidents with lifeboats* (MSC.1/Circ.1206/Rev.1).

4 The Committee, at its ninety-eighth session (7 to 16 June 2017), approved the *Guidelines on safety during abandon ship drills using lifeboats*, following the amalgamation of annex 1 to the *Measures to prevent accidents with lifeboats* (MSC.1/Circ.1206/Rev.1) and the *Interim Recommendation on conditions for authorization of service providers for lifeboats, launching appliances and on-load release gear* (MSC.1/Circ.1277) in the *Requirements for maintenance, thorough examination, operational testing, overhaul and repair of lifeboats and rescue boats, launching appliances and release gear* (resolution MSC.402(96)), which revoked annex 1 to MSC.1/Circ.1206/Rev.1.

5 Member States are invited to give effect to the annexed Guidelines and to bring them to the attention of shipowners, ship operators, ship-vetting organizations, ship personnel, surveyors, manufacturers and all other parties concerned.

6 This circular supersedes annex 2 to MSC.1/Circ.1206/Rev.1.

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ANNEX

GUIDELINES ON SAFETY DURING ABANDON SHIP DRILLS USING LIFEBOATS

1 GENERAL

1.1 Introduction

1.1.1 It is essential that seafarers are familiar with the life-saving appliances on board their ships and that they have confidence that the appliances provided for their safety will work and will be effective in an emergency. Frequent periodic shipboard drills are necessary to achieve this.

1.1.2 Crew training is an important component of drills. As a supplement to initial shore-based training, onboard drills and training will familiarize crew members with the ships' appliances and the associated procedures. The objective of drill and training is to develop appropriate crew competencies, enabling effective and safe utilization of the equipment required by the 1974 SOLAS Convention, as amended (SOLAS). The time limits set out in SOLAS for ship abandonment should be considered as a secondary objective when conducting drills.

1.2 Drill frequency

Experience has shown that holding frequent drills makes the crew more familiar with the life-saving appliances on board their ships and increases their confidence that the appliances will work and will be effective in an emergency. Drills give the opportunity to gain experience in the use of the safety equipment in cooperation. The ability to cope with an emergency and handle the situation is improved by frequent drills. However, frequent crew changes sometimes make it difficult to ensure that all on board have the opportunity to participate in drills when the minimum required drills are conducted only. Therefore, consideration needs to be given to scheduling drills as necessary to ensure all on board have an early opportunity to become familiar with the ship appliances and systems.

1.3 Drills must be safe

1.3.1 Abandon ship drills should be planned, organized and performed in accordance with relevant shipboard requirements of occupational safety and health so that the recognized risks are minimized.

1.3.2 Drills provide an opportunity to verify that the life-saving appliances are working and that all associated equipment is in place, in good working order and ready for use.

1.3.3 Before conducting drills, it should be checked that the lifeboat and its equipment have been maintained in accordance with the ship's maintenance manuals and any associated technical documentation, as well as noting all the precautionary measures necessary. Abnormal conditions of wear and tear or corrosion should be reported to the responsible officer immediately.

1.4 Emphasis on learning

Drills should be conducted with an emphasis on learning and be viewed as a learning experience, not just as a task to meet a regulatory requirement to conduct drills. Whether they are emergency drills required by SOLAS or additional special drills conducted to enhance

the competence of the crew members, they should be carried out at safe speed. During drills, care should be taken to ensure that persons on board familiarize themselves with their duties and with the equipment. If necessary, pauses should be made during the drills to explain especially difficult elements. The experience of the crew is an important factor in determining how fast a drill or certain drill elements should be carried out.

1.5 Planning and organizing drills

1.5.1 SOLAS requires that drills shall, as far as practicable, be conducted as if there was an actual emergency.[1] This means that the entire drill should, as far as possible, be carried out, while ensuring that the drill can be performed in such a way that it is safe in every respect. Consequently, elements of the drill that may involve unnecessary risks need special attention or may be excluded from the drill.

1.5.2 In preparing for a drill, those responsible should review the manufacturer's instruction manual to ensure that a planned drill is conducted properly. Those responsible for the drill should ensure that the crew is familiar with the guidance provided in the life-saving appliances instruction manuals.

1.5.3 Lessons learned in the course of a drill should be documented and made a part of the follow-up shipboard training discussions and the planning of the next drill session.

1.5.4 The lowering of a boat with its full complement of persons is an example of an element of a drill that may, depending on the circumstances, involve an unnecessary risk. Such drills should only be carried out if special precautions are observed.

2 ABANDON SHIP DRILLS

2.1 Introduction

It is important that the crew who operate safety equipment on board are familiar with the functioning and operation of such equipment. SOLAS requires that sufficiently detailed manufacturers' training manuals and instructions be carried on board, which should be easily understood by the crew. Such manufacturers' manuals and instructions should be accessible for everyone on board and observed and followed closely when preparing and conducting drills.

2.2 Guidance to the shipowner

2.2.1 The shipowner should ensure that new safety equipment on board the company's ships has been approved and installed in accordance with the provisions of SOLAS and the International Life-Saving Appliances (LSA) Code.

2.2.2 Procedures for holding safe drills should be included in the Safety Management System (SMS) of the shipping companies. Detailed procedures for elements of drills that involve a special risk should be evident from workplace assessments adjusted to the relevant life-saving appliance.

2.2.3 Personnel carrying out maintenance and repair work on lifeboats should be qualified accordingly.[2]

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1 Refer to SOLAS regulation III/19.3.1.

2 Refer to the *Requirements for maintenance, thorough examination, operational testing, overhaul and repair of lifeboats and rescue boats, launching appliances and release gear*, adopted by resolution MSC.402(96).

2.3 Lifeboats lowered by means of falls

2.3.1 During drills, everyone participating should be alert for potentially dangerous conditions or situations and should bring them to the attention of the responsible person for appropriate action. Feedback and recommendations to the shipowner, the Administration and the system manufacturer are important elements of the marine safety system.

2.3.2 When drills are to be performed with persons on board the lifeboat, it is recommended that the boat be lowered and recovered without any persons on board first to ascertain that the arrangement functions correctly. In this case, the boat should then be lowered into the water with only the number of persons on board necessary to operate the boat.[3]

2.3.3 To prevent lashings or gripes from getting entangled, proper release should be checked before swinging out the davit.

2.4 Free-fall lifeboats

2.4.1 The monthly drills with free-fall lifeboats should be carried out according to the manufacturer's instructions, so that the persons who are to enter the boat in an emergency are trained to embark the boat, take their seats in a correct way and use the safety belts; as well as being instructed on how to act during launching into the sea.

2.4.2 When the lifeboat is free-fall launched as part of a drill, this should be carried out with the minimum personnel required to manoeuvre the boat in the water and to recover it. The recovery operation should be carried out with special attention, bearing in mind the high-risk level of this operation. Where permitted by SOLAS[4], simulated launching should be carried out in accordance with the manufacturer's instructions, taking due note of the Guidelines for simulated launching of free-fall lifeboats, as set out in the appendix.

[3] Refer to the *Clarification of SOLAS regulation III/19* (MSC.1/Circ.1326 and Corr.1).

[4] Refer to SOLAS regulation III/20.11.2.

APPENDIX

GUIDELINES FOR SIMULATED LAUNCHING OF FREE-FALL LIFEBOATS DURING DRILLS

1 Definition

Simulated launching carried out during drills, in accordance with SOLAS regulation III/19, is a means of training the crew in the free-fall release procedure of free-fall lifeboats without the physical activation of the release mechanism.

2 Purpose and scope

The purpose of these Guidelines is to provide a basic outline of essential steps to safely carry out simulated launching. These Guidelines are general; the lifeboat manufacturer's instruction manual should always be consulted before conducting simulated launching. Simulated launching should only be carried out with lifeboats and launching appliances designed to accommodate it, and for which the manufacturer has provided instructions. All persons involved should be familiar with the manufacturers' instructions and the activation of the release mechanism. Manuals, posters and signs may be used to assist familiarization and the conduct of drills. Simulated launching should be carried out under the supervision of a responsible person who should be an officer experienced in such procedures and be conducted without the physical activation of the free-fall release system. Testing of release systems should be separate to and not carried out during simulated launching drills.

3 Conduct of drills – typical simulated launching sequence (SOLAS regulation III/19)

3.1 Check equipment and documentation to ensure that all components of the lifeboat and launching appliance are in good operational condition.

3.2 Ensure that all personnel involved in the drill are familiar with the operating manuals, posters and signs.

3.3 Ensure that the restraining device(s) provided by the manufacturer for simulated launching are installed and secure and that the free-fall release mechanism is fully and correctly engaged.

3.4 Establish and maintain good communication between the assigned operating crew and the responsible person.

3.5 Disengage lashings, gripes, etc. installed to secure the lifeboat for sea or for maintenance, except those required for simulated free-fall.

3.6 Participating crew board the lifeboat and fasten their seatbelts under the supervision of the responsible person.

3.7 All crew disembark the lifeboat.

3.8 Return the lifeboat to the condition it was in prior to step provided in paragraph 3.4. Ensure that the lifeboat is returned to its normal stowed condition. Remove any restraining and/or recovery devices used only for the simulated launch procedure.

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MSC.1/Circ.1580
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GUIDELINES FOR VESSELS AND UNITS WITH DYNAMIC POSITIONING (DP) SYSTEMS

1 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), approved the *Guidelines for vessels and units with dynamic positioning (DP) systems*, as set out in the annex, prepared by the Sub-Committee on Ship Systems and Equipment, at its fourth session (20 to 24 March 2017).

2 Member States are invited to bring the annexed Guidelines to the attention of DP manufacturers, ship designers, shipyards, shipowners and other parties concerned.

3 Member States are also invited to apply the annexed Guidelines to vessels and units with dynamic positioning systems.

4 Furthermore, Member States are invited to use the model form of the Dynamic Positioning Verification Acceptance Document (DPVAD), as set out in the appendix to the Guidelines.

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ANNEX

GUIDELINES FOR VESSELS AND UNITS WITH DYNAMIC POSITIONING (DP) SYSTEMS

TABLE OF CONTENTS

PREAMBLE

1 The *Guidelines for vessels with dynamic positioning systems* (MSC/Circ.645) were approved by MSC 63 in May 1994 to provide the industry with an international standard for dynamic positioning systems on all types of vessels. These Guidelines for new vessels and units with dynamic positioning systems have been developed to provide an amended standard reflecting the development in DP operation since 1994 and the current industry practice and DP technologies.

2 It is recommended that the present Guidelines be applied to vessels and units constructed on or after 9 June 2017. For vessels and units constructed on or after 1 July 1994 but before 9 June 2017, the previous version of the Guidelines (MSC/Circ.645) may continue to be applied, however it is recommended that section 4 of the present Guidelines be applied to all new and existing vessels and units, as appropriate.

3 Taking into account that dynamically positioned vessels are moved and operated internationally and recognizing that the design and operating criteria require special consideration, these Guidelines have been developed to facilitate international operation without having to document the dynamic positioning system in detail for every new area of operation.

4 Compliance with the Guidelines should be documented by means of a Dynamic Positioning Verification Acceptance Document (DPVAD) for the dynamic positioning system.

5 If the Administration exempts any vessel or unit which embodies features of a novel kind from any of the provisions of these Guidelines, the exemptions should be listed in the DPVAD.

6 If the Administration approves alternative design and arrangements for any particular provision of these Guidelines, pertinent technical information about the approval should be summarized and annexed to the DPVAD.

1 GENERAL

1.1 Purpose

The purpose of these Guidelines is to recommend the design criteria, equipment, operating provisions and testing as well as a documentation regime for dynamic positioning systems in order to reduce the risk to the personnel, the vessel, other vessels or structures, sub-sea installations and the environment, while performing operations under dynamic positioning control.

1.2 Definitions

For the purpose of these Guidelines, unless expressly provided otherwise, the terms used herein are defined hereunder:

1.2.1 *Activity-Specific Operating Guidelines (ASOG)* means guidelines on the operational, environmental and equipment performance limits for the location and specific activity. (For drilling operations, the ASOG may be known as the Well-Specific Operating Guidelines (WSOG)).

1.2.2 *Bus-tie breaker* means a device connecting/disconnecting switchboard sections ("closed bus-tie(s)" means connected).

1.2.3 *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 owner of the ship and who on assuming such responsibility has agreed to take over all duties and responsibilities imposed by the International Safety Management Code.

1.2.4 *Computer system* means a system consisting of one or more computers and associated hardware, software and their interfaces.

1.2.5 *Consequence analysis* means a software function continuously verifying that the vessel will remain in position even if the worst-case failure occurs.

1.2.6 *Dynamic Positioning control station (DP control station)* means a workstation designated for DP operations, where necessary information sources, such as indicators, displays, alarm panels, control panels and internal communication systems are installed (this includes: DP control and independent joystick control operator stations, required position reference systems' Human Machine Interface (HMI), manual thruster levers, mode change systems, thruster emergency stops, internal communications).

1.2.7 *Dynamic Positioning operation (DP operation)* means using the DP system to control at least two degrees of freedom in the horizontal plane automatically.

1.2.8 *Dynamic Positioning Verification Acceptance Document (DPVAD)* means the document issued by the Administration or its Recognized Organization to a DP vessel complying with these Guidelines. (See appendix for model form.)

1.2.9 *Dynamically positioned vessel (DP vessel)* means a unit or a vessel which automatically maintains its position and/or heading (fixed location, relative location or predetermined track) by means of thruster force.

1.2.10 *Dynamic Positioning control system (DP control system)* means all control components and systems, hardware and software necessary to dynamically position the vessel. The DP control system consists of the following:

.1 computer system/joystick system;

.2 sensor system(s);

.3 control stations and display system (operator panels);

.4 position reference system(s);

.5 associated cabling and cable routeing; and

.6 networks.

1.2.11 *Dynamic Positioning system (DP system)* means the complete installation necessary for dynamically positioning a vessel comprising, but not limited to, the following sub-systems:

.1 power system;

.2 thruster system; and

.3 DP control system.

1.2.12 *Failure* means an occurrence in a component or system that causes one or both of the following effects:

.1 loss of component or system function; and/or

.2 deterioration of functional capability to such an extent that the safety of the vessel, personnel or environment protection is significantly reduced.

1.2.13 *Failure Modes and Effects Analysis (FMEA)* means a systematic analysis of systems and sub-systems to a level of detail that identifies all potential failure modes down to the appropriate sub-system level and their consequences.

1.2.14 *FMEA proving trials* means the test program for verifying the FMEA.

1.2.15 *Hidden failure* means a failure that is not immediately evident to operations or maintenance personnel and has the potential for failure of equipment to perform an on-demand function, such as protective functions in power plants and switchboards, standby equipment, backup power supplies or lack of capacity or performance.

1.2.16 *Joystick system* means a system with centralized manual position control and manual or automatic heading control.

1.2.17 *Loss of position and/or heading* means that the vessel's position and/or heading is outside the limits set for carrying out the DP activity in progress.

1.2.18 *Position keeping* means maintaining a desired position and/or heading or track within the normal excursions of the control system and the defined environmental conditions (e.g. wind, waves, current, etc.).

1.2.19 *Power management system* means a system that ensures continuity of electrical supply under all operating conditions.

1.2.20 *Power system* means all components and systems necessary to supply the DP system with power. The power system includes but is not limited to:

.1 prime movers with necessary auxiliary systems including piping, fuel, cooling, pre-lubrication and lubrication, hydraulic, pre-heating, and pneumatic systems;

.2 generators;

.3 switchboards;

.4 distribution systems (cabling and cable routeing);

.5 power supplies, including uninterruptible power supplies (UPS); and

.6 power management system(s) (as appropriate).

1.2.21 *Redundancy* means the ability of a component or system to maintain or restore its function when a single failure has occurred. Redundancy can be achieved, for instance, by the installation of multiple components, systems or alternative means of performing a function.

1.2.22 *Time to safely terminate (operations)* means the amount of time required in an emergency to safely cease operations of the DP vessel.

1.2.23 *Thruster system* means all components and systems necessary to supply the DP system with thrust force and direction. The thruster system includes:

.1 thrusters with drive units and necessary auxiliary systems including piping, cooling, hydraulic, and lubrication systems, etc.;

.2 main propellers and rudders if these are under the control of the DP system;

.3 thruster control system(s);

.4 manual thruster controls; and

.5 associated cabling and cable routeing.

1.2.24 *Worst-Case Failure Design Intent (WCFDI)* means the specified minimum DP system capabilities to be maintained following the worst-case failure. The worst-case failure design intent is used as the basis of the design. This usually relates to the number of thrusters and generators that can simultaneously fail.

1.2.25 *Worst-Case Failure (WCF)* means the identified single fault in the DP system resulting in maximum detrimental effect on DP capability as determined through the FMEA.

2 EQUIPMENT CLASSES

2.1 A DP system consists of components and systems acting together to achieve sufficiently reliable position keeping capability. The necessary redundancy level for components and systems is determined by the consequence of a loss of position and/or

heading keeping capability. To achieve this philosophy the requirements have been grouped into three equipment classes. For each equipment class, the associated worst-case failure should be defined as in paragraph 2.2 below. The equipment class of the vessel required for a particular operation should be agreed between the company and the customer based on a risk analysis of the consequence of a loss of position and/or heading. Otherwise, the Administration or coastal State may decide the equipment class for the particular operation.

2.2 The equipment classes are defined by their worst-case failure modes as follows:

.1 For equipment class 1, a loss of position and/or heading may occur in the event of a single fault.

.2 For equipment class 2, a loss of position and/or heading will not occur in the event of a single fault in any active component or system. Common static components may be accepted in systems which will not immediately affect position keeping capabilities upon failure (e.g. ventilation and seawater systems not directly cooling running machinery). Normally such static components will not be considered to fail where adequate protection from damage is demonstrated to the satisfaction of the Administration. Single failure criteria include, but are not limited to:

.1 any active component or system (generators, thrusters, switchboards, communication networks, remote-controlled valves, etc.); and

.2 any normally static component (cables, pipes, manual valves, etc.) that may immediately affect position keeping capabilities upon failure or is not properly documented with respect to protection.

.3 For equipment class 3, a loss of position and/or heading will not occur in the event of a single fault or failure. A single failure includes:

.1 items listed above for class 2, and any normally static component assumed to fail;

.2 all components in any one watertight compartment, from fire or flooding; and

.3 all components in any one fire sub-division, from fire or flooding (for cables, see also paragraph 3.5.1).

2.3 For equipment classes 2 and 3, a single inadvertent act should be considered as a single fault if such an act is reasonably probable.

2.4 Based on the single failure criteria in paragraph 2.2, the worst-case failure should be determined and used as the criterion for the consequence analysis (see paragraph 3.4.2.4).

2.5 The Administration should assign the relevant equipment class to a DP vessel based on the criteria in paragraph 2.2 and state it in the DPVAD (see paragraph 5.2).

2.6 When a DP vessel is assigned an equipment class this means that the DP vessel is suitable for DP operations within the assigned and lower equipment classes.

2.7 It is a provision of the Guidelines that the DP vessel is operated in such a way that the worst-case failure, as determined in paragraph 2.2, can occur at any time without causing a breach of acceptable excursion criteria set for loss of position and/or heading for equipment classes 2 and 3.

3 FUNCTIONAL REQUIREMENTS

3.1 General

3.1.1 Insofar as is practicable, all components in a DP system should be designed, constructed and tested in accordance with international standards recognized by the Administration.

3.1.2 If external forces from mission-related systems (cable lay, pipe lay, mooring, etc.) have a direct impact on DP performance, the influence of these systems should be considered and factored into the DP system design. Where available from the DP system or equipment manufacturer, such data inputs should be provided automatically to the DP control system. Additionally, provisions should be made to provide such data inputs into the DP control system manually. These systems and the associated automatic inputs should be subject to surveys, testing and analysis specified in paragraph 5.1.

3.1.3 In order to meet the single failure criteria given in paragraph 2.2, redundancy of components will normally be necessary as follows:

.1 for equipment class 2, redundancy of all active components; and

.2 for equipment class 3, redundancy of all components and A-60 physical separation of the components.

3.1.4 For equipment class 3, full redundancy of the control systems may not be possible. (i.e. there may be a need for a single changeover system from the main computer system to the backup computer system). Such connections between otherwise redundant and separated systems may be accepted when these are operated so that they do not represent a possible failure propagation path during DP operations. Failure in one system should in no case be transferred to the other redundant system.

3.1.5 For equipment classes 2 and 3, connections between otherwise redundant and separated systems should be kept to a minimum and made to fail to the safest condition. Failure in one system should in no case be transferred to the other redundant system.

3.1.6 Redundant components and systems should be immediately available without needing manual intervention from the operators and with such capacity that the DP operation can be continued for such a period that the work in progress can be terminated safely. The transfer of control should be smooth and within acceptable limitations of the DP operation(s) for which the vessel is designed.

3.1.7 For equipment classes 2 and 3, hidden failure monitoring should be provided on all devices where the FMEA shows that a hidden failure will result in a loss of redundancy.

3.1.8 The DP control station should be arranged where the operator has a good view of the vessel's exterior limits and the surrounding area. Equipment that should be located at the DP control station includes, but is not limited to:

.1 DP control and independent joystick control operator stations;

.2 manual thruster levers;

.3 mode change systems;

.4 thruster emergency stops;

.5 internal communications; and

.6 position reference systems' HMI, when considered necessary.

3.2 Power system

3.2.1 The power system should have an adequate response time to changes in power demand.

3.2.2 For equipment class 1, the power system need not be redundant.

3.2.3 For equipment class 2, the power system should be divisible into two or more systems so that, in the event of failure of one sub-system, at least one other system will remain in operation and provide sufficient power for station keeping. The power system(s) may be run as one system during operation, but should be arranged by bus-tie breaker(s) to separate the systems automatically upon failures which could be transferred from one system to another, including, but not limited to, overloading and short circuits.

3.2.4 For equipment class 3, the power system should be divisible into two or more systems so that, in the event of failure of one system, at least one other system will remain in operation and provide sufficient power for station keeping. The divided power system should be located in different spaces separated by A-60 class divisions. Where the power systems are located below the operational waterline, the separation should also be watertight. Bus-tie breakers should be open during equipment class 3 operations unless equivalent integrity of power operation can be accepted according to paragraph 3.1.4.

3.2.5 For equipment classes 2 and 3, the power available for position keeping should be sufficient to maintain the vessel in position after worst-case failure according to paragraph 2.2.

3.2.6 For equipment classes 2 and 3, at least one automatic power management system (PMS) should be provided and should have redundancy according to the equipment class and a blackout prevention function.

3.2.7 Alternative energy storage (e.g. batteries and fly-wheels) may be used as sources of power to thrusters as long as all relevant redundancy, independency and separation requirements for the relevant notation are complied with. For equipment classes 2 and 3, the available energy from such sources may be included in the consequence analysis function required in paragraph 3.4.2.4 when reliable energy measurements can be provided for the calculations.

3.2.8 Sudden load changes resulting from single faults or equipment failures should not create a blackout.

3.3 Thruster system

3.3.1 Each thruster on a DP system should be capable of being remote-controlled individually, independently of the DP control system.

3.3.2 The thruster system should provide adequate thrust in longitudinal and lateral directions, and provide yawing moment for heading control.

3.3.3 For equipment classes 2 and 3, the thruster system should be connected to the power system in such a way that paragraph 3.3.2 can be complied with even after failure of one of the constituent power systems and the thrusters connected to that system.

3.3.4 The values of thruster force used in the consequence analysis (see paragraph 3.4.2.4) should be corrected for interference between thrusters and other effects which would reduce the effective force.

3.3.5 Failure of a thruster system including pitch, azimuth and/or speed control, should not cause an increase in thrust magnitude or change in thrust direction.

3.3.6 Individual thruster emergency stop systems should be arranged in the DP control station. For equipment classes 2 and 3, the thruster emergency stop system should have loop monitoring. For equipment class 3, the effects of fire and flooding should be considered.

3.4 DP control system

3.4.1 General

.1 In general, the DP control system should be arranged in a DP control station where the operator has a good view of the vessel's exterior limits and the surrounding area.

.2 The DP control station should display information from the power system, thruster system and DP control system to ensure that these systems are functioning correctly. Information necessary to safely operate the DP system should be visible at all times. Other information should be available upon the operator's request.

.3 Display systems and the DP control station in particular should be based on sound ergonomic principles which promote proper operation of the system. The DP control system should provide for easy accessibility of the control mode, i.e. manual joystick, or automatic DP control of thrusters, propellers and rudders, if part of the thruster system. The active control mode should be clearly displayed.

.4 For equipment classes 2 and 3, operator controls should be designed so that no single inadvertent act on the operator's panel can lead to a loss of position and/or heading.

.5 Alarms and warnings for failures in all systems interfaced to and/or controlled by the DP control system should be audible and visual. A record of their occurrence and of status changes should be provided together with any necessary explanations.

.6 The DP control system should prevent failures being transferred from one system to another. The redundant components should be so arranged that any failed component or components may be easily isolated so that the other component(s) can take over smoothly with no loss of position and/or heading.

.7 It should be possible to control the thrusters manually, by individual levers and by an independent joystick, in the event of failure of the DP control system. If an independent joystick is provided with sensor inputs, failure of the main DP control system should not affect the integrity of the inputs to the independent joystick.

.8 A dedicated UPS should be provided for each DP control system (i.e. minimum one UPS for equipment class 1, two UPSs for equipment class 2 and three UPSs for equipment class 3) to ensure that any power failure will not affect more than one computer system and its associated components. The reference systems and sensors should be distributed on the UPSs in the same manner as the control systems they serve, so that any power failure will not cause loss of position keeping ability. An alarm should be initiated in case of loss of charge power. UPS battery capacity should provide a minimum of 30 minutes operation following a main supply failure. For equipment classes 2 and 3, the charge power for the UPSs supplying the main control system should originate from different power systems.

.9 The software should be produced in accordance with an appropriate international quality standard recognized by the Administration.

3.4.2 Computers

.1 For equipment class 1, the DP control system need not be redundant.

.2 For equipment class 2, the DP control system should consist of at least two computer systems so that, in case of any single failure, automatic position keeping ability will be maintained. Common facilities such as self-checking routines, alignment facilities, data transfer arrangements and plant interfaces should not be capable of causing failure of more than one computer system. An alarm should be initiated if any computer fails or is not ready to take control.

.3 For equipment class 3, the main DP control system should consist of at least two computer systems arranged so that, in case of any single failure, automatic position keeping ability will be maintained. Common facilities such as self-checking routines, alignment facilities, data transfer arrangements and plant interfaces should not be capable of causing failure of more than one computer system. The two or more computer systems mentioned above do not include the backup computer system; thus, in addition, one separate backup DP control system should be arranged, see paragraph 3.4.2.6. An alarm should be initiated if any computer fails or is not ready to take control.

.4 For equipment classes 2 and 3, the DP control system should include a software function, normally known as "consequence analysis", which continuously verifies that the vessel will remain in position even if the worst-case failure occurs. This analysis should verify that the thrusters, propellers and rudders (if included under DP control) that remain in operation after the worst-case failure can generate the same resultant thruster force and moment as required before the failure. The consequence analysis should provide an alarm if the occurrence of a worst-case failure were to lead to a loss of position and/or heading due to insufficient thrust for the prevailing environmental conditions (e.g. wind, waves, current, etc.). For operations which will take a long time to safely terminate, the consequence analysis should include a function which simulates the remaining thrust and power after the worst-case failure, based on input of the environmental conditions.

.5 Redundant computer systems should be arranged with automatic transfer of control after a detected failure in one of the computer systems. The automatic transfer of control from one computer system to another should be smooth with no loss of position and/or heading.

.6 For equipment class 3, the backup DP control system should be in a room separated by an A-60 class division from the main DP control station. During DP operation, this backup control system should be continuously updated by input from at least one of the required sets of sensors, position reference system, thruster feedback, etc. and be ready to take over control. The switchover of control to the backup system should be manual, situated on the backup computer, and should not be affected by a failure of the main DP control system. Main and backup DP control systems should be so arranged that at least one system will be able to perform automatic position keeping after any single failure.

.7 Each DP computer system should be isolated from other on-board computer systems and communications systems to ensure the integrity of the DP system and command interfaces. This isolation may be effected via hardware and/or software systems and physical separation of cabling and communication lines. Robustness of the isolation should be verified by analysis and proven by testing. Specific safeguards should be implemented to ensure the integrity of the DP computer system and prevent the connection of unauthorized or unapproved devices or systems.

3.4.3 Position reference systems

.1 Position reference systems should be selected with due consideration to operational requirements, both with regard to restrictions caused by the manner of deployment and expected performance in working situations.

.2 For equipment class 1, at least two independent position reference systems should be installed and simultaneously available to the DP control system during operation.

.3 For equipment classes 2 and 3, at least three independent position reference systems should be installed and simultaneously available to the DP control system during operation.

.4 When two or more position reference systems are required, they should not all be of the same type, but based on different principles and suitable for the operating conditions.

.5 The position reference systems should produce data with adequate accuracy and repeatability for the intended DP operation.

.6 The performance of position reference systems should be monitored and warnings should be provided when the signals from the position reference systems are either incorrect or substantially degraded.

.7 For equipment class 3, at least one of the position reference systems should be connected directly to the backup control system and separated by an A-60 class division from the other position reference systems.

3.4.4 Vessel sensors

.1 Vessel sensors should at least measure vessel heading, vessel motions and wind speed and direction.

.2 When an equipment class 2 or 3 DP control system is fully dependent on correct signals from vessel sensors, these signals should be based on three systems serving the same purpose (i.e. this will result in at least three heading reference sensors being installed).

.3 Sensors for the same purpose which are connected to redundant systems should be arranged independently so that failure of one will not affect the others.

.4 For equipment class 3, one of each type of sensor should be connected directly to the backup DP control system, and should be separated by an A-60 class division from the other sensors. If the data from these sensors is passed to the main DP control system for their use, this system should be arranged so that a failure in the main DP control system cannot affect the integrity of the signals to the backup DP control system.

3.5 Cables and piping systems

3.5.1 For equipment class 3, cables for redundant equipment or systems should not be routed together through the same compartments. Where this is unavoidable, such cables may run together in cable ducts of A-60 class, the termination of the ducts included, which are effectively protected from all fire hazards except that represented by the cables themselves. Cable connection boxes may not be provided within such ducts.

3.5.2 For equipment class 2, piping systems for fuel, lubrication, hydraulic oil, cooling water and cables should be located with due regard to fire hazards and mechanical damage.

3.5.3 For equipment class 3, redundant piping systems (e.g. piping for fuel, cooling water, lubrication oil, hydraulic oil, etc.) should not be routed together through the same compartments. Where this is unavoidable, such pipes may run together in ducts of A-60 class, the termination of the ducts included, which are effectively protected from all fire hazards except that represented by the pipes themselves.

3.6 Requirements for essential non-DP systems

For equipment classes 2 and 3, systems not directly part of the DP system, but which in the event of failure could cause failure of the DP system (e.g. common fire suppression systems, engine ventilation, heating, ventilation and air conditioning (HVAC) systems, shutdown systems, etc.), should also comply with relevant requirements of these Guidelines.

3.7 Independent joystick system

3.7.1 A joystick system independent of the automatic DP control system should be arranged. The power supply for the independent joystick system (IJS) is to be independent of the DP control system UPSs. An alarm should be initiated upon failure of the IJS.

3.7.2 The IJS should have automatic heading control.

4 OPERATIONAL REQUIREMENTS

4.1 Before every DP operation, the DP system should be checked according to applicable vessel specific location checklist(s) and other decision support tools such as ASOG in order to make sure that the DP system is functioning correctly and that the system has been set up for the appropriate mode of operation.

4.2 During DP operations, the system should be checked at regular intervals according to the applicable vessel-specific watchkeeping checklist.

4.3 DP operations necessitating equipment class 2 or 3 should be terminated when the environmental conditions (e.g. wind, waves, current, etc.) are such that the DP vessel will no longer be able to keep position if the single failure criterion applicable to the equipment class should occur. In this context, deterioration of environmental conditions and the necessary time to safely terminate the operation should also be taken into consideration. This should be checked by way of environmental envelopes if operating in equipment class 1 and by way of an automatic means (e.g. consequence analysis) if operating in equipment class 2 or 3.

4.4 The necessary operating instructions should be kept on board.

4.5 DP capability polar plots should be produced to demonstrate position keeping capacity for fully operational and post worst-case single failure conditions. The capability plots should represent the environmental conditions in the area of operation and the mission-specific operational condition of the vessel.

4.6 The following checklists, test procedures, trials and instructions should be incorporated into the vessel-specific DP operations manuals:

.1 location checklist (see paragraph 4.1);

.2 watchkeeping checklist (see paragraph 4.2);

.3 DP operating instructions (see paragraph 4.4);

.4 annual tests and procedures (see paragraph 5.1.1.3);

.5 initial and periodical (5-year) tests and procedures (see paragraphs 5.1.1.1 and 5.1.1.2);

.6 examples of tests and procedures after modifications and non-conformities (see paragraph 5.1.1.4);

.7 blackout recovery procedure;

.8 list of critical components;

.9 examples of operating modes;

.10 decision support tools such as ASOG; and

.11 capability plots (see paragraph 4.5).

5 SURVEYS, TESTING AND DYNAMIC POSITIONING VERIFICATION ACCEPTANCE DOCUMENT (DPVAD)

5.1 Surveys and testing

5.1.1 Each DP vessel to which the Guidelines apply should be subject to the surveys and testing specified below:

.1 an initial survey which should include a complete survey of the DP system and FMEA proving trials for DP classes 2 and 3 to ensure full compliance with the applicable parts of the Guidelines. Furthermore it should include a complete test of all systems and components and the ability to keep position after single failures associated with the assigned equipment class. The type of tests carried out and results should be recorded and kept on board;

.2 a periodical testing at intervals not exceeding five years to ensure full compliance with the applicable parts of the Guidelines. A complete test should be carried out as required in paragraph 5.1.1.1. The type of tests carried out and results should be recorded and kept on board;

.3 an annual survey should be carried out within three months before or after each anniversary date of the Dynamic Positioning Verification Acceptance Document[1]. The annual survey should ensure that the DP system has been maintained in accordance with applicable parts of the Guidelines and is in good working order. The annual test of all important systems and components should be carried out to document the ability of the DP vessel to keep position after single failures associated with the assigned equipment class and validate the FMEA and operations manual. The type of tests carried out and results should be recorded and kept on board; and

.4 a survey, either general or partial according to circumstances, should be carried out every time a defect is discovered and corrected or an accident occurs which affects the safety of the DP vessel, or whenever any significant repairs or alterations are made. After such a survey, necessary tests should be carried out to demonstrate full compliance with the applicable provisions of the Guidelines. The type of tests carried out and results should be recorded and kept on board.

5.1.2 For equipment classes 2 and 3, an FMEA should be carried out. This is a systematic analysis of the systems to the level of detail required to demonstrate that no single failure will cause a loss of position or heading and should verify worst-case failure design intent. This analysis should then be confirmed by FMEA proving trials. The FMEA and FMEA proving trials result should be kept on board and the FMEA should be kept updated so that it remains current.

5.1.3 These surveys and tests should be witnessed by officers of the Administration. The Administration may, however, entrust the surveys and testing either to surveyors nominated for the purpose or to organizations recognized by it. In every case, the Administration concerned should guarantee the completeness and efficiency of the surveys and testing. The Administration may entrust the company of the vessel to carry out annual and minor repair surveys according to a test programme accepted by the Administration.

[1] If a Dynamic Positioning Verification Acceptance Document is not available, the anniversary date of the initial survey should be used to determine the date of the annual survey.

5.1.4 After any survey and testing has been completed, no significant change should be made to the DP system without the sanction of the Administration, except the direct replacement of equipment and fittings for the purpose of repair or maintenance.

5.2 Dynamic Positioning Verification Acceptance Document (DPVAD)

5.2.1 Compliance with these Guidelines should be verified by a DPVAD issued by or on behalf of the Administration.

5.2.2 A DPVAD should be issued, after survey and testing in accordance with these Guidelines, by the Administration or an organization recognized by it.

5.2.3 The DPVAD should be drawn up in the official language of the issuing country and in the form given in the appendix to the Guidelines. If the language used is neither English nor French, the text should include a translation into one of these languages.

5.2.4 The DPVAD is issued for a period not exceeding five years, or for a period specified by the Administration.

5.2.5 The DPVAD should cease to be valid if significant alterations have been made in the DP system equipment, fittings, arrangements, etc. specified in the Guidelines without the sanction of the Administration, except the direct replacement of such equipment or fittings for the purpose of repair or maintenance.

5.2.6 The DPVAD issued to a DP vessel should cease to be valid upon transfer of such a vessel to the flag of another country.

5.2.7 The privileges of the DPVAD may not be claimed in favour of any DP vessel unless the DPVAD is valid.

5.2.8 Results of the DPVAD tests should be readily available on board for reference.

6 TRAINING

Personnel engaged in operating a DP system should have received relevant training and practical experience in accordance with the provisions of the 1978 STCW Convention, as amended, the STCW Code, as amended, and the *Guidelines for Dynamic Positioning System (DP) Operator Training* (MSC/Circ.738, as amended).

APPENDIX

Model Form of Dynamic Positioning Verification Acceptance Document

Dynamic Positioning Verification Acceptance Document

(Official seal) *(State)*

Issued under the provisions of the

Guidelines for vessels with
dynamic positioning systems
(MSC.1/Circ.[…])

under the authority of the Government of

_____
(full designation of the State)

by _____
(full official designation of the competent person or organization authorized by the Administration)

Distinctive identification (Name or number)	Type	Port of registry	IMO number

Date on which keel was laid or vessel was at similar stage of construction* or on which major conversion was commenced* .....

THIS IS TO CERTIFY that the above-mentioned vessel has been duly documented, surveyed and tested in accordance with the Guidelines for vessels with dynamic positioning systems (MSC.1/Circ.[…]) and found to comply with the Guidelines.

The vessel is allowed to operate in DP Equipment Class .....
and in lower equipment classes.

This document is valid until .....
unless terminated by the Administration, provided that the vessel is operated, tested and surveyed according to the provisions in the Guidelines and the results are properly recorded.

Issued at .....
(Place of issue of document)

…….. ……..
(Date of issue) *(Signature of authorized official issuing the certificate)*

……
(Seal or stamp of the issuing authority, as appropriate)

* Delete as appropriate.

LIST OF EXEMPTIONS AND EQUIVALENTS

(refer to paragraphs 5 and 6 of the preamble of the Guidelines)

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LIST OF MAIN SYSTEMS AND COMPONENTS COVERED BY DPVAD[2]

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[2] All main systems and components comprising the dynamic positioning system should be recorded to account for overall system composition and design. Such records should readily facilitate cross-referencing to drawings, schematics, and/or other system diagrams. System and component updates introduced after the date of DPVAD issuance should be recorded only after proper testing/validation has been verified and found acceptable to the designated authority.

Record of annual survey reports, and periodic (5-year) testing reports

Date	Test type	Remarks	Report Reference Date/Number[3]	Sign. of appointed surveyor (if required)[4]	Sign. of Master/ Unit Manager

3 All reports should be filed together with this DPVAD for use during later testing and inspections by nominated surveyors, flag State surveyors, etc.

4 Refer to item 5.1.3.

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MSC.1/Circ.1581
16 June 2017

UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-2

1 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), with a view to providing more specific guidance on suitable means for the calibration of portable atmosphere testing instruments for cargo areas of tankers; fire integrity of the boundaries of spaces within the cargo area of tankers; and fire integrity of the bulkheads between the wheelhouse and the navigation lockers inside the wheelhouse, approved Unified interpretations of SOLAS chapter II-2, prepared by the Sub-Committee on Ship Systems and Equipment, at its fourth session (20 to 24 March 2017), as set out in the annex.

2 Member States are invited to use the annexed unified interpretations as guidance when applying the provisions of SOLAS regulations II-2/4 and II-2/9, and to bring the unified interpretations to the attention of all parties concerned.

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ANNEX

UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-2

REGULATION 4.5.7 – GAS MEASUREMENT AND DETECTION

Regulation 4.5.7.1 – Portable instrument

Compliance with the provision "suitable means shall be provided for the calibration of such instruments" in SOLAS regulation II-2/4.5.7.1, as adopted by resolution MSC.291(87), may be achieved by portable atmosphere testing instruments being calibrated on board or ashore in accordance with the manufacturer's instructions.

For the avoidance of any doubt, the above consideration refers to the calibration of portable instruments for measuring oxygen or flammable vapour concentrations, as required by SOLAS regulation II-2/4.5.7.1, and not to any pre-operational accuracy tests as recommended by the manufacturer.

REGULATION 9.2 – THERMAL AND STRUCTURAL BOUNDARIES

Regulation 9.2.2 – Passenger ships

Regulation 9.2.2.4.2

Regulation 9.2.3 – Cargo ships except tankers

Regulation 9.2.3.3.2

Regulation 9.2.4 – Tankers

Regulation 9.2.4.2.2

A navigation locker that can only be accessed from the wheelhouse should be considered as a control station with respect to the requirements in tables 9.3, 9.5 and 9.7 of regulation 9, and the bulkhead separating the wheelhouse and such a locker should have fire integrity of at least "B-0" class.

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MSC.1/Circ.1582
16 June 2017

UNIFIED INTERPRETATIONS OF CHAPTER 15 OF THE FSS CODE

1 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), with a view to providing more specific guidance on requirements related to inert gas systems on tankers, approved Unified interpretations of chapter 15 of the FSS Code, prepared by the Sub-Committee on Ship Systems and Equipment, at its fourth session (20 to 24 March 2017), as set out in the annex.

2 Member States are invited to use the annexed unified interpretations as guidance when applying paragraphs 15.2.2.2.2, 15.2.2.3.2.2, 15.2.2.4.1 and 15.2.2.4.5 of chapter 15 of the FSS Code, and to bring the unified interpretations to the attention of all parties concerned.

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ANNEX

UNIFIED INTERPRETATIONS OF CHAPTER 15 OF THE FSS CODE

CHAPTER 15 – INERT GAS SYSTEMS

Paragraph 15.2.2.2.2

The automatic shutdown of the inert gas system and its components should involve the following:

.1 shutdown of fans and closing of regulating valve for the following:

.1 high water level in scrubber (not applicable for N_2);

.2 low pressure/flow to scrubber (not applicable for N_2); or

.3 high-high temperature of inert gas supply.

.2 closing of regulating valve in the event of:

.1 high oxygen content (in excess of 5% by volume); or

.2 failure of blowers/fans or N_2 compressors.

.3 activation of double-block and bleed arrangement upon:

.1 loss of inert gas supply (for ships with double block and bleed replacing water seal); or

.2 loss of power.

Paragraph 15.2.2.3.2.2

Unambiguous information regarding the operational status of stop valves in branch piping leading from the inert gas main to cargo tanks means position indicators providing open/intermediate/closed status information in the control panel required in paragraph 15.2.2.4. Limit switches should be used to positively indicate both open and closed positions. Intermediate position status should be indicated when the valve is in neither open nor closed position.

Paragraph 15.2.2.4.1

The operational status of the inert gas system should be based on indication that inert gas is being supplied downstream of the gas regulating valve and on the pressure or flow of the inert gas mains upstream of the non-return devices. However, the operational status of the inert gas system as required in paragraph 15.2.2.4.1 should not be considered to require additional indicators and alarms other than those specified in paragraphs 15.2.2.4 and 15.2.3.2 or 15.2.4.2, as appropriate.

Paragraph 15.2.2.4.5.3

The term "alarm system independent" means that a second pressure sensor, independent of the sensor serving the alarms for low pressure, high pressure and pressure indicator/recorder should be provided. Notwithstanding the above, a common programmable logic controller (PLC) should, however, be accepted for the alarms in the control system. The independent sensor should not be required if the system is arranged for the shutdown of cargo pumps. If a system for shutdown of cargo pumps is arranged, an automatic system shutting down all cargo pumps should be provided. The shutdown should be alarmed at the control station. The shutdown should not prevent the operation of ballast pumps or pumps used for bilge drainage of a cargo pump room.

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20 June 2017

AMENDMENTS TO THE GUIDELINES FOR EVALUATION AND REPLACEMENT OF LIFEBOAT RELEASE AND RETRIEVAL SYSTEMS (MSC.1/CIRC.1392)

1 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), with a view to including a method of assessment for backing plates and bolts not made of material resistant to corrosion in the marine environment in order to confirm their condition, approved amendments to the *Guidelines for evaluation and replacement of lifeboat release and retrieval systems* (MSC.1/Circ.1392), prepared by the Sub-Committee on Ship Systems and Equipment, at its fourth session (20 to 24 March 2017), as set out in the annex.

2 Member States are invited to use the Guidelines in conjunction with the annexed amendments as guidance when applying SOLAS regulation III/1.5, as adopted by resolution MSC.317(89), and to bring the amendments to the attention of all parties concerned.

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ANNEX

AMENDMENTS TO THE GUIDELINES FOR EVALUATION AND REPLACEMENT OF LIFEBOAT RELEASE AND RETRIEVAL SYSTEMS (MSC.1/CIRC.1392)

Paragraph 21 is replaced with the following:

"21 The Administration, or a recognized organization acting on its behalf, may allow that hook fixed structural connections of the release mechanism and supporting structure which are not made of material resistant to corrosion in the marine environment, as required by paragraph 4.4.7.6.9 of the LSA Code, need not be replaced if they are in a good condition and installed in a sheltered position inside the lifeboat. The assessment for verifying that fixed structural connections and supporting structures are in 'good condition' should be carried out by the manufacturer or by one of its representatives in accordance with paragraph 23 below.

The assessment for verification is not required if the materials of the foundation, bolts and supporting structure, both internally and externally, are made of materials resistant to corrosion in the marine environment.

.1 Method of assessment:

The assessment of fixed structural connections of the release mechanism and supporting structures should be carried out according to the manual developed by the manufacturer. However, if either such a manual or the original equipment manufacturer, or any entity which has taken legal and legitimate responsibilities for equipment when the original equipment manufacturer no longer exists or supports the equipment, do not exist, this assessment should be carried out according to the following method:

.1 100% visual examination of all components within clear sight in order to assess the general condition and look for signs of corrosion. No dismantling or removal of components is required at this stage.

.2 At least 25% of bolts for each hook fixation should be removed for visual examination[1]. Additionally, a non-destructive testing (NDT) technique, such as magnetic particle inspection (MPI), where suitable, may be applied. If any of the removed bolts of the hook fixation shows signs of corrosion or are deemed to be in "bad condition", then the rest of the bolts for the same hook fixation should be removed and examined. As a general rule, any bolt that has lost material to corrosion of 2% from the original dimensions should be deemed to be "in bad condition" and replaced. Replacement bolts are to be made of material corrosion resistant in the marine environment based on a like for like principle.

[1] In most types of lifeboats, the arrangement of keel shoe fixation allows for access and removal of bolts for inspection. When this is not the case, e.g. where bolts are solidly embedded or built in to the fiber reinforced plastic (FRP) structure, the Adminstration, or recognized organization acting on its behalf, should handle it on a case-by-case basis.

.3 If fixed structural connections of the release mechanism or supporting structures show signs of corrosion, then ultrasonic thickness measurement and corrosion mapping should be performed. For this non-destructive examination (NDE) to be possible, the probes need to have adequate access and the surface needs to be smooth and appropriate for ultrasonic scanning. As a general rule, a backing plate that has suffered corrosion wastage of 10% or more from the original plate thickness should be deemed to be "in bad condition" and replaced. Replacement of structural connections, backing plates, etc. are to be made of materials resistant to corrosion in the marine environment and based on a like for like principle.

.4 If after the assessment, the bolts, backing plates, keel shoes, etc. are in good condition, then all parts are to be cleaned and recoated, if necessary.

.2 Backing plates and bolts installed outside the lifeboat and deemed to be in 'good condition' after the assessment need not be replaced even when not made of material resistant to corrosion in the marine environment."

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5 July 2017

GUIDELINES ON MARITIME CYBER RISK MANAGEMENT

1 The Facilitation Committee, at its forty-first session (4 to 7 April 2017), and the Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), having considered the urgent need to raise awareness on cyber risk threats and vulnerabilities, approved the *Guidelines on maritime cyber risk management*, as set out in the annex.

2 The Guidelines provide high-level recommendations on maritime cyber risk management to safeguard shipping from current and emerging cyberthreats and vulnerabilities. The Guidelines also include functional elements that support effective cyber risk management.

3 Member Governments are invited to bring the contents of this circular to the attention of all stakeholders concerned.

4 This circular supersedes the interim guidelines contained in MSC.1/Circ.1526.

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ANNEX

GUIDELINES ON MARITIME CYBER RISK MANAGEMENT

1 INTRODUCTION

1.1 These Guidelines provide high-level recommendations for maritime cyber risk management. For the purpose of these Guidelines, *maritime cyber risk* refers to a measure of the extent to which a technology asset is threatened by a potential circumstance or event, which may result in shipping-related operational, safety or security failures as a consequence of information or systems being corrupted, lost or compromised.

1.2 Stakeholders should take the necessary steps to safeguard shipping from current and emerging threats and vulnerabilities related to digitization, integration and automation of processes and systems in shipping.

1.3 For details and guidance related to the development and implementation of specific risk management processes, users of these Guidelines should refer to specific Member Governments' and Flag Administrations' requirements, as well as relevant international and industry standards and best practices.

1.4 Risk management is fundamental to safe and secure shipping operations. Risk management has traditionally been focused on operations in the physical domain, but greater reliance on digitization, integration, automation and network-based systems has created an increasing need for cyber risk management in the shipping industry.

1.5 Predicated on the goal of supporting safe and secure shipping, which is operationally resilient to cyber risks, these Guidelines provide recommendations that can be incorporated into existing risk management processes. In this regard, the Guidelines are complementary to the safety and security management practices established by this Organization.

2 GENERAL

2.1 Background

2.1.1 Cybertechnologies have become essential to the operation and management of numerous systems critical to the safety and security of shipping and protection of the marine environment. In some cases, these systems are to comply with international standards and Flag Administration requirements. However, the vulnerabilities created by accessing, interconnecting or networking these systems can lead to cyber risks which should be addressed. Vulnerable systems could include, but are not limited to:

.1 Bridge systems;
.2 Cargo handling and management systems;
.3 Propulsion and machinery management and power control systems;
.4 Access control systems;
.5 Passenger servicing and management systems;
.6 Passenger facing public networks;
.7 Administrative and crew welfare systems; and
.8 Communication systems.

2.1.2 The distinction between information technology and operational technology systems should be considered. Information technology systems may be thought of as focusing on the use of data as information. Operational technology systems may be thought of as focusing on the use of data to control or monitor physical processes. Furthermore, the protection of information and data exchange within these systems should also be considered.

2.1.3 While these technologies and systems provide significant efficiency gains for the maritime industry, they also present risks to critical systems and processes linked to the operation of systems integral to shipping. These risks may result from vulnerabilities arising from inadequate operation, integration, maintenance and design of cyber-related systems, and from intentional and unintentional cyberthreats.

2.1.4 Threats are presented by malicious actions (e.g. hacking or introduction of malware) or the unintended consequences of benign actions (e.g. software maintenance or user permissions). In general, these actions expose vulnerabilities (e.g. outdated software or ineffective firewalls) or exploit a vulnerability in operational or information technology. Effective cyber risk management should consider both kinds of threat.

2.1.5 Vulnerabilities can result from inadequacies in design, integration and/or maintenance of systems, as well as lapses in cyberdiscipline. In general, where vulnerabilities in operational and/or information technology are exposed or exploited, either directly (e.g. weak passwords leading to unauthorized access) or indirectly (e.g. the absence of network segregation), there can be implications for security and the confidentiality, integrity and availability of information. Additionally, when operational and/or information technology vulnerabilities are exposed or exploited, there can be implications for safety, particularly where critical systems (e.g. bridge navigation or main propulsion systems) are compromised.

2.1.6 Effective cyber risk management should also consider safety and security impacts resulting from the exposure or exploitation of vulnerabilities in information technology systems. This could result from inappropriate connection to operational technology systems or from procedural lapses by operational personnel or third parties, which may compromise these systems (e.g. inappropriate use of removable media such as a memory stick).

2.1.7 Further information regarding vulnerabilities and threats can be found in the additional guidance and standards referenced in section 4.

2.1.8 These rapidly changing technologies and threats make it difficult to address these risks only through technical standards. As such, these Guidelines recommend a risk management approach to cyber risks that is resilient and evolves as a natural extension of existing safety and security management practices.

2.1.9 In considering potential sources of threats and vulnerabilities and associated risk mitigation strategies, a number of potential control options for cyber risk management should also be taken into consideration, including amongst others, management, operational or procedural, and technical controls.

2.2 Application

2.2.1 These Guidelines are primarily intended for all organizations in the shipping industry, and are designed to encourage safety and security management practices in the cyberdomain.

2.2.2 Recognizing that no two organizations in the shipping industry are the same, these Guidelines are expressed in broad terms in order to have a widespread application. Ships with limited cyber-related systems may find a simple application of these Guidelines to be sufficient; however, ships with complex cyber-related systems may require a greater level of care and should seek additional resources through reputable industry and Government partners.

2.2.3 These Guidelines are recommendatory.

3 ELEMENTS OF CYBER RISK MANAGEMENT

3.1 For the purpose of these Guidelines, *cyber risk management* means the process of identifying, analysing, assessing, and communicating a cyber-related risk and accepting, avoiding, transferring, or mitigating it to an acceptable level, considering costs and benefits of actions taken to stakeholders.

3.2 The goal of maritime cyber risk management is to support safe and secure shipping, which is operationally resilient to cyber risks.

3.3 Effective cyber risk management should start at the senior management level. Senior management should embed a culture of cyber risk awareness into all levels of an organization and ensure a holistic and flexible cyber risk management regime that is in continuous operation and constantly evaluated through effective feedback mechanisms.

3.4 One accepted approach to achieve the above is to comprehensively assess and compare an organization's current, and desired, cyber risk management postures. Such a comparison may reveal gaps that can be addressed to achieve risk management objectives through a prioritized cyber risk management plan. This risk-based approach will enable an organization to best apply its resources in the most effective manner.

3.5 These Guidelines present the functional elements that support effective cyber risk management. These functional elements are not sequential – all should be concurrent and continuous in practice and should be incorporated appropriately in a risk management framework:

.1 Identify: Define personnel roles and responsibilities for cyber risk management and identify the systems, assets, data and capabilities that, when disrupted, pose risks to ship operations.

.2 Protect: Implement risk control processes and measures, and contingency planning to protect against a cyber-event and ensure continuity of shipping operations.

.3 Detect: Develop and implement activities necessary to detect a cyber-event in a timely manner.

.4 Respond: Develop and implement activities and plans to provide resilience and to restore systems necessary for shipping operations or services impaired due to a cyber-event.

.5 Recover: Identify measures to back-up and restore cyber systems necessary for shipping operations impacted by a cyber-event.

3.6 These functional elements encompass the activities and desired outcomes of effective cyber risk management across critical systems affecting maritime operations and information exchange, and constitute an ongoing process with effective feedback mechanisms.

3.7 Effective cyber risk management should ensure an appropriate level of awareness of cyber risks at all levels of an organization. The level of awareness and preparedness should be appropriate to roles and responsibilities in the cyber risk management system.

4 BEST PRACTICES FOR IMPLEMENTATION OF CYBER RISK MANAGEMENT

4.1 The approach to cyber risk management described herein provides a foundation for better understanding and managing cyber risks, thus enabling a risk management approach to address cyberthreats and vulnerabilities. For detailed guidance on cyber risk management, users of these Guidelines should also refer to Member Governments' and Flag Administrations' requirements, as well as relevant international and industry standards and best practices.

4.2 Additional guidance and standards may include, but are not limited to:[1]

.1 The Guidelines on Cyber Security Onboard Ships produced and supported by BIMCO, CLIA, ICS, INTERCARGO, INTERTANKO, OCIMF and IUMI.

.2 ISO/IEC 27001 standard on Information technology – Security techniques – Information security management systems – Requirements. Published jointly by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

.3 United States National Institute of Standards and Technology's Framework for Improving Critical Infrastructure *Cyber*security (the NIST Framework).

4.3 Reference should be made to the most current version of any guidance or standards utilized.

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[1] The additional guidance and standards are listed as a non-exhaustive reference to further detailed information for users of these Guidelines. The referenced guidance and standards have not been issued by the Organization and their use remains at the discretion of individual users of these Guidelines.