

標題

MSC 101 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

2019年6月5日から14日にIMO(英国・ロンドン)において第101回海上安全委員会(MSC 101)が開催されました。今般、IMOよりMSC 101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) SOLAS 証書の Forms C, E 及び P の改正(添付1参照)

貨物船及び旅客船に対する安全証書の設備の記録(Form C、P)及び貨物船に対する安全設備証書の設備の記録(Form E)の様式の中の「航海設備の詳細 8.1 項 舵角、プロペラ回転数、推力、ピッチ及び操作モード表示器」に関し、搭載されていない設備の表記を統一するための改正が採択されました。

適用: 2024年1月1日

(2) FSS コードの改正(添付2参照)

イナートガス装置の設計に対する要件に関し、「forward of」の表記が誤解を招く恐れがあるため、「downstream of」の表記に修正する FSS コード 15 章の改正が採択されました。

適用: 2024年1月1日

(3) IGF コードの改正(添付3参照)

燃料タンクの配置(IGF コード 5.3.4.2)、液化ガス燃料タンクの充填制限値(同コード 6.8.3)、燃料管(同コード 9.5.3-9.5.6)、ピストン形内燃機関(同コード 10.3.1.1.1)及び燃料が貯蔵されているホールドスペースの防火(同コード 11.3.3、11.3.3.1)に関する改正が採択されました。

適用: 2024年1月1日

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NOTES:

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(4) LSA コードの改正(添付 4 参照)

下記 2 件の LSA コードの改正が採択されました。

- i) 2 つの独立した推進装置を持つ救命艇においてオール等の艀装品が省略できる旨の同コード 4.4.8.1 の改正
- ii) 貨物船に搭載される生存艇として使用しない救助艇において、艀装品等を満載した状態で重量が 700kg を超えない場合には、所定の条件下で蓄積機械力に代えて一人の人力による積み付け位置からの吊り上げ及び乗艇場所への振出しによる進水を認める同コード 6.1.1.3 の改正

適用: 2024 年 1 月 1 日

(5) IBC コードの改正(添付 5 参照)

有害液体物質の運送要件見直し等のための IBC コード 15 章(特定の貨物に対する特別要件)、16 章(作業に関する規定)、17 章(最低要件)、18 章(本コードの適用を受けない化学品)、19 章(運送貨物インデックス)及び 21 章(本コードに従って貨物を運送する際の要件)等の改正が採択されました。本改正に関する情報は、別途弊会テクニカルインフォメーションを発行してお知らせする予定です。

適用: 2021 年 1 月 1 日

(6) 2011 ESP コードの改正

IACS の統一規則(UR) Z10 シリーズとの整合や強制適用される要件の表記変更等のための 2011 ESP コードの改正が採択されました。

適用: 2021 年 1 月 1 日

(7) IMSBC コードの改正

新規貨物の追加を含む、IMSBC コードの第 5 回改正が採択されました。本改正に関する情報は、別途弊会テクニカルインフォメーションを発行してお知らせする予定です。

適用: 2021 年 1 月 1 日(ただし、主管庁判断により 2020 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、2020 年 5 月に開催される MSC 102 にて採択される見込みです。

(1) 係船設備に関する SOLAS 条約 II-1/3-8 の改正(添付 7 参照)

下記 3.2.(1)の安全な係船設備の設計及び装置の選定に関する新ガイドライン、係船索を含む係船設備の点検及び保守に関する新ガイドラインが原則承認されたため、これらを適用する旨規定する SOLAS 条約 II-1/3-8 の改正案が承認されました。

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- (2) 水密性に関する要件整合のための SOLAS 条約 II-1/B-1 ~ B-4 部の改正(添付 7 参照)  
SOLAS 条約 II-1/B-1 ~ B-4 部において、水密性に関する要件を整合するための改正案が承認されました。
  - (3) IGF コードの改正(添付 8 参照)  
下記 3 件の IGF コードの改正案が承認されました。
    - i) 6.7.1.1 において、タンクコファダムを圧力逃し装置の要求対象区画から削除
    - ii) 燃料調整室に対し固定式消火装置を要求するための、11.8 の新規追加
    - iii) アルミニウム合金材以外の溶接継手の引張試験に関する 16.3.3.5.1 の修正
  - (4) IGC コードの改正(添付 9 参照)  
上記 2.(3)3 に記載の IGF コード改正に合わせ、アルミニウム合金材以外の溶接継手の引張試験に関する IGC コード 6.5.3.5.1 の改正案が承認されました。
3. 今回の会合において承認された統一解釈、ガイドライン、ガイダンス等のうち、主要なものは以下のとおりです。
- 3.1 統一解釈
- (1) ro-ro 及び車両積載区域の通風筒の開口を考慮する要件に関する統一解釈の改正(添付 15、16、17 参照)  
LL 条約、2008 IS コード及び SOLAS 条約で要求される復原性計算において、閉囲された ro-ro 及び車両積載区域の通風筒の開口を考慮する要件を追加するための解釈(MSC.1/Circ.1535、MSC.1/Circ.1537、MSC.1/Circ.1539)の改正。
  - (2) 2008 IS コードの統一解釈(添付 16 参照)  
2008 IS コード B 部 3.4.2.3 において、熱帯満載喫水線を有するタンカーの非損傷時復原性計算のための積み付け条件を明確にするための解釈。
  - (3) 旅客船の液位監視装置に関する統一解釈(添付 17 参照)  
旅客船の浸水警報装置の代替としてタンクに液位監視装置を備える場合も、浸水警報装置と同様に SOLAS 条約 II-2 章 21.4.13 にある安全な帰港(Safe Return to Port, SRtP)の要件に適合しなければならない旨の解釈。
  - (4) SOLAS 条約 II-2 章の統一解釈(添付 25 参照)  
以下 3 点の SOLAS 条約 II-2 章関連の統一解釈。
    - i) EGCS 等に供される尿素又は水酸化ナトリウム溶液タンクが独立した区画に設置される場合の防熱保全性を明確にするための 9.2 の解釈
    - ii) 9.7.5 において、調理室の排気ダクトに固定式ガス消火装置を用いる場合の要件を明確にする解釈
    - iii) 消防員用の持ち運び式双方向無線電話装置の耐圧防爆型や本質安全防爆型の詳細を定めた 10.10.4 の解釈

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- (5) SOLAS 条約 III 章の統一解釈(添付 27 参照)  
以下 2 点の SOLAS 条約 III 章関連の統一解釈。
- i) 少なくとも 5 年に 1 回実施する救命艇、救助艇やその進水装置及び離脱装置の開放検査や効力試験に検査員の立ち合いが必要であることを明確にするための 20.11 の解釈(関連 IACS UI SC144)
  - ii) II-1 章/3-9 で要求される灯火及び救命索を備える救命浮環を、III 章/22.1.1 及び III 章/32.1.1 で要求される救命浮環の最小数に含むことができない旨を明確にする解釈
- (6) IGC コードの統一解釈(添付 20, 26 参照)  
SSE 小委員会で作成された、以下 2 点の IGC コード関連の統一解釈。
- i) 11.3.6 で要求される、貨物エリアにおける水噴霧消火装置の管、弁、ノズルその他の取り付け物に対する耐熱要件の適用について、対象となる貨物エリアを明確化するための解釈
  - ii) 11.4.8 で要求されるドライケミカル粉末消火装置設置後の放出試験の手順を明確にするための解釈
- CCC 小委員会で作成された、以下 4 点の IGC コード関連の統一解釈。
- i) 船体構造を保護するヒーティング設備の冗長性の要件について、原則、加熱装置等の二重化が必要であることを明確化した 4.19.1.6 の解釈(関連 IACS UI GC23)
  - ii) 耐圧部の健全性等に寄与しない緊急遮断弁の材料は、耐熱要件の対象に含まないことを明確化した 5.13.1.1.4 の解釈(関連 IACS UI GC24)
  - iii) 船首部、船尾部に設置される追加の救命いかだであっても、貨物エリアに面している場合は水噴霧装置により保護することを明確化した 11.3.1 の解釈(関連 IACS UI GC22)
  - iv) 水噴霧ポンプの容量決定において保護が要求されるタンク群について、「船の横方向の 2 つの組み合わせ」を明確化する 11.3.3 の解釈(関連 IACS UI GC22)
- (7) SOLAS 条約 II-1/28, II-1/29 及び II-1/30 の統一解釈(添付 14 参照)  
アジマススラスト等の最新の複合的な推進・操舵システムを考慮した、推進・操舵関連の II-1/28, 29 及び 30 の解釈(関連 IACS UI SC242)。
- (8) IGF コードの統一解釈(添付 19 参照)  
以下 4 点の IGF コード関連の統一解釈。
- i) 燃料タンク等の接続部からの漏洩に対して船体用鋼材を保護するためのドリフトレイ設置の可否を明確にするための 6.3.10 の解釈(関連 IACS UI GF2)
  - ii) 二元燃料機関及びガス機関の吸気弁についてリスク評価を実施すれば 12.5 に例示された危険場所の代替として分類できる旨の 12.4 及び 12.5 の解釈
  - iii) 燃料貯蔵ホールスペースに対する危険場所の分類を明確化する 12.5.2.1 の解釈(関連 IACS UI GF14)
  - iv) 通風システムの可視可聴警報装置について、必要な要件を明確化する 15.10.1 の解釈(関連 IACS UI GF15)

(次頁に続く)

### 3.2 ガイドライン、ガイダンス及びその他サーキュラー

- (1) 係船設備に関する2件の新規ガイドライン及び1件のガイダンスの改正  
係船設備に関し以下3件が原則承認された。これらは上記2.(1)の SOLAS 条約改正案に合わせて正式に承認され、2024年1月1日に発効する見込みです。
  - i) 安全な係船設備の設計及び装置の選定に関する新規ガイドライン
  - ii) 係船索を含む係船設備の点検及び保守に関する新規ガイドライン
  - iii) 曳航設備及び係留設備のガイダンス(MSC.1/Circ.1175)の改正
- (2) SOLAS 条約 II-1 章及び III 章の代替設計・配置に関するガイドラインの改正(添付 12 参照)  
SOLAS 条約 III 章の目標、機能要件、期待性能を追加するための、SOLAS 条約 II-1 章及び III 章の代替設計・配置に関するガイドライン(MSC.1/Circ.1212)の改正。
- (3) 救命艇のシステムの操作及び保守マニュアル作成のガイドラインの改正(添付 11 参照)  
脱出経路の標識及び防火設備の位置の表示に関する総会決議 A.1116(30)を参照するための、救命艇のシステムの操作及び保守マニュアル作成のガイドライン(MSC.1/Circ.1205)の改正。
- (4) 総会決議 A.658(16)の改正(添付 10 参照)  
LSA コード 1.2.2.7 で参照されている総会決議 A.658(16)において、再帰反射材の促進耐候試験に関して、カーボンアーク式以外の試験機の使用も認めるための決議改正案。本改正案は、2019年11月開催の第31回総会(A31)で採択される見込みです。
- (5) 改正 IGC コード 19 章の貨物運送に関する MSC サーキュラー(添付 21 参照)  
1986年7月1日以降で2016年7月1日より前に建造された船舶が、改正 IGC コード(決議 MSC.370(93)) 19 章の貨物リスト上の貨物を運送できるようにするために IGC 証書の付録を例示するための MSC サーキュラー。
- (6) 固定式ガス消火装置の免除対象貨物の更新(添付 13 参照)  
上記 1.(6)の IMSBC コード改正に関連し、固定式ガス消火装置の免除対象貨物を更新するための MSC.1/Circ.1395/Rev.3 の改正。
- (7) 極海域を航行する船舶の航行及び通信機器に関するガイダンス(添付 22 参照)  
Module A(極海域の環境条件を考慮した一般事項)及び Module B(特定の通信機器に対する事項)の2部で構成された、極海域を航行する船舶の航行及び通信機器に関するガイダンス。
- (8) 極海域を航行する船舶の救命設備に関する暫定ガイドライン(添付 23 参照)  
個人用救命設備、生存艇等に対する追加の基準等が規定された、極海域を航行する船舶の救命設備に関する暫定ガイドライン。

(次頁に続く)

- (9) 新造及び既存の ro-ro 旅客船の ro-ro 区域及び特殊分類区域における火災事故抑止のための暫定ガイドライン(添付 24 参照)  
下記の 5 項目で構成された、新造及び既存の ro-ro 旅客船の ro-ro 区域及び特殊分類区域における火災事故を最小化するための暫定ガイドライン。
- i) PREVENTION/IGNITION
  - ii) DETECTION AND DECISION
  - iii) EXTINGUISHMENT
  - iv) CONTAINMENT
  - v) INTEGRITY OF LIFE-SAVING APPLIANCES AND EVACUATION

#### 4. その他

- (1) 自動運航船に対する規則の検討(添付 18 参照)  
船舶の自動化に関する研究が進んでいる中で、自動運航船に適用するべき条約要件について MSC で検討を行っています。  
今回の審議では、前回会合で決定した自動運航船に関わる IMO の諸規制の論点整理 (Regulatory Scoping Exercise, 以下 RSE) の実施方法に従い、各条約や章ごとに実施されている RSE の第一段階(検討すべき要件の洗い出し)の作業の進捗状況が報告されました。RSE の作業結果については、最終的に 2020 年 5 月に開催される MSC 102 で検討される予定です。  
また、自動運航船を開発する際のトライアルに関する暫定ガイドラインが承認されました。本ガイドラインには、自動運航船関連のシステムやインフラの試験的な運用の際に考慮すべき基本方針が記述されております。
- (2) 燃料油の使用における安全性強化の検討(添付 6 参照)  
2020 年 1 月 1 日から適用が開始となる燃料油の硫黄分 0.50% 規制をきっかけとして、燃料油の使用における安全上の問題が検討されております。  
MSC 101 における審議の結果、暫定的な対策として、引火点 60 度未満の燃料油が船舶に供給された事例などを、旗国政府が IMO に報告することを要請する MSC 決議が採択されました。  
また、2021 年に開催される MSC 104 での最終化を目標に、燃料油の使用における船舶の安全性強化の手法を開発していくための実行計画が合意されました。今後は本実行計画に従い、関連の強制要件作成(SOLAS 条約 II-2 章の改正等)について検討していくこととなります。

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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:

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9. DRAFT AMENDMENTS TO THE IGC CODE
10. DRAFT ASSEMBLY RESOLUTION ON AMENDMENTS TO THE USE AND FITTING OF RETRO-REFLECTIVE MATERIALS ON LIFE-SAVING APPLIANCES (RESOLUTION A.658(16))
11. MSC.1/Circ.1205/Rev.1
12. MSC.1/Circ.1212/Rev.1
13. MSC.1/Circ.1395/Rev.4
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27. MSC.1/Circ.1618

**ANNEX 1**

**RESOLUTION MSC.456(101)  
(adopted on 14 June 2019)**

**AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE  
SAFETY OF LIFE AT SEA (SOLAS), 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 101st 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 the said amendments shall be deemed to have been accepted on 1 July 2023, 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 2024 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

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

**APPENDIX  
CERTIFICATES**

**RECORD OF EQUIPMENT FOR CARGO SHIP SAFETY  
(FORM E)**

**3 Details of navigational systems and equipment**

1 Item 8.1. is replaced by the following:

"

	<b>Item</b>	<b>Actual provision</b>
8.1	Rudder, propeller, thrust, pitch and operational mode indicator <sup>2 3</sup>	.....

"

**RECORD OF EQUIPMENT FOR CARGO SHIP SAFETY  
(FORM C)**

**5 Details of navigational systems and equipment**

2 Item 8.1. is replaced by the following:

"

	<b>Item</b>	<b>Actual provision</b>
8.1	Rudder, propeller, thrust, pitch and operational mode indicator <sup>2 3</sup>	.....

"

**RECORD OF EQUIPMENT FOR PASSENGER SHIP SAFETY  
(FORM P)**

**5 Details of navigational systems and equipment**

3 Item 8.1. is replaced by the following:

"

	<b>Item</b>	<b>Actual provision</b>
8.1	Rudder, propeller, thrust, pitch and operational mode indicator <sup>3 4</sup>	.....

"

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**ANNEX 2**

**RESOLUTION MSC.457(101)  
(adopted on 14 June 2019)**

**AMENDMENTS TO THE INTERNATIONAL CODE  
FOR FIRE SAFETY SYSTEMS (FSS CODE)**

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO resolution MSC.98(73), by which it adopted the International Code for Fire Safety Systems ("the FSS Code"), which has become mandatory under chapter II-2 of the International Convention for the Safety of Life at Sea (SOLAS), 1974 (hereinafter referred to as "the Convention"),

RECALLING FURTHER article VIII(b) and regulation II-2/3.22 of the Convention concerning the procedure for amending the FSS Code,

HAVING CONSIDERED, at its 101st session, amendments to the FSS 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 FSS 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 2023 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 2024 upon their acceptance in accordance with paragraph 2 above;

4 REQUESTS the Secretary-General, in conformity with 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  
FOR FIRE SAFETY SYSTEMS (FSS CODE)**

**CHAPTER 15  
INERT GAS SYSTEMS**

**2 Engineering specifications**

**2.2 Requirements for all systems**

**2.2.3.2 Inert gas lines**

1 Paragraph 2.2.3.2.1 is replaced by the following:

"2.2.3.2.1 The inert gas main may be divided into two or more branches downstream of the non-return devices required by paragraph 2.2.3.1."

2 Paragraph 2.2.3.2.6 is replaced by the following:

"2.2.3.2.6 Arrangements shall be provided to enable the inert gas main to be connected to an external supply of inert gas. The arrangements shall consist of a 250 mm nominal pipe size bolted flange, isolated from the inert gas main by a valve and located downstream of the non-return valve. The design of the flange should conform to the appropriate class in the standards adopted for the design of other external connections in the ship's cargo piping system."

**2.2.4 Indicators and alarms**

3 Paragraph 2.2.4.2 is replaced by the following:

"2.2.4.2 Instrumentation shall be fitted for continuously indicating and permanently recording, when inert gas is being supplied:

- .1 the pressure of the inert gas mains downstream of the non-return devices; and
- .2 the oxygen content of the inert gas."

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**ANNEX 3**

**RESOLUTION MSC.458(101)**  
**(adopted on 14 June 2019)**

**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 function of the Committee,

RECALLING ALSO 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 chapter II-1 of the International Convention for the Safety of Life at Sea (SOLAS), 1974 ("the Convention"),

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

HAVING CONSIDERED, at its 101st 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 2023 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 2024 upon their acceptance in accordance with paragraph 2 above;

4 REQUESTS the Secretary-General, in conformity with 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)

#### PART A

#### 2 GENERAL

##### 2.2 Definitions

- 1 The following new paragraph 2.2.42 is introduced after existing paragraph 2.2.41:

"2.2.42 *Ship constructed on or after 1 January 2024* means:

- .1 for which the building contract is placed on or after 1 January 2024;  
or
- .2 in the absence of a building contract, the keels of which are laid or  
which are at a similar stage of construction on or after 1 July 2024;  
or
- .3 the delivery of which is on or after 1 January 2028."

#### PART A-1

### SPECIFIC REQUIREMENTS FOR SHIPS USING NATURAL GAS AS FUEL

#### 5 SHIP DESIGN AND ARRANGEMENT

##### 5.3 Regulations – General

- 2 The text defining  $f_v$  in paragraph 5.3.4.2 is replaced by the following:

" $f_v$  is calculated by use of the formulations for factor  $v$  contained in SOLAS regulation II-1/7-2.6.1.1 and reflects the probability that the damage is extending vertically above the lowermost boundary of the fuel tank. The formulations to be used are:"

#### 6 FUEL CONTAINMENT SYSTEM

##### 6.8 Regulations on loading limit for liquefied gas fuel tanks

- 3 The following regulation is added after existing regulation 6.8.2:

"6.8.3 For ships constructed on or after 1 January 2024, in cases where the tank insulation and tank location make the probability very small for the tank contents to be heated up due to an external fire, special considerations may be made to allow a higher loading limit than calculated using the reference temperature, but never above 95%."

## **9 FUEL SUPPLY TO CONSUMERS**

### **9.5 Regulations for fuel distribution outside of machinery space**

4 The following regulations are added after existing regulation 9.5.2:

"9.5.3 The requirements in 9.5.4 to 9.5.6 shall apply to ships constructed on or after 1 January 2024 in lieu of the requirements in 9.5.1 and 9.5.2.

9.5.4 Where gaseous fuel pipes pass through enclosed spaces in the ship, they shall be protected by a secondary enclosure. This enclosure can be a ventilated duct or a double wall piping system. The duct or double wall piping system shall be mechanically under pressure ventilated with 30 air changes per hour, and gas detection as required in 15.8 shall be provided. Other solutions providing an equivalent safety level may also be accepted by the Administration.

9.5.5 The requirement in 9.5.4 need not be applied for fully welded fuel gas vent pipes led through mechanically ventilated spaces.

9.5.6 Liquefied fuel pipes shall be protected by a secondary enclosure able to contain leakages. If the piping system is in a fuel preparation room or a tank connection space, the Administration may waive this requirement. Where gas detection as required in 15.8.1.2 is not fit for purpose, the secondary enclosures around liquefied fuel pipes shall be provided with leakage detection by means of pressure or temperature monitoring systems, or any combination thereof. The secondary enclosure shall be able to withstand the maximum pressure that may build up in the enclosure in case of leakage from the fuel piping. For this purpose, the secondary enclosure may need to be arranged with a pressure relief system that prevents the enclosure from being subjected to pressures above their design pressures."

## **10 POWER GENERATION INCLUDING PROPULSION AND OTHER GAS CONSUMERS**

### **10.3 Regulations for internal combustion engines of piston type**

5 New regulation 10.3.1.1.1 is added after existing regulation 10.3.1.1 as follows:

"10.3.1.1.1 For ships constructed on or after 1 January 2024, the exhaust system shall be equipped with explosion relief systems unless designed to accommodate the worst case overpressure due to ignited gas leaks or justified by the safety concept of the engine. A detailed evaluation of the potential for unburnt gas in the exhaust system is to be undertaken covering the complete system from the cylinders up to the open end. This detailed evaluation shall be reflected in the safety concept of the engine."

## **11 FIRE SAFETY**

### **11.3 Regulations for fire protection**

6 Regulation 11.3.3 is replaced by the following:

"11.3.3 The space containing the fuel containment system shall be separated from the machinery spaces of category A or other rooms with high fire risks. The separation shall be done by a cofferdam of at least 900 mm with insulation of A-60 class. When

determining the insulation of the space containing the fuel containment system from other spaces with lower fire risks, the fuel containment system shall be considered as a machinery space of category A, in accordance with SOLAS regulation II-2/9. For type C tanks, the fuel storage hold space may be considered as a cofferdam."

7 The following new regulation 11.3.3.1 is added after regulation 11.3.3:

"11.3.3.1 Notwithstanding the last sentence in 11.3.3, for ships constructed on or after 1 January 2024, the fuel storage hold space may be considered as a cofferdam provided that:

- .1 the type C tank is not located directly above machinery spaces of category A or other rooms with high fire risk; and
- .2 the minimum distance to the A-60 boundary from the outer shell of the type C tank or the boundary of the tank connection space, if any, is not less than 900 mm."

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**ANNEX 4**

**RESOLUTION MSC.459(101)**  
**(adopted on 14 June 2019)**

**AMENDMENTS TO THE INTERNATIONAL  
LIFE-SAVING APPLIANCE CODE (LSA CODE)**

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO resolution MSC.88(66), by which it adopted the International Life-Saving Appliance (LSA) Code ("the LSA Code"), which has become mandatory under chapter III of the International Convention for the Safety of Life at Sea (SOLAS), 1974 ("the Convention"),

RECALLING FURTHER article VIII(b) and regulation III/3.10 of the Convention concerning the procedure for amending the LSA Code,

HAVING CONSIDERED, at its 101st session, amendments to the LSA 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 LSA 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 2023 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 2024 upon their acceptance in accordance with paragraph 2 above;

4 ALSO INVITES Contracting Governments to note that the amendment to paragraph 6.1.1.3 of the Code shall apply to rescue boats installed on board ships on or after 1 January 2024;

5 REQUESTS the Secretary-General, in conformity with 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;

6 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  
LIFE-SAVING APPLIANCE CODE (LSA CODE)**

**CHAPTER IV  
SURVIVAL CRAFT**

**4.4 General requirements for lifeboats**

1 Paragraph 4.4.8.1 is replaced by the following:

".1 except for a lifeboat equipped with two independent propulsion systems, where the arrangement consists of two separate engines, shaft lines, fuel tanks, piping systems and any other associated ancillaries, and for a free fall lifeboat, sufficient buoyant oars to make headway in calm seas. Thole pins, crutches or equivalent arrangements shall be provided for each oar provided. Thole pins or crutches shall be attached to the boat by lanyards or chains;"

**CHAPTER VI  
LAUNCHING AND EMBARKATION APPLIANCES**

**6.1 Launching and embarkation appliances**

2 The following text is added at the end of paragraph 6.1.1.3:

"Notwithstanding the above, on cargo ships equipped with a rescue boat which is not one of the ship's survival craft, having a mass not more than 700 kg in fully equipped condition, with engine, but without the crew, the launching appliance of the boat does not need to be fitted with stored mechanical power provided that:

- .1 manual hoisting from the stowed position and turning out to the embarkation position is possible by one person;
- .2 the force on the crank handle does not exceed 160 N at the maximum crank radius of 350 mm; and
- .3 means having sufficient strength such as bowing line are provided for bringing the rescue boat against the ship's side and holding it alongside so that persons can be safely embarked."

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**ANNEX 5**

**RESOLUTION MSC.460(101)  
(adopted on 14 June 2019)**

**AMENDMENTS TO THE INTERNATIONAL CODE FOR  
THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING DANGEROUS  
CHEMICALS IN BULK (IBC CODE)**

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO resolution MSC.4(48), by which it adopted the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk ("the IBC Code"), which has become mandatory under chapter VII of the International Convention for the Safety of Life at Sea (SOLAS), 1974 ("the Convention"),

RECALLING FURTHER article VIII(b) and regulation VII/8.1 of the Convention concerning the procedure for amending the IBC Code,

HAVING CONSIDERED, at its 101st session, amendments to the IBC 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 IBC 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 2020 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 2021 upon their acceptance in accordance with paragraph 2 above;

4 REQUESTS the Secretary-General, in conformity with 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 FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING DANGEROUS CHEMICALS IN BULK (IBC CODE)

#### Chapter 1

##### General

- 1 The existing section 1.3 is replaced by the following:

##### "1.3 Definitions

The following definitions apply unless expressly provided otherwise. (Additional definitions are given in individual chapters).

- 1.3.1 *Accommodation spaces* are those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces. *Public spaces* are those portions of the accommodation spaces which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.
- 1.3.2 *Administration* means the Government of the State whose flag the ship is entitled to fly. For *Administration (Port)* see *Port Administration*.
- 1.3.3 *Anniversary date* means the day and the month of each year which will correspond to the date of expiry of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk.
- 1.3.4 *Boiling point* is the temperature at which a product exhibits a vapour pressure equal to the atmospheric pressure.
- 1.3.5 *Breadth (B)* means the maximum breadth of the ship, measured amidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material. The breadth (*B*) shall be measured in metres.
- 1.3.6 *Cargo area* is that part of the ship that contains cargo tanks, slop tanks, cargo pump-rooms including pump-rooms, cofferdams, ballast or void spaces adjacent to cargo tanks or slop tanks and also deck areas throughout the entire length and breadth of the part of the ship over the above-mentioned spaces. Where independent tanks are installed in hold spaces, cofferdams, ballast or void spaces at the after end of the aftermost hold space or at the forward end of the forward-most hold space are excluded from the cargo area.
- 1.3.7 *Cargo pump-room* is a space containing pumps and their accessories for the handling of the products covered by the Code.

- 1.3.8 *Cargo service spaces* are spaces within the cargo area used for workshops, lockers and store-rooms of more than 2 m<sup>2</sup> in area, used for cargo-handling equipment.
- 1.3.9 *Cargo tank* is the envelope designed to contain the cargo.
- 1.3.10 *Chemical tanker* is a cargo ship constructed or adapted and used for the carriage in bulk of any liquid product listed in chapter 17.
- 1.3.11 *Cofferdam* is the isolating space between two adjacent steel bulkheads or decks. This space may be a void space or a ballast space.
- 1.3.12 *Control stations* are those spaces in which ship's radio or main navigating equipment or the emergency source of power is located or where the fire-recording or fire-control equipment is centralized. This does not include special fire-control equipment which can be most practically located in the cargo area.
- 1.3.13 *Dangerous chemicals* means any liquid chemicals designated as presenting a safety hazard, based on the safety criteria for assigning products to chapter 17.
- 1.3.14 *Density* is the ratio of the mass to the volume of a product, expressed in terms of kilograms per cubic metre. This applies to liquids, gases and vapours.
- 1.3.15 *Explosive/flammability limits/range* are the conditions defining the state of fuel-oxidant mixture at which application of an adequately strong external ignition source is only just capable of producing flammability in a given test apparatus.
- 1.3.16 *Flashpoint* is the temperature in degrees Celsius at which a product will give off enough flammable vapour to be ignited. Values given in the Code are those for a "closed-cup test" determined by an approved flashpoint apparatus.
- 1.3.17 *Gas-freeing* means the process where a portable or fixed ventilation system is used to introduce fresh air into a tank in order to reduce the concentration of hazardous gases or vapours to a level safe for tank entry.
- 1.3.18 *Hold space* is the space enclosed by the ship's structure in which an independent cargo tank is situated.
- 1.3.19 *Independent* means that a piping or venting system, for example, is in no way connected to another system and that there are no provisions available for the potential connection to other systems.
- 1.3.20 *Length (L)* means 96% of the total length on a waterline at 85% of the least moulded depth measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that be greater. In ships designed with a rake of keel, the waterline on which this length is measured shall be parallel to the designed waterline. The length (L) shall be measured in metres.

- 1.3.21 *Machinery spaces of category A* are those spaces and trunks to such spaces which contain:
- .1 internal-combustion machinery used for main propulsion; or
  - .2 internal-combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW; or
  - .3 any oil-fired boiler or oil fuel unit or any oil-fired equipment other than boilers, such as inert gas generators, incinerators, etc.
- 1.3.22 *Machinery spaces* are all machinery spaces of category A and all other spaces containing propelling machinery, boilers, oil fuel units, steam and internal-combustion engines, generators and major electrical machinery, oil filling station, refrigerating, stabilizing, ventilation and air-conditioning machinery, and similar spaces, and trunks to such spaces.
- 1.3.23 *MARPOL* means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997, as amended.
- 1.3.24 *Noxious Liquid Substance* means any substance indicated in the Pollution Category column of chapters 17 or 18 of the International Bulk Chemical Code, or the current MEPC.2/Circular or provisionally assessed under the provisions of regulation 6.3 of MARPOL Annex II as falling into categories X, Y or Z.
- 1.3.25 *Oil fuel unit* is the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler, or equipment used for the preparation for delivery of heated oil to an internal-combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a gauge pressure of more than 0.18 MPa.
- 1.3.26 *Organization* is the International Maritime Organization (IMO).
- 1.3.27 *Permeability* of a space means the ratio of the volume within that space which is assumed to be occupied by water to the total volume of that space.
- 1.3.28 *Port Administration* means the appropriate authority of the country in the port of which the ship is loading or unloading.
- 1.3.29 *Products* is the collective term used to cover both Noxious Liquid Substances and Dangerous Chemicals.
- 1.3.30 *Pump-room* is a space, located in the cargo area, containing pumps and their accessories for the handling of ballast and oil fuel.
- 1.3.31 *Purging* means the introduction of inert gas into a tank which is already in an inert condition with the object of further reducing the oxygen content; and/or reducing the existing hydrocarbon or other flammable vapours content to a level below which combustion cannot be supported if air is subsequently introduced into the tank.

- 1.3.32 *Recognized organization* is an organization authorized by an Administration in accordance with MARPOL Annex II regulation 8.2.2 and SOLAS regulation XI-1/1.
- 1.3.33 *Recognized standards* are applicable international or national standards acceptable to the Administration or standards laid down and maintained by an organization which complies with the standards adopted by the Organization and which is recognized by the Administration.
- 1.3.34 *Reference temperature* is the temperature at which the vapour pressure of the cargo corresponds to the set pressure of the pressure-relief valve.
- 1.3.35 *Separate* means that a cargo piping system or cargo vent system, for example, is not connected to another cargo piping or cargo vent system.
- 1.3.36 *Service spaces* are those spaces used for galleys, pantries containing cooking appliances, lockers, mail and specie rooms, store-rooms, workshops other than those forming part of the machinery spaces and similar spaces and trunks to such spaces.
- 1.3.37 *SOLAS* means the International Convention for the Safety of Life at Sea, 1974, as amended.
- 1.3.38 *Vapour pressure* is the equilibrium pressure of the saturated vapour above a liquid expressed in Pascals (Pa) at a specified temperature.
- 1.3.39 *Void space* is an enclosed space in the cargo area external to a cargo tank, other than a hold space, ballast space, oil fuel tank, cargo pump-room, pump-room, or any space in normal use by personnel."

2 Paragraph 1.5.1.2 is replaced by the following:

"1.5.1.2 The recognized organization referred to in 1.3.32 shall comply with the provisions of SOLAS and MARPOL and with parts 1 and 2 of the Code for Recognized Organizations (RO Code), as adopted by resolutions MSC.349(92) and MEPC.237(65), as may be amended."

## Chapter 15

### Special requirements

3 In paragraph 15.8.25.1, the reference to paragraph "1.3.18" in the second set of brackets is replaced by "1.3.19".

4 Section 15.15 is replaced by the following:

#### **"15.15 Hydrogen sulphide (H<sub>2</sub>S) detection equipment for bulk liquids**

Hydrogen sulphide (H<sub>2</sub>S) detection equipment shall be provided on board ships carrying bulk liquids prone to H<sub>2</sub>S formation. It should be noted that scavengers and biocides, when used, may not be 100% effective in controlling the formation of H<sub>2</sub>S. Toxic vapour detection instruments complying with the requirement in 13.2.1 of the Code for testing for H<sub>2</sub>S may be used to satisfy this requirement."

## Chapter 16

### Operational requirements

5 Paragraph 16.2.7 is replaced by the following:

"16.2.7 Where *column o* in the table of chapter 17 refers to this paragraph, the cargo is subject to the prewash requirements in regulation 13.7.1.4 of Annex II of MARPOL."

6 The complete text of chapters 17, 18 and 19 is replaced by the following:

## "Chapter 17

### Summary of minimum requirements

17.1 Mixtures of noxious liquid substances presenting pollution hazards only, and which are assessed or provisionally assessed under regulation 6.3 of MARPOL Annex II, may be carried under the requirements of the Code applicable to the appropriate position of the entry in this chapter for Noxious Liquid Substances, not otherwise specified (n.o.s.).

#### 17.2 EXPLANATORY NOTES

Product name ( <i>column a</i> )	The product name shall be used in the shipping document for any cargo offered for bulk shipments. Any additional name may be included in brackets after the product name. In some cases, the product names are not identical with the names given in previous issues of the Code.
UN Number ( <i>column b</i> )	Deleted
Pollution Category ( <i>column c</i> )	The letter X, Y, Z means the Pollution Category assigned to each product under MARPOL Annex II.
Hazards ( <i>column d</i> )	"S" means that the product is included in the Code because of its safety hazards; "P" means that the product is included in the Code because of its pollution hazards; and "S/P" means that the product is included in the Code because of both its safety and pollution hazards.
Ship Type ( <i>column e</i> )	1: Ship Type 1 (2.1.2.1) 2: Ship Type 2 (2.1.2.2) 3: Ship Type 3 (2.1.2.3)
Tank type ( <i>column f</i> )	1: independent tank (4.1.1) 2: integral tank (4.1.2) G: gravity tank (4.1.3) P: pressure tank (4.1.4)
Tank vents ( <i>column g</i> )	Cont.: controlled venting Open: open venting
Tank environmental control ( <i>column h</i> )	Inert: inerting (9.1.2.1) Pad: liquid or gas padding (9.1.2.2) Dry: drying (9.1.2.3) Vent: natural or forced ventilation (9.1.2.4) No: no special requirements under this Code (inerting may be required under SOLAS)

Electrical equipment (column i)	Temperature classes (i')	T1 to T6 - indicates no requirements blank no information
	Apparatus group (i'')	IIA, IIB or IIC: - indicates no requirements blank no information
	Flash point (i''')	Yes: flashpoint exceeding 60°C (10.1.6) No: flashpoint not exceeding 60°C (10.1.6) NF: non-flammable product (10.1.6)
Gauging (column j)	O: open gauging (13.1.1.1) R: restricted gauging (13.1.1.2) C: closed gauging (13.1.1.3)	
Vapour detection (column k)	F: flammable vapours T: toxic vapours	
Fire protection (column l)	No: indicates no special requirements under this Code A: alcohol-resistant foam or multi-purpose foam B: regular foam; encompasses all foams that are not of an alcohol-resistant type, including fluoro-protein and aqueous-film-forming foam (AFFF) C: water-spray D: dry chemical No: no special requirements under this Code	
Materials of construction (column m)	Deleted	
Emergency equipment (column n)	Yes: see 14.3.1 No: no special requirements under this Code	
Specific and operational requirements (column o)	When specific reference is made to chapters 15 and/or 16, these requirements shall be additional to the requirements in any other column.	



a	c	d	e	f	g	h	i'	ii''	iii'''	j	k	l	n	o
Acetic acid	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	F	AC	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.17, 15.19, 16.2.9
Acetic anhydride	Z	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.19.6
Acetochlor	X	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.6, 16.2.9
Acetone cyanohydrin	Y	S/P	1	1G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.13, 15.17, 15.19, 16.6.1, 16.6.2, 16.6.3
Acetonitrile	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Acetonitrile (Low purity grade)	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Acid oil mixture from soya bean, corn (maize) and sunflower oil refining	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Acrylamide solution (50% or less)	Y	S/P	3	2G	Cont	No			NF	C	T	No	No	15.12, 15.13, 15.17, 15.19, 16.2.9, 16.6.1
Acrylic acid	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.13, 15.17, 15.19, 16.2.9, 16.6.1
Acrylic acid/ethenesulphonic acid copolymer with phosphonate groups, sodium salt solution	Z	P	3	2G	Open	No			Yes	O	No	ABC	No	
Acrylonitrile	Y	S/P	2	2G	Cont	No	T1	IIB	No	C	FT	AC	Yes	15.12, 15.13, 15.17, 15.19
Acrylonitrile-Styrene copolymer dispersion in polyether polyol	Y	P	3	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Adiponitrile	Z	S/P	2	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Alachlor technical (90% or more)	X	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6, 16.2.9
Alcohol (C9-C11) poly (2.5-9) ethoxylate	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Alcohol (C6-C17) (secondary) poly(3-6) ethoxylates	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Alcohol (C6-C17) (secondary) poly(7-12) ethoxylates	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Alcohol (C10-C18) poly(7) ethoxylate	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Alcohol (C12-C16) poly(1-6) ethoxylates	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Alcohol (C12-C16) poly(20+) ethoxylates	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Alcohol (C12-C16) poly(7-19) ethoxylates	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Alcohols (C13+)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
Alcohols (C12+), primary, linear	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Alcohols (C8-C11), primary, linear and essentially linear	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Alcohols (C12-C13), primary, linear and essentially linear	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Alcohols (C14-C18), primary, linear and essentially linear	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Alkanes (C6-C9)	X	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	No	15.12, 15.17, 15.19.6
Iso- and cyclo-alkanes (C10-C11)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Iso- and cyclo-alkanes (C12+)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
n-Alkanes (C9-C11)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
n-Alkanes (C10 – C20)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Alkaryl polyethers (C9-C20)	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6
Alkenoic acid, polyhydroxy ester borated	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
Alkenyl (C11+) amide	X	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Alkenyl (C16-C20) succinic anhydride	Z	S/P	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Alkyl acrylate/vinylpyridine copolymer in toluene	Y	S/P	2	2G	Cont	No	T1	IIB	No	C	FT	ABC	No	15.12, 15.17, 15.19.6, 16.2.9
Alkylaryl phosphate mixtures (more than 40% Diphenyl tolyl phosphate, less than 0.02% ortho-isomers)	X	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6
Alkylated (C4-C9) hindered phenols	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Alkylbenzene, alkylindane, alkylindene mixture (each C12-C17)	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Alkyl benzene distillation bottoms	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Alkylbenzene mixtures (containing at least 50% of toluene)	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19.6
Alkylbenzenes mixtures (containing naphthalene)	X	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Alkyl (C3-C4) benzenes	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Alkyl (C5-C8) benzenes	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Alkyl (C9+) benzenes	Y	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6
Alkyl (C11-C17) benzene sulphonic acid	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Alkylbenzene sulphonic acid, sodium salt solution	Y	S/P	2	2G	Cont	No	-	-	NF	C	T	No	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Alkyl/cyclo (C4-C5) alcohols	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Alkyl (C10-C15, C12 rich) phenol poly (4-12) ethoxylate	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
Alkyl (C12+) dimethylamine	X	S/P	1	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Alkyl dithiocarbamate (C19-C35)	Y	P	3	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Alkyldithiothiadiazole (C6-C24)	Y	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6, 16.2.6
Alkyl ester copolymer (C4-C20)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Alkyl (C7-C9) nitrates	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 15.20, 16.6.1, 16.6.2, 16.6.3
Alkyl (C8-C10)/(C12-C14):(40% or less/60% or more) polyglucoside solution (55% or less)	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Alkyl (C8-C10)/(C12-C14):(60% or more/40% or less) polyglucoside solution(55% or less)	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Alkyl (C7-C11) phenol poly(4-12) ethoxylate	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Alkyl (C8-C40) phenol sulphide	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	
Alkyl (C8-C9) phenylamine in aromatic solvents	Y	S/P	2	2G	Cont	No	T1	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Alkyl (C9-C15) phenyl propoxylate	Z	S/P	3	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Alkyl (C8-C10) polyglucoside solution (65% or less)	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Alkyl (C8-C10)/(C12-C14):(50%/50%) polyglucoside solution (55% or less)	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Alkyl (C12-C14) polyglucoside solution (55% or less)	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Alkyl (C12-C16) propoxyamine ethoxylate	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.6
Alkyl (C10-C20, saturated and unsaturated) phosphite	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
Alkyl sulphonic acid ester of phenol	Y	P	3	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Alkyl (C18+) toluenes	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.9
Alkyl (C18-C28) toluenesulphonic acid	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.17, 15.19, 16.2.6, 16.2.9
Alkyl (C18-C28) toluenesulphonic acid, calcium salts, borated	Y	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Alkyl (C18-C28) toluenesulphonic acid, calcium salts, low overbase	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
Alkyl (C18-C28) toluenesulphonic acid, calcium salts, high overbase	Y	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Allyl alcohol	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	AC	Yes	15.12, 15.17, 15.19
Allyl chloride	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12, 15.17, 15.19
Aluminium chloride/Hydrogen chloride solution	Y	S/P	2	2G	Cont	No	-	-	NF	C	T	No	Yes	15.11, 15.12, 15.17, 15.19
Aluminium hydroxide, sodium hydroxide, sodium carbonate solution (40% or less)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19
Aluminium sulphate solution	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19
2-(2-Aminoethoxy) ethanol	Z	S/P	3	2G	Cont	No			Yes	C	T	AD	Yes	15.12, 15.17, 15.19

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Aminoethyldiethanolamine/Aminoethylethanolamine solution	Z	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Aminoethyl ethanolamine	Z	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19
N-Aminoethylpiperazine	Z	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19
2-Amino-2-methyl-1-propanol	Z	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Ammonia aqueous (28% or less)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19
Ammonium chloride solution (less than 25%) (*)	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	
Ammonium hydrogen phosphate solution	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Ammonium lignosulphonate solutions	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Ammonium nitrate solution (93% or less) (*)	Z	S/P	2	1G	Cont	No			NF	R	T	No	No	15.2, 15.11.4, 15.11.6, 15.12.3, 15.12.4, 15.18, 15.19.6, 16.2.9
Ammonium polyphosphate solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Ammonium sulphate solution	Z	P	3	2G	Open	No			NF	O	No	No	No	
Ammonium sulphide solution (45% or less) (*)	Y	S/P	2	2G	Cont	Inert	T4	IIB	No	C	FT	AC	No	15.12, 15.17, 15.19, 16.6.1, 16.6.2, 16.6.3
Ammonium thiosulphate solution (60% or less)	Z	S/P	3	2G	Open	No			NF	O	No	No	No	

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Amyl acetate (all isomers)	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.19.6
n-Amyl alcohol	Z	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	ABC	Yes	15.12, 15.17, 15.19
Amyl alcohol, primary	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
sec-Amyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
tert-Amyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
tert-Amyl ethyl ether	Z	P	3	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
tert-Amyl methyl ether	X	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Aniline	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Aryl polyolefins (C11-C50)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Aviation alkylates (C8 paraffins and iso-paraffins BPT 95 - 120°C)	X	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
Barium long chain (C11-C50) alkaryl sulphonate	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19, 16.2.6, 16.2.9
Benzene and mixtures having 10% benzene or more (i)	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19.6, 16.2.9
Benzene sulphonyl chloride	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.9
Benzenetricarboxylic acid, trioctyl ester	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
Benzyl acetate	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Benzyl alcohol	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Benzyl chloride	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	ABC	Yes	15.12, 15.13, 15.17, 15.19
Bio-fuel blends of Diesel/gas oil and FAME (>25% but <99% by volume)	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Bio-fuel blends of Diesel/gas oil and vegetable oil (>25% but <99% by volume)	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Bio-fuel blends of Gasoline and Ethyl alcohol (>25% but <99% by volume)	X	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	AC	No	15.12, 15.17, 15.19.6
Bis (2-ethylhexyl) terephthalate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Brake fluid base mix: Poly(2-8)alkylene (C2-C3) glycols/Polyalkylene (C2-C10) glycols monoalkyl (C1-C4) ethers and their borate esters	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Bromochloromethane	Z	P	3	2G	Open	No			NF	O	No	No	No	
Butene oligomer	X	P	2	2G	Cont	No	T4	IIB	No	R	F	ABC	No	15.19.6
2-Butoxyethanol (58%)/Hyperbranched polyesteramide (42%) (mixture)	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12.3, 15.12.4, 15.19
Butyl acetate (all isomers)	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
Butyl acrylate (all isomers)	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	F	ABC	No	15.13, 15.19.6, 16.6.1, 16.6.2
tert-Butyl alcohol	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	AC	No	15.19.6
Butylamine (all isomers)	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.19
Butylbenzene (all isomers)	X	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Butyl benzyl phthalate	X	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6



a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Butyl butyrate (all isomers)	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.19.6
Butyl/Decyl/Cetyl/Eicosyl methacrylate mixture	Y	S/P	2	2G	Open	No	T3	IIA	No	R	F	ABC	No	15.13, 15.19.6, 16.6.1, 16.6.2
Butylene glycol	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	
1,2-Butylene oxide	Y	S/P	3	2G	Cont	Inert	T2	IIB	No	C	FT	AC	No	15.8.1 to 15.8.7, 15.8.12, 15.8.13, 15.8.16, 15.8.17, 15.8.18, 15.8.19, 15.8.21, 15.8.25, 15.8.27, 15.8.29, 15.12, 15.17, 15.19.6
n-Butyl ether	Y	S/P	3	2G	Cont	Inert	T4	IIB	No	R	F	AC	No	15.4.6, 15.19
Butyl methacrylate	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.13, 15.19.6, 16.6.1, 16.6.2
n-Butyl propionate	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.19.6
Butyraldehyde (all isomers)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Butyric acid	Y	S/P	3	2G	Cont	No			Yes	O	No	AC	No	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.19.6
gamma-Butyrolactone	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Calcium alkaryl sulphonate (C11-C50)	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Calcium alkyl (C10-C28) salicylate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Calcium hydroxide slurry	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9

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Calcium hypochlorite solution (15% or less)	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 15.19.6
Calcium hypochlorite solution (more than 15%)	X	S/P	1	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 15.19
Calcium lignosulphonate solutions	Z	P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Calcium long-chain alkyl (C5-C10) phenate	Y	P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6
Calcium long-chain alkyl (C11-C40) phenate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Calcium long-chain alkyl phenate sulphide (C8-C40)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Calcium long-chain alkyl salicylate (C13+)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Calcium long-chain alkyl (C18-C28) salicylate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Calcium nitrate/Magnesium nitrate/Potassium chloride solution	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Calcium nitrate solution (50% or less)	Z	S	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Camelina oil	Y	S/P	2(k)	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7
epsilon-Caprolactam (molten or aqueous solutions)	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Carbolic oil	Y	S/P	2	2G	Cont	No			Yes	C	FT	ABC	Yes	15.12, 15.17, 15.19, 16.2.9
Carbon disulphide	Y	S/P	1	1G	Cont	Pad+inert	T6	IIC	No	C	FT	C	Yes	15.3, 15.12, 15.17, 15.18, 15.19
Carbon tetrachloride	Y	S/P	2	2G	Cont	No			NF	C	T	No	No	15.12, 15.17, 15.19.6

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Cashew nut shell oil (untreated)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.7, 16.2.9
Castor oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Cesium formate solution (*)	Y	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	15.19.6
Cetyl/Eicosyl methacrylate mixture	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.13, 15.19.6, 16.2.9, 16.6.1, 16.6.2
Chlorinated paraffins (C10-C13)	X	S/P	1	2G	Cont	No			NF	C	T	No	No	15.12, 15.17, 15.19, 16.2.6
Chlorinated paraffins (C14-C17) (with 50% chlorine or more, and less than 1% C13 or shorter chains)	X	S/P	1	2G	Cont	No	-	-	Yes	C	T	AC	No	15.12, 15.17, 15.19
Chloroacetic acid (80% or less)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.17, 15.18, 15.19, 16.2.9
Chlorobenzene	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Chloroform	Y	S/P	3	2G	Cont	No			NF	C	T	No	No	15.12, 15.17, 15.19.6
Chlorohydrins (crude)	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.19
4-Chloro-2-methylphenoxyacetic acid, dimethylamine salt solution	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
o-Chloronitrobenzene	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12.3, 15.12.4, 15.19, 16.2.6, 16.2.9
1-(4-Chlorophenyl)-4,4- dimethyl-pentan-3-one	Y	S/P	2	2G	Open	No			Yes	O	No	ABD	No	15.19.6, 16.2.6, 16.2.9
2- or 3-Chloropropionic acid	Z	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.19, 16.2.9

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Chlorosulphonic acid	Y	S/P	1	2G	Cont	No			NF	C	T	No	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.5, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.16.2, 15.17, 15.18, 15.19
m-Chlorotoluene	Y	S/P	2	2G	Cont	No	T4	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19
o-Chlorotoluene	Y	P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.19.6
p-Chlorotoluene	Y	P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.19.6, 16.2.9
Chlorotoluenes (mixed isomers)	Y	P	2	2G	Cont	No	T4	IIA	No	R	F	ABC	No	15.19.6
Choline chloride solutions	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Citric acid (70% or less)	Z	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Coal tar	X	S/P	2	2G	Cont	No	T2	IIA	Yes	C	T	BD	No	15.12, 15.17, 15.19.6, 16.2.6, 16.2.9
Coal tar naphtha solvent	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19.6, 16.2.9
Coal tar pitch (molten) (*)	X	S/P	2	1G	Cont	No	T2	IIA	Yes	C	T	ABCD	No	15.12, 15.17, 15.19.6, 16.2.6, 16.2.9
Cocoa butter	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Coconut oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Coconut oil fatty acid	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Coconut oil fatty acid methyl ester	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6
Copper salt of long chain (C17+) alkanolic acid	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Corn Oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Cotton seed oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9

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Creosote (coal tar)	X	S/P	1	2G	Cont	No	T2	IIA	Yes	C	T	AD	No	15.12, 15.17, 15.19.6, 16.2.6, 16.2.9
Cresols (all isomers)	Y	S/P	1	2G	Cont	No	T1	IIA	Yes	C	T	ABC	Yes	15.12, 15.18, 15.19, 16.2.9
Cresol/Phenol/Xylenol mixture	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Cresylic acid, dephenolized	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Cresylic acid, sodium salt solution	Y	S/P	2	2G	Cont	No	T4	IIB	No	C	FT	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Crotonaldehyde	X	S/P	1	1G	Cont	No	T3	IIB	No	C	FT	AC	Yes	15.12, 15.17, 15.18, 15.19
1,5,9-Cyclododecatriene	X	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.13, 15.19.6, 16.6.1, 16.6.2
Cycloheptane	X	S/P	2	2G	Cont	No	T4	IIA	No	R	F	AC	No	15.19.6
Cyclohexane	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6, 16.2.9
Cyclohexane-1,2-dicarboxylic acid, diisononyl ester	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Cyclohexane oxidation products, sodium salts solution	Z	P	3	2G	Open	No			NF	O	No	No	No	
Cyclohexanol	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
Cyclohexanone	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
Cyclohexanone, Cyclohexanol mixture	Y	S/P	3	2G	Cont	No			Yes	R	F	AC	No	15.19.6
Cyclohexyl acetate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Cyclohexylamine	Y	S/P	3	2G	Cont	No	T3	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.19

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1,3-Cyclopentadiene dimer (molten)	Y	S/P	2	2G	Cont	No	T1	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19, 16.2.6, 16.2.9
Cyclopentane	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
Cyclopentene	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
p-Cymene	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
Decahydronaphthalene	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Decanoic acid	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Decene	X	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Decyl acrylate	X	S/P	1	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.13, 15.19, 16.6.1, 16.6.2
Decyl alcohol (all isomers)	Y	P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9(e)
Decyl/Dodecyl/Tetradecyl alcohol mixture	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Decyloxytetrahydrothiophene dioxide	X	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9
Diacetone alcohol	Z	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Dialkyl (C8-C9) diphenylamines	Z	P	3	2G	Open	No			Yes	O	No	ABC	No	
Dialkyl (C7-C13) phthalates	X	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19.6, 16.2.6
Dialkyl (C9-C10) phthalates	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Dialkyl thiophosphates sodium salts solution	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9

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2,6-Diaminohexanoic acid phosphonate mixed salts solution	Z	S/P	3	2G	Cont	No			NF	R	No	No	No	15.11, 15.17, 15.19.6
Dibromomethane	Y	S/P	2	2G	Open	No			NF	O	No	No	No	15.19.6
Dibutylamine	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	ABC	Yes	15.12, 15.17, 15.19
Dibutyl hydrogen phosphonate	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
2,6-Di-tert-butylphenol	X	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.9
Dibutyl phthalate	X	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6
Dibutyl terephthalate	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.9
Dichlorobenzene (all isomers)	X	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	ABD	No	15.12, 15.17, 15.19.6
3,4-Dichloro-1-butene	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
1,1-Dichloroethane	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
Dichloroethyl ether	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.18, 15.19
1,6-Dichlorohexane	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6
2,2'-Dichloroisopropyl ether	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19
Dichloromethane	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19.6
2,4-Dichlorophenol	Y	S/P	2	2G	Cont	Dry			Yes	C	T	AD	Yes	15.12, 15.16.2, 15.17, 15.19, 16.2.6, 16.2.9
2,4-Dichlorophenoxyacetic acid, diethanolamine salt solution	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19, 16.2.9
2,4-Dichlorophenoxyacetic acid, dimethylamine salt solution (70% or less)	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19, 16.2.9

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2,4-Dichlorophenoxyacetic acid, triisopropanolamine salt solution	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
1,1-Dichloropropane	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.19.6
1,2-Dichloropropane	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
1,3-Dichloropropene	X	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	ABC	Yes	15.12, 15.17, 15.19
Dichloropropene/Dichloropropane mixtures	X	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	ABD	No	15.12, 15.17, 15.19
2,2-Dichloropropionic acid	Y	S/P	2	2G	Cont	Dry			Yes	C	T	AD	Yes	15.11.2, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.16.2, 15.17, 15.19, 16.2.9
Dicyclopentadiene, Resin Grade, 81-89%	Y	S/P	2	2G	Cont	Inert	T2	IIB	No	C	FT	ABC	Yes	15.12, 15.13, 15.17, 15.19
Diethanolamine	Y	S/P	3	2G	Cont	No	T1	IIA	Yes	C	T	AC	No	15.12, 15.17, 15.19.6, 16.2.6, 16.2.9
Diethylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.19
Diethylaminoethanol	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
2,6-Diethylaniline	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Diethylbenzene	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Diethylene glycol	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Diethylene glycol dibutyl ether	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Diethylene glycol diethyl ether	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6



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Diethylene glycol phthalate	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
Diethylenetriamine	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 15.17, 15.19
Diethylenetriaminepentaacetic acid, pentasodium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Diethyl ether (*)	Z	S/P	2	1G	Cont	Inert	T4	IIB	No	R	F	AC	No	15.4, 15.14, 15.19
Di-(2-ethylhexyl) adipate	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Di-(2-ethylhexyl) phosphoric acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AD	No	15.12.3, 15.12.4, 15.19.6
Diethyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6
Diethyl sulphate	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Diglycidyl ether of bisphenol A	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Diglycidyl ether of bisphenol F	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6, 16.2.6
Diheptyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6
Di-n-hexyl adipate	X	S/P	1	2G	Open	No			Yes	O	No	AC	No	15.19
Dihexyl phthalate	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Diisobutylamine	Y	S/P	2	2G	Cont	No	T4	IIB	No	C	FT	ABC	No	15.12.3, 15.12.4, 15.19
Diisobutylene	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
Diisobutyl ketone	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Diisobutyl phthalate	X	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6
Diisononyl adipate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6
Diisooctyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Diisopropanolamine	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Diisopropylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.17, 15.19.6

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Diisopropylbenzene (all isomers)	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Diisopropylnaphthalene	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6
N,N-Dimethylacetamide	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
N,N-Dimethylacetamide solution (40% or less)	Z	S/P	3	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 15.19.6
Dimethyl adipate	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
Dimethylamine solution (45% or less)	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19
Dimethylamine solution (greater than 45% but not greater than 55%)	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19
Dimethylamine solution (greater than 55% but not greater than 65%)	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.14, 15.19
N,N-Dimethylcyclohexylamine	Y	S/P	2	2G	Cont	No	T3	IIB	No	C	FT	AC	Yes	15.12, 15.17, 15.19
Dimethyl disulphide	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
N,N-Dimethyldodecylamine	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Dimethylethanolamine	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Dimethylformamide	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12, 15.17, 15.19.6
Dimethyl glutarate	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6

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Dimethyl hydrogen phosphite	Y	S/P	3	2G	Cont	No	T4	IIB	No	R	F	AC	No	15.19.6
Dimethyl octanoic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Dimethyl phthalate	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9
Dimethylpolysiloxane	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6
2,2-Dimethylpropane-1,3-diol (molten or solution)	Z	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	16.2.9
Dimethyl succinate	Y	P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9
Dinitrotoluene (molten)	X	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19, 15.21, 16.2.6, 16.2.9, 16.6.4
Dinonyl phthalate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6
Diocetyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6
1,4-Dioxane	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12, 15.17, 15.19.6, 16.2.9
Dipentene	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Diphenyl	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Diphenylamine (molten)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Diphenylamine, reaction product with 2,2,4-Trimethylpentene	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19, 16.2.6
Diphenylamines, alkylated	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19, 16.2.6, 16.2.9
Diphenyl/Diphenyl ether mixtures	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
Diphenyl ether	X	P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9
Diphenyl ether/Diphenyl phenyl ether mixture	X	P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9

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Diphenylmethane diisocyanate	Y	S/P	2	2G	Cont	Dry	-	-	Yes(a)	C	T(a)	AB(b)D	Yes	15.12, 15.16.2, 15.17, 15.19, 16.2.6, 16.2.9
Diphenylol propane-epichlorohydrin resins	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Di-n-propylamine	Y	S/P	2	2G	Cont	No	T3	IIB	No	C	FT	AC	Yes	15.12.3, 15.12.4, 15.17, 15.19.6
Dipropylene glycol	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Dithiocarbamate ester (C7-C35)	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6
Ditridecyl adipate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
Ditridecyl phthalate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6
Diundecyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Dodecane (all isomers)	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
tert-Dodecanethiol	Y	S/P	3	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
1-Dodecene	Y	S/P	3	2G	Open	No			Yes	O	No	ABC	No	15.19.6
Dodecene (all isomers)	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Dodecyl alcohol	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9
n-Dodecyl mercaptan	X	S/P	1	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Dodecylamine/Tetradecylamine mixture	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.9
Dodecylbenzene	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Dodecyl diphenyl ether disulphonate solution	X	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19, 16.2.6

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Dodecyl hydroxypropyl sulphide	X	P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6
Dodecyl methacrylate	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.13, 15.19.6
Dodecyl/Octadecyl methacrylate mixture	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.13, 15.19.6, 16.2.6, 16.6.1, 16.6.2
Dodecyl/Pentadecyl methacrylate mixture	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.13, 15.19.6, 16.6.1, 16.6.2
Dodecyl phenol	X	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.6
Dodecyl Xylene	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Drilling brines (containing zinc chloride)	X	S/P	2	2G	Open	No			NF	O	No	No	Yes	15.19.6
Drilling brines (containing calcium bromide)	Z	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6
Epichlorohydrin	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	AC	Yes	15.12, 15.17, 15.19
Ethanolamine	Y	S/P	3	2G	Cont	No	T2	IIA	Yes	C	FT	AC	Yes	15.12, 15.17, 15.19, 16.2.9
2-Ethoxyethyl acetate	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12, 15.17, 15.19.6
Ethoxylated long chain (C16+) alkyloxyalkylamine	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.9
Ethoxylated tallow amine (>95%)	X	S/P	2	2G	Cont	Inert	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Ethyl acetate	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.19.6
Ethyl acetoacetate	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	
Ethyl acrylate	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12, 15.13, 15.17, 15.19, 16.6.1, 16.6.2
Ethylamine (*)	Y	S/P	2	1G	Cont	No	T2	IIA	No	C	F	AC	No	15.12.3.2, 15.14, 15.19
Ethylamine solutions (72% or less)	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	F	AC	No	15.12.3.2, 15.14, 15.19

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Ethyl amyl ketone	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Ethylbenzene	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12, 15.17, 15.19.6
Ethyl tert-butyl ether	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Ethyl butyrate	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Ethylcyclohexane	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
N-Ethylcyclohexylamine	Y	S/P	2	2G	Cont	No	T3	IIB	No	C	FT	AC	No	15.12.3, 15.12.4, 15.19
S-Ethyl dipropylthiocarbamate	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6, 16.2.9
Ethylene carbonate	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Ethylene chlorohydrin	Y	S/P	1	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.18, 15.19
Ethylene cyanohydrin	Y	S/P	2	2G	Cont	No		IIB	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Ethylenediamine	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Ethylenediaminetetraacetic acid, tetrasodium salt solution	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Ethylene dibromide	Y	S/P	2	2G	Cont	No			NF	C	T	No	No	15.12, 15.17, 15.19, 16.2.9
Ethylene dichloride	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19
Ethylene glycol	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6
Ethylene glycol acetate	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Ethylene glycol butyl ether acetate	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6
Ethylene glycol diacetate	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6

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Ethylene glycol methyl ether acetate	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6
Ethylene glycol monoalkyl ethers	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12.3, 15.12.4, 15.19, 16.2.9
Ethylene glycol phenyl ether	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9,
Ethylene glycol phenyl ether/Diethylene glycol phenyl ether mixture	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Ethylene glycol (>75%)/sodium alkyl carboxylates/borax mixture	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6
Ethylene glycol (>85%)/sodium alkyl carboxylates mixture	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6
Ethylene oxide/Propylene oxide mixture with an ethylene oxide content of not more than 30% by mass	Y	S/P	2	1G	Cont	Inert	T2	IIB	No	C	FT	AC	Yes	15.8, 15.12, 15.14, 15.17, 15.19
Ethylene-vinyl acetate copolymer (emulsion)	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Ethyl-3-ethoxypropionate	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
2-Ethylhexanoic acid	Y	S/P	3	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
2-Ethylhexyl acrylate	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.13, 15.19.6, 16.6.1, 16.6.2
2-Ethylhexylamine	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.19.6
2-Ethyl-2-(hydroxymethyl) propane-1,3-diol (C8-C10) ester	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Ethylidene norbornene	Y	S/P	2	2G	Cont	No	T3	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6

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Ethyl methacrylate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.13, 15.19.6, 16.6.1, 16.6.2
N-Ethylmethylallylamine	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12.3, 15.12.4, 15.19
Ethyl propionate	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
2-Ethyl-3-propylacrolein	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6, 16.2.9
Ethyl toluene	Y	P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.19.6
Fatty acid (saturated C13+)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
Fatty acid methyl esters (m)	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Fatty acids, (C8-C10)	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Fatty acids, (C12+)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Fatty acids, (C16+)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Fatty acids, essentially linear (C6-C18) 2-ethylhexyl ester	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6
Ferric chloride solutions	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.17, 15.19, 16.2.9
Ferric nitrate/Nitric acid solution	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.17, 15.19
Fish oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Fish silage protein concentrate (containing 4% or less formic acid)	Y	P	2	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.6
Fish protein concentrate (containing 4% or less formic acid)	Z	P	3	2G	Open	No	-	-	NF	O	No	No	No	
Fluorosilicic acid solution (20-30%)	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.17, 15.19



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Formaldehyde solutions (45% or less)	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Formamide	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6, 16.2.9
Formic acid (85% or less acid)	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T(g)	AC	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.17, 15.19, 16.2.9
Formic acid (over 85%)	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT(g)	AC	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.17, 15.19, 16.2.9
Formic acid mixture (containing up to 18% propionic acid and up to 25% sodium formate)	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T(g)	AC	No	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.19.6
Furfural	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	Yes	15.12, 15.17, 15.19
Furfuryl alcohol	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Glucitol/glycerol blend propoxylated (containing less than 10% amines)	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Glucitol/glycerol blend propoxylated (containing 10% or more amines)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
Glutaraldehyde solutions (50% or less)	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19
Glycerine	Z	S	3	2G	Open	No			Yes	O	No	AC	No	16.2.9
Glycerol monooleate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6, 16.2.6, 16.2.9
Glycerol propoxylated	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Glycerol, propoxylated and ethoxylated	Z	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	

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Glycerol/sucrose blend propoxylated and ethoxylated	Z	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Glyceryl triacetate	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	15.19.6
Glycidyl ester of C10 trialkylacetic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Glycine, sodium salt solution	Z	S/P	3	2G	Open	No			NF	O	No	No	No	
Glycolic acid solution (70% or less)	Z	S/P	3	2G	Cont	No	-	-	NF	C	T	No	Yes	15.12.3, 15.12.4, 15.17, 15.19, 16.2.9
Glyoxal solution (40% or less)	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Glyoxylic acid solution (50% or less)	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	ACD	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.17, 15.19, 16.2.9, 16.6.1, 16.6.2, 16.6.3
Glyphosate solution (not containing surfactant)	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Grape Seed Oil	Y	S/P	2(k)	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7
Groundnut oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Heptane (all isomers)	X	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
n-Heptanoic acid	Z	S/P	3	2G	Cont	No			Yes	R	No	ABC	No	15.19.6, 15.17
Heptanol (all isomers) (d)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Heptene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
Heptyl acetate	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
1-Hexadecylnaphthalene / 1,4-bis(hexadecyl)naphthalene mixture	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Hexamethylenediamine (molten)	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9

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Hexamethylenediamine adipate (50% in water)	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Hexamethylenediamine solution	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Hexamethylene diisocyanate	Y	S/P	2	2G	Cont	Dry	T1	IIB	Yes	C	T	AC(b)D	Yes	15.12, 15.16.2, 15.17, 15.18, 15.19
Hexamethylene glycol	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	
Hexamethyleneimine	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19
Hexamethylenetetramine solutions	Z	S	3	2G	Open	No			Yes	O	No	AC	No	15.19.6
Hexane (all isomers)	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	No	15.12, 15.17, 15.19.6
1,6-Hexanediol, distillation overheads	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Hexanoic acid	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Hexanol	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Hexene (all isomers)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Hexyl acetate	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
Hexylene glycol	Z	S	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Hydrocarbon wax	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 15.17, 15.19.6, 16.2.6, 16.2.9
Hydrochloric acid (*)	Z	S/P	3	1G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.17, 15.19
Hydrogen peroxide solutions (over 60% but not over 70% by mass)	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.5.1, 15.12.3, 15.12.4, 15.19.6
Hydrogen peroxide solutions (over 8% but not over 60% by mass)	Y	S/P	3	2G	Cont	No			NF	R	T	No	No	15.5.2, 15.18, 15.12.3, 15.12.4, 15.19.6
2-Hydroxyethyl acrylate	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.13, 15.17, 15.19, 16.6.1, 16.6.2
N-(Hydroxyethyl)ethylenediaminetriacetic acid, trisodium salt solution	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6

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2-Hydroxy-4-(methylthio)butanoic acid	Z	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Illipe oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Isoamyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Isobutyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.19.6
Isobutyl formate	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.19.6
Isobutyl methacrylate	Z	S/P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.13, 15.19.6, 16.6.1, 16.6.2
Isophorone	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Isophoronediamine	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Isophorone diisocyanate	Y	S/P	2	2G	Cont	Dry			Yes	C	T	ABD	Yes	15.12, 15.16.2, 15.17, 15.19
Isoprene	Y	S/P	2	2G	Cont	No	T3	IIB	No	C	FT	ABC	No	15.12, 15.13, 15.14, 15.17, 15.19.6, 16.6.1, 16.6.2
Isopropanolamine	Y	S/P	3	2G	Cont	No	T2	IIA	Yes	R	No	AC	No	15.19.6, 16.2.6, 16.2.9
Isopropyl acetate	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.19.6
Isopropylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12.3.2, 15.14, 15.19
Isopropylamine (70% or less) solution	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12.3.2, 15.19
Isopropylcyclohexane	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6, 16.2.9
Isopropyl ether	Y	S/P	3	2G	Cont	Inert	T2	IIA	No	R	F	AC	No	15.4.6, 15.13, 15.19.6, 16.6.1, 16.6.2
Jatropha oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7
Lactic acid	Z	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19

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Lactonitrile solution (80% or less)	Y	S/P	1	1G	Cont	No			NF	C	T	No	Yes	15.12, 15.13, 15.17, 15.18, 15.19, 16.6.1, 16.6.2, 16.6.3
Lard	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Latex, ammonia (1% or less)- inhibited	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6, 16.2.6, 16.2.9
Latex: Carboxylated styrene-Butadiene copolymer; Styrene-Butadiene rubber	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Lauric acid	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Ligninsulphonic acid, magnesium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Ligninsulphonic acid, sodium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Linseed oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Liquid chemical wastes	X	S/P	2	2G	Cont	No			No	C	FT	AC	No	15.12, 15.17, 15.19, 20.5.1, 20.7
Long-chain alkaryl polyether (C11-C20)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Long-chain alkaryl sulphonic acid (C16-C60)	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Long-chain alkylphenate/Phenol sulphide mixture	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Long-chain alkylphenol (C14-C18)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
Long-chain alkylphenol (C18-C30)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6

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L-Lysine solution (60% or less)	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Magnesium chloride solution	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Magnesium hydroxide slurry	Z	S	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Magnesium long-chain alkaryl sulphonate (C11-C50)	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Magnesium long-chain alkyl salicylate (C11+)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Maleic anhydride	Y	S/P	3	2G	Cont	No			Yes	C	T	AC(f)	Yes	15.12, 15.17, 15.19, 16.2.9
Maleic anhydride-sodium allylsulphonate copolymer solution	Z	P	3	2G	Open	No			Yes	O	No	ABC	No	
Mango kernel oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Mercaptobenzothiazol, sodium salt solution	X	S/P	2	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
Mesityl oxide	Z	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Metam sodium solution	X	S/P	2	2G	Cont	No	-	-	NF	C	T	No	No	15.12.3, 15.12.4, 15.19
Methacrylic acid	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.13, 15.12.3, 15.12.4, 15.19, 16.2.9, 16.6.1
Methacrylic acid - alkoxy poly (alkylene oxide) methacrylate copolymer, sodium salt aqueous solution (45% or less)	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Methacrylic resin in ethylene dichloride	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19, 16.2.9
Methacrylonitrile	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	AC	Yes	15.12, 15.13, 15.17, 15.19

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3-Methoxy-1-butanol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
3-Methoxybutyl acetate	Y	S/P	3	2G	Open	No			Yes	O	No	ABC	No	15.19.6
N-(2-Methoxy-1-methyl ethyl)-2-ethyl-6-methyl chloroacetanilide	X	S/P	1	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19, 16.2.6
Methyl acetate	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	AC	No	15.19.6
Methyl acetoacetate	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Methyl acrylate	Y	S/P	3	2G	Cont	No	T1	IIB	No	C	FT	AC	No	15.12, 15.17, 15.13, 15.19
Methyl alcohol (*)	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AC	No	15.12.1, 15.12.2, 15.12.3.2, 15.12.3.3, 15.12.4, 15.17, 15.19
Methylamine solutions (42% or less)	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.19
Methylamyl acetate	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.19.6
Methylamyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Methyl amyl ketone	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.19.6
N-Methylaniline	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
alpha-Methylbenzyl alcohol with acetophenone (15% or less)	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Methylbutenol	Y	S/P	3	2G	Cont	No	T4	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Methyl tert-butyl ether	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.19.6
Methyl butyl ketone	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19.6
Methylbutynol	Z	S/P	3	2G	Cont	No	T4	IIB	No	R	F	AC	No	15.19.6

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Methyl butyrate	Y	S/P	3	2G	Cont	No	T4	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Methylcyclohexane	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Methylcyclopentadiene dimer	Y	S/P	2	2G	Cont	No	T4	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Methylcyclopentadienyl manganese tricarbonyl	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.18, 15.19, 16.2.9
Methyl diethanolamine	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
2-Methyl-6-ethyl aniline	Y	S/P	3	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Methyl ethyl ketone	Z	S/P	3	2G	Cont	No	T1	IIA	No	R	F	AC	No	15.19.6
2-Methyl-5-ethyl pyridine	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Methyl formate	Z	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.14, 15.19.6
2-Methylglutaronitrile with 2-Ethylsuccinonitrile (12% or less)	Z	S/P	3	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
2-Methyl-2-hydroxy-3-butyne	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6, 16.2.9
Methyl isobutyl ketone	Z	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Methyl methacrylate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.13, 15.19.6
3-Methyl-3-methoxybutanol	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Methyl naphthalene (molten)	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
N-Methylglucamine solution (70% or less)	Z	S	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
2-Methyl-1,3-propanediol	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	



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2-Methylpyridine	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	F	AC	No	15.12.3.2, 15.19
3-Methylpyridine	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AC	No	15.12.3, 15.12.4, 15.19
4-Methylpyridine	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AC	No	15.12.3, 15.12.4, 15.19, 16.2.9
N-Methyl-2-pyrrolidone	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6
Methyl propyl ketone	Z	S	3	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Methyl salicylate	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6
alpha-Methylstyrene	Y	S/P	2	2G	Cont	No	T1	IIB	No	C	FT	AD(j)	No	15.12, 15.13, 15.17, 15.19.6, 16.6.1, 16.6.2
3-(methylthio)propionaldehyde	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12, 15.17, 15.19.6
Molybdenum polysulphide long chain alkyl dithiocarbamide complex	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Morpholine	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12.3, 15.12.4, 15.19
Motor fuel anti-knock compound (containing lead alkyls)	X	S/P	1	1G	Cont	Inert	T4	IIA	No	C	FT	AC	Yes	15.6, 15.12, 15.17, 15.18, 15.19
Myrcene	X	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Naphthalene (molten)	X	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	ABC	No	15.12, 15.17, 15.19.6, 16.2.9
Naphthalene crude (molten)	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19.6, 16.2.6, 16.2.9
Naphthalenesulphonic acid-Formaldehyde copolymer, sodium salt solution	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Neodecanoic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Nitrating acid (mixture of sulphuric and nitric acids)	Y	S/P	1	1G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.16.2, 15.17, 15.18, 15.19

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Nitric acid (70% and over)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.16.2, 15.17, 15.19
Nitric acid (less than 70%)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.17, 15.19
Nitilotriacetic acid, trisodium salt solution	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6
Nitrobenzene	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 15.17, 15.19, 16.2.9
Nitroethane	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	ABC(f)	No	15.12.3, 15.12.4, 15.19.6, 16.6.1, 16.6.2, 16.6.4
Nitroethane (80%)/ Nitropropane(20%)	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	ABC(f)	No	15.12.3, 15.12.4, 15.19.6, 16.6.1, 16.6.2, 16.6.3
Nitroethane, 1-Nitropropane (each 15% or more) mixture	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	ABC(f)	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.6.1, 16.6.2, 16.6.3
o-Nitrophenol (molten)	Y	S/P	2	2G	Cont	No	T4	IIB	No	R	F	ABC	No	15.19.6, 16.2.6, 16.2.9
1- or 2-Nitropropane	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12, 15.17, 15.19
Nitropropane (60%)/Nitroethane (40%) mixture	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	ABC(f)	No	15.12, 15.17, 15.19.6
o- or p-Nitrotoluenes	Y	S/P	2	2G	Cont	No		IIB	Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Nonane (all isomers)	X	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
Nonanoic acid (all isomers)	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.9
Non-edible industrial grade palm oil	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.7, 16.2.9
Nonene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Nonyl alcohol (all isomers)	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6

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Nonyl methacrylate monomer	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
Nonylphenol	X	S/P	1	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Nonylphenol poly(4+)ethoxylate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
Noxious liquid, NF, (1) n.o.s. (trade name ....., contains .....) ST1, Cat. X	X	P	1	2G	Open	No	-	-	Yes	O	No	AC	No	15.19, 16.2.6
Noxious liquid, F, (2) n.o.s. (trade name ....., contains .....) ST1, Cat. X	X	P	1	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19, 16.2.6
Noxious liquid, NF, (3) n.o.s. (trade name ....., contains .....) ST2, Cat. X	X	P	2	2G	Open	No	-		Yes	O	No	AC	No	15.19, 16.2.6
Noxious liquid, F, (4) n.o.s. (trade name ....., contains .....) ST2, Cat. X	X	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19, 16.2.6
Noxious liquid, NF, (5) n.o.s. (trade name ....., contains .....) ST2, Cat. Y	Y	P	2	2G	Open	No	-		Yes	O	No	AC	No	15.19, 16.2.6, 16.2.9(l)
Noxious liquid, F, (6) n.o.s. (trade name ....., contains .....) ST2, Cat. Y	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19, 16.2.6, 16.2.9(l)
Noxious liquid, NF, (7) n.o.s. (trade name ....., contains .....) ST3, Cat. Y	Y	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	15.19, 16.2.6, 16.2.9(l)

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Noxious liquid, F, (8) n.o.s. (trade name ....., contains .....) ST3, Cat. Y	Y	P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19, 16.2.6, 16.2.9(l)
Noxious liquid, NF, (9) n.o.s. (trade name ....., contains .....) ST3, Cat. Z	Z	P	3	2G	Open	No	-		Yes	O	No	AC	No	
Noxious liquid, F, (10) n.o.s. (trade name ....., contains .....) ST3, Cat. Z	Z	P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Octamethylcyclotetrasiloxane	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6, 16.2.9
Octane (all isomers)	X	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Octanoic acid (all isomers)	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Octanol (all isomers)	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Octene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
n-Octyl acetate	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9
Octyl aldehydes	Y	S/P	2	2G	Cont	No	T4	IIB	No	R	F	AC	No	15.19.6, 16.2.9
Octyl decyl adipate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6, 16.2.9
n-Octyl mercaptan	X	S/P	1	2G	Open	No			Yes	O	No	ABC	No	15.19
Offshore contaminated bulk liquid P (o)	X	P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6
Offshore contaminated bulk liquid S (o)	X	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	Yes	15.12, 15.15, 15.17, 15.19
Olefin-Alkyl ester copolymer (molecular weight 2000+)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Olefin Mixture (C7-C9) C8 rich, stabilized	X	P	2	2G	Cont	No	T3	IIB	No	R	F	ABC	No	15.13, 15.19.6
Olefin mixtures (C5-C7)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Olefin mixtures (C5-C15)	X	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6

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Olefins (C13+, all isomers)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
alpha-Olefins (C6-C18) mixtures	X	S/P	2	2G	Cont	No	T4	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Oleic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Oleum	Y	S/P	2	2G	Cont	Dry	-	-	NF	C	T	No	Yes	15.11.2 to 15.11.8, 15.12, 15.16.2, 15.17, 15.19, 16.2.6
Oleylamine	X	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Olive oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Oxygenated aliphatic hydrocarbon mixture	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Palm acid oil	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Palm fatty acid distillate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Palm kernel acid oil	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.7, 16.2.9
Palm kernel fatty acid distillate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.7, 16.2.9
Palm kernel oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Palm kernel olein	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Palm kernel stearin	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Palm mid-fraction	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Palm oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9

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Palm oil fatty acid methyl ester	Y	P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6, 16.2.9
Palm olein	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Palm stearin	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Paraffin wax, highly-refined	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Paraffin wax, semi-refined	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 15.17, 15.19.6, 16.2.6, 16.2.9
Paraldehyde	Z	S/P	3	2G	Cont	No	T3	IIB	No	R	F	AC	No	15.19.6, 16.2.9
Paraldehyde-ammonia reaction product	Y	S/P	2	2G	Cont	No	T1	IIB	No	C	FT	ABC	Yes	15.12, 15.17, 15.19
Pentachloroethane	Y	S/P	2	2G	Cont	No			NF	C	T	No	No	15.12, 15.17, 15.19.6
1,3-Pentadiene	Y	P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.13, 15.19.6, 16.6.1, 16.6.2, 16.6.3
1,3-Pentadiene (greater than 50%), cyclopentene and isomers, mixtures	Y	S/P	2	2G	Cont	Inert	T3	IIB	No	C	FT	ABC	Yes	15.12, 15.13, 15.17, 15.19
Pentaethylenhexamine	X	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Pentane (all isomers)	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.14, 15.19.6
Pentanoic acid	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
n-Pentanoic acid (64%)/2-Methyl butyric acid (36%) mixture	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.17, 15.19
Pentene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.14, 15.19.6
n-Pentyl propionate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Perchloroethylene	Y	S/P	2	2G	Cont	No			NF	C	T	No	No	15.12, 15.17, 15.19.6

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Phenol	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
1-Phenyl-1-xylyl ethane	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6
Phosphate esters, alkyl (C12-C14) amine	Y	S/P	2	2G	Cont	No	T4	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Phosphoric acid	Z	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.11.1, 15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.17, 15.19, 16.2.9
Phosphorus, yellow or white (*)	X	S/P	1	1G	Cont	Pad+(vent or inert)			No(c)	C	No	ABC	No	15.7, 15.19, 16.2.9
Phthalic anhydride (molten)	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
alpha-Pinene	X	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
beta-Pinene	X	S/P	2	2G	Cont	No	T1	IIB	No	R	F	ABC	No	15.19.6
Pine oil	X	S/P	2	2G	Open	No			Yes	O		ABC	No	15.19.6, 16.2.6, 16.2.9
Piperazine, 68% solution	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Polyacrylic acid solution (40% or less)	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Polyalkyl (C18-C22) acrylate in xylene	Y	S/P	2	2G	Cont	No	T1	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Polyalkylalkenaminesuccinimide, molybdenum oxysulphide	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Poly(2-8)alkylene glycol monoalkyl(C1-C6) ether	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Poly(2-8)alkylene glycol monoalkyl (C1-C6) ether acetate	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6
Polyalkyl (C10-C20) methacrylate	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9

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Polyalkyl (C10-C18) methacrylate/ethylene-propylene copolymer mixture	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Polyaluminium chloride solution	Z	S	3	2G	Open	No			NF	O	No	No	No	
Polybutene	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Polybutenyl succinimide	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Poly(2+)cyclic aromatics	X	S/P	1	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Polyether (molecular weight 1350+)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Polyethylene glycol	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Polyethylene glycol dimethyl ether	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	
Poly(ethylene glycol) methylbutenyl ether (MW>1000)	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Polyethylene polyamines	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Polyethylene polyamines (more than 50% C5 -C20 paraffin oil)	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Polyferric sulphate solution	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19
Poly(iminoethylene)-graft-N-poly(ethyleneoxy) solution (90% or less)	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Polyisobutenamine in aliphatic (C10-C14) solvent	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
(Polyisobutene) amino products in aliphatic hydrocarbons	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6



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Polyisobutenyl anhydride adduct	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	
Poly(4+)isobutylene (MW>224)	X	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Polyisobutylene (MW≤224)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
Polyglycerin, sodium salt solution (containing less than 3% sodium hydroxide)	Z	S	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19. 16.2.9
Polymethylene polyphenyl isocyanate	Y	S/P	3	2G	Cont	Dry			Yes(a)	C	T(a)	AD	Yes	15.12, 15.16.2, 15.17, 15.19.6, 16.2.9
Polyolefin (molecular weight 300+)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Polyolefin amide alkeneamine (C17+)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Polyolefin amide alkeneamine borate (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Polyolefin amide alkeneamine polyol	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Polyolefinamine (C28-C250)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Polyolefinamine in alkyl (C2-C4) benzenes	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Polyolefinamine in aromatic solvent	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Polyolefin aminoester salts (molecular weight 2000+)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Polyolefin anhydride	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Polyolefin ester (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9

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Polyolefin phenolic amine (C28-C250)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Polyolefin phosphorusulphide, barium derivative (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Poly(20)oxyethylene sorbitan monooleate	Y	P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.6, 16.2.9
Poly(5+)propylene	Y	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.9
Polypropylene glycol	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6
Polysiloxane	Y	P	2	2G	Cont	No	T2	IIB	No	R	F	ABC	No	15.19.6, 16.2.9
Potassium chloride solution	Z	P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Potassium hydroxide solution (*)	Y	S/P	3	2G	Open	No			NF	C	No	No	No	15.12.3.2, 15.19
Potassium formate solutions (*)	Z	S	3	2G	Open	No			NF	R	No	No	No	15.19.6
Potassium oleate	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.6, 16.2.9
Potassium thiosulphate (50% or less)	Y	S/P	3	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
n-Propanolamine	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.9
2-Propene-1-aminium, N,N-dimethyl-N-2-propenyl-, chloride, homopolymer solution	Y	P	3	2G	Open	No	-	-	NF	O	No	No	No	15.19.6
beta-Propiolactone	Y	S/P	1	2G	Cont	No		IIA	Yes	C	T	AC	Yes	15.12, 15.17, 15.18, 15.19
Propionaldehyde	Y	S/P	3	2G	Cont	Inert	T4	IIB	No	R	F	AC	No	15.19.6
Propionic acid	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AC	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.17, 15.19

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Propionic anhydride	Y	S/P	2	2G	Cont	No	T2	IIA	Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Propionitrile	Y	S/P	1	1G	Cont	No	T1	IIB	No	C	FT	AC	Yes	15.12, 15.17, 15.18, 15.19
n-Propyl acetate	Y	P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.19.6
n-Propyl alcohol	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12, 15.17, 15.19.6
n-Propylamine	Z	S/P	2	2G	Cont	Inert	T2	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.19
Propylbenzene (all isomers)	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.19.6
Propylene carbonate	Z	S	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Propylene glycol methyl ether acetate	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	
Propylene glycol monoalkyl ether	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Propylene glycol phenyl ether	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	
Propylene oxide	Y	S/P	2	2G	Cont	Inert	T2	IIB	No	C	FT	AC	No	15.8, 15.12, 15.14, 15.17, 15.19
Propylene tetramer	X	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
Propylene trimer	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
Pyridine	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Pyrolysis gasoline (containing benzene)	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19.6
Rapeseed oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Rapeseed oil (low erucic acid containing less than 4% free fatty acids)	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Rape seed oil fatty acid methyl esters	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6
Resin oil, distilled	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19.6
Rice bran oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9

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Rosin	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Safflower oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Shea butter	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Sodium alkyl (C14-C17) sulphonates (60-65% solution)	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Sodium aluminosilicate slurry	Z	P	3	2G	Open	No			NF	O	No	No	No	16.2.9
Sodium benzoate	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	16.2.9
Sodium borohydride (15% or less)/Sodium hydroxide solution (*)	Y	S/P	3	2G	Open	No			NF	C	No	No	No	15.19, 16.2.6, 16.2.9
Sodium bromide solution (less than 50%) (*)	Y	S/P	3	2G	Open	No	-	-	NF	R	No	No	No	15.19.6
Sodium carbonate solution (*)	Z	S/P	3	2G	Open	No			NF	R	No	No	No	15.19.6
Sodium chlorate solution (50% or less) (*)	Z	S/P	3	2G	Open	No			NF	R	No	No	No	15.9, 15.12, 15.19, 16.2.9
Sodium dichromate solution (70% or less)	Y	S/P	1	1G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.18, 15.19
Sodium hydrogen sulphide (6% or less)/Sodium carbonate (3% or less) solution	Z	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
Sodium hydrogen sulphite solution (45% or less)	Z	P	3	2G	Open	No			NF	O	No	No	No	16.2.9
Sodium hydrosulphide/Ammonium sulphide solution (*)	Y	S/P	2	2G	Cont	No	T4	IIB	No	C	FT	AC	Yes	15.12, 15.15, 15.17, 15.19, 16.6.1, 16.6.2, 16.6.3
Sodium hydrosulphide solution (45% or less) (*)	Z	S/P	3	2G	Cont	Vent or pad (gas)			NF	R	T	No	Yes	15.12, 15.15, 15.19.6, 16.2.9
Sodium hydroxide solution (*)	Y	S/P	3	2G	Open	No			NF	C	No	No	No	15.19, 16.2.6, 16.2.9

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Sodium hypochlorite solution (15% or less)	Y	S/P	2	2G	Cont	No	-	-	NF	R	No	No	No	15.17, 15.19.6
Sodium methylate 21-30% in methyl alcohol	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.19, 16.2.6 (only if >28%), 16.2.9
Sodium nitrite solution	Y	S/P	3	2G	Cont	No			NF	C	T	No	No	15.12.3, 15.12.4, 15.19, 16.2.6, 16.2.9
Sodium petroleum sulphonate	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	Yes	15.12.3, 15.12.4, 15.19.6, 16.2.6
Sodium poly(4+)acrylate solutions	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Sodium silicate solution	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19, 16.2.9
Sodium sulphate solutions	Z	S	3	2G	Open	No			NF	O	No	No	No	16.2.9,
Sodium sulphide solution (15% or less)	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19, 16.2.9
Sodium sulphite solution (25% or less)	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
Sodium thiocyanate solution (56% or less)	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
Soyabean oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Soybean Oil Fatty Acid Methyl Ester	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
Styrene monomer	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 15.13, 15.17, 15.19.6, 16.6.1, 16.6.2
Sulphohydrocarbon (C3-C88)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Sulpholane	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9
Sulphur (molten) (*)	Z	S	3	1G	Open	Vent or pad (gas)	T3		Yes	O	FT	No	No	15.10, 16.2.9

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Sulphuric acid	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.16.2, 15.17, 15.19, 16.2.9
Sulphuric acid, spent	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.16.2, 15.17, 15.19
Sulphurized fat (C14-C20)	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	
Sulphurized polyolefinamide alkene (C28-C250) amine	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Sunflower seed oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Tall oil, crude	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Tall oil, distilled	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Tall oil fatty acid (resin acids less than 20%)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6
Tall oil pitch	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Tall oil soap, crude	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6
Tallow	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Tallow fatty acid	Y	P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Tetrachloroethane	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 15.19
Tetraethylene glycol	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Tetraethylene pentamine	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19
Tetrahydrofuran	Z	S	3	2G	Cont	No	T3	IIB	No	R	F	AC	No	15.19.6
Tetrahydronaphthalene	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Tetramethylbenzene (all isomers)	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.9
Titanium dioxide slurry	Z	P	3	2G	Open	No			NF	O	No	No	No	

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Toluene	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AC	No	15.12, 15.17, 15.19.6
Toluenediamine	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.18, 15.19, 16.2.6, 16.2.9
Toluene diisocyanate	Y	S/P	2	2G	Cont	Dry	-	-	Yes	C	T	ABC(b)D	Yes	15.12, 15.16.2, 15.17, 15.18, 15.19, 16.2.9
o-Toluidine	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19
Tributyl phosphate	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	No	15.12.3, 15.12.4, 15.19.6
1,2,3-Trichlorobenzene (molten)	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
1,2,4-Trichlorobenzene	X	S/P	1	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19, 16.2.9
1,1,1-Trichloroethane	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6
1,1,2-Trichloroethane	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6
Trichloroethylene	Y	S/P	2	2G	Cont	No	-	-	NF	C	T	No	No	15.12, 15.17, 15.19.6
1,2,3-Trichloropropane	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19
1,1,2-Trichloro-1,2,2-Trifluoroethane	Y	P	2	2G	Open	No			NF	O	No	No	No	15.19.6
Tricresyl phosphate (containing 1% or more ortho-isomer)	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 15.17, 15.19, 16.2.6
Tricresyl phosphate (containing less than 1% ortho-isomer)	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19.6, 16.2.6
Tridecane	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6
Tridecanoic acid	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Tridecyl acetate	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Triethanolamine	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Triethylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	ABC	No	15.12.3, 15.12.4, 15.19

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Triethylbenzene	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Triethylenetetramine	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.9
Triethyl phosphate	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6
Triethyl phosphite	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Triisopropanolamine	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9
Triisopropylated phenyl phosphates	X	P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.6
Trimethylacetic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.11, 15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Trimethylamine solution (30% or less)	Z	S/P	2	2G	Cont	No	T3	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.14, 15.19.6
Trimethylbenzene (all isomers)	X	S/P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.19.6
Trimethylol propane propoxylated	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
2,2,4-Trimethyl-1,3-pentanediol diisobutyrate	Y	S/P	3	2G	Open	No			Yes	O	No	ABC	No	15.19.6
2,2,4-Trimethyl-1,3-pentanediol-1-isobutyrate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6
1,3,5-Trioxane	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12, 15.17, 15.19.6, 16.2.9
Tripropylene glycol	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Trixylyl phosphate	X	S/P	1	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19.6, 16.2.6



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Tung oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Turpentine	X	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	AC	No	15.19.6
Undecanoic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
1-Undecene	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6
Undecyl alcohol	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Urea/Ammonium nitrate solution	Y	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	15.19.6
Urea/Ammonium phosphate solution	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Urea solution	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	16.2.9,
Used cooking oil (m)	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Used cooking oil (Triglycerides, C16-C18 and C18 unsaturated) (m) (n)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Valeraldehyde (all isomers)	Y	S/P	3	2G	Cont	Inert	T3	IIB	No	R	F	ABC	No	15.4.6, 15.13, 15.19.6, 16.6.1, 16.6.2
Vegetable acid oils (m)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Vegetable fatty acid distillates (m)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Vegetable oil mixtures, containing less than 15% free fatty acid (m)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.7, 16.2.9
Vinyl acetate	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	ABC	No	15.12, 15.13, 15.17, 15.19.6, 16.6.1, 16.6.2
Vinyl ethyl ether	Z	S/P	2	2G	Cont	Inert	T3	IIB	No	R	F	ABC	No	15.4, 15.13, 15.14, 15.19.6, 16.6.1, 16.6.2

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Vinylidene chloride	Y	S/P	2	2G	Cont	Inert	T2	IIA	No	C	FT	ABC	No	15.12, 15.13, 15.14, 15.17, 15.19, 16.6.1, 16.6.2
Vinyl neodecanoate	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.13, 15.17, 15.19, 16.6.1, 16.6.2
Vinyltoluene	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 15.13, 15.17, 15.19.6, 16.6.1, 16.6.2
White spirit, low (15-20%) aromatic	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Wood lignin with sodium acetate/oxalate	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	
Xylenes	Y	P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.19.6, 16.2.9 (h)
Xylenes/ethylbenzene (10% or more) mixture	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 15.19.6
Xylenol	Y	S/P	2	2G	Cont	No	-	IIA	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.9
Zinc alkaryl dithiophosphate (C7-C16)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Zinc alkenyl carboxamide	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Zinc alkyl dithiophosphate (C3-C14)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6

### Footnotes to products in chapter 17

Some entries in chapter 17 contain footnotes, as either letters or symbols in parentheses following the name of the product, in *column a* of the tables. These provide additional information about the carriage requirements for the product. The definitions of these footnotes are included below.

- a If the product to be carried contains flammable solvents such that the flashpoint does not exceed 60°C, then special electrical systems and a flammable-vapour detector shall be provided.
- b Although water is suitable for extinguishing open-air fires involving chemicals to which this footnote applies, water shall not be allowed to contaminate closed tanks containing these chemicals because of the risk of hazardous gas generation.
- c Phosphorus, yellow or white, is carried above its autoignition temperature and therefore flashpoint is not appropriate. Electrical equipment requirements may be similar to those for substances with a flashpoint above 60°C.
- d Requirements are based on those isomers having a flashpoint of 60°C or less; some isomers have a flashpoint greater than 60°C and therefore the requirements based on flammability would not apply to such isomers.
- e Applies to n-decyl alcohol only.
- f Dry chemical shall not be used as fire-extinguishing media.
- g Confined spaces shall be tested for both formic acid vapours and carbon monoxide gas, a decomposition product.
- h Applies to p-xylene only.
- i For mixtures containing no other components with safety hazards and where the pollution category is Y or less.
- j Only certain alcohol-resistant foams are effective.
- k Requirements for Ship Type identified in *column e* might be subject to regulation 4.1.3 of Annex II of MARPOL.
- l Applicable when the melting point is equal to or greater than 0°C.
- m From vegetable oils, animal fats and fish oils specified in the IBC Code.
- n Confirmation that the product is composed of Triglycerides, C16-C18 and C18 unsaturated shall be required in order for the entry to be used. Otherwise, the more generic entry "Used cooking oil (m)" must be used.
- o Indicates that the entries are to be used solely for backloading of contaminated bulk liquids from offshore installations used in the search and exploitation of seabed mineral resources.
- \* Indicates that with reference to chapter 21 of the IBC Code (paragraph 21.1.3), deviations from the normal assignment criteria used for some carriage requirements have been implemented.

## Chapter 18

### List of products to which the Code does not apply

18.1 The following are products which have been reviewed for their safety and pollution hazards and determined not to present hazards to such an extent as to warrant application of the Code.

18.2 Although the products listed in this chapter fall outside the scope of the Code, the attention of Administrations is drawn to the fact that some safety precautions may be needed for their safe transportation. Accordingly, Administrations shall prescribe appropriate safety requirements.

18.3 Some liquid substances are identified as falling into Pollution Category Z and, therefore, subject to certain requirements of MARPOL Annex II.

18.4 Liquid mixtures which are assessed or provisionally assessed under regulation 6.3 of MARPOL Annex II as falling into Pollution Category Z or OS, and which do not present safety hazards, may be carried under the appropriate entry in this chapter for "Noxious or Non-Noxious Liquid Substances, not otherwise specified (n.o.s.)".

#### EXPLANATORY NOTES

Product name	The product name shall be used in the shipping document for any cargo offered for bulk shipments. Any additional name may be included in brackets after the product name. In some cases, the product names are not identical with the names given in previous issues of the Code.
Pollution Category	The letter Z means the Pollution Category assigned to each product under Annex II of MARPOL. OS means the product was evaluated and found to fall outside Categories X, Y, or Z.

<b>Product Name</b>	<b>Pollution Category</b>
Acetone	Z
Alcoholic beverages, n.o.s.	Z
Apple juice	OS
n-Butyl alcohol	Z
sec-Butyl alcohol	Z
Calcium carbonate slurry	OS
Clay slurry	OS
Coal slurry	OS
Ethyl alcohol	Z
Glucose solution	OS
Glycerol ethoxylated	OS
Hydrogenated starch hydrolysate	OS
Isopropyl alcohol	Z
Kaolin slurry	OS
Lecithin	OS
Maltitol solution	OS

<b>Product Name</b>	<b>Pollution Category</b>
Microsilica slurry	OS
Molasses	OS
Noxious liquid, (11) n.o.s. (trade name ....., contains ....) Cat. Z	Z
Non noxious liquid, (12) n.o.s. (trade name ....., contains ....) Cat. OS	OS
Orange juice (concentrated)	OS
Orange juice (not concentrated)	OS
Potassium chloride solution (less than 26%)	OS
Propylene glycol	OS
Sodium acetate solutions	Z
Sodium bicarbonate solution (less than 10%)	OS
Sorbitol solution	OS
Sulphonated polyacrylate solution	Z
Tetraethyl silicate monomer/oligomer (20% in ethanol)	Z
Triethylene glycol	OS
Vegetable protein solution (hydrolysed)	OS
Water	OS

## Chapter 19

### Index of Products Carried in Bulk

19.1 The first column of the Index of Products Carried in Bulk (hereafter referred to as "the Index") provides the so-called Index Name. Where the Index Name is in capitals and in bold, the Index Name is identical to the Product Name in either chapter 17 or chapter 18. The second column listing the relevant Product Name is therefore empty. Where the Index Name is non-bold lower case it reflects a synonym for which the Product Name in either chapter 17 or chapter 18 is given in the second column. The relevant chapter of the IBC Code is reflected in the third column.

19.2 Following a review of chapter 19, a column listing UN numbers which was previously included had been removed from the Index. Since UN numbers are only available for a limited number of Index Names and there are inconsistencies between some of the names used in chapter 19 and those linked to UN numbers, it was decided to remove UN number references in order to avoid any confusion.

19.3 The Index has been developed for information purposes only. None of the Index Names indicated in non-bold lower case in the first column shall be used as the Product Name on the shipping document.

19.4 Prefixes forming an integral part of the name are shown in ordinary (roman) type and are taken into account in determining the alphabetical order of entries. These include such prefixes as:

Mono Di Tri Tetra Penta Iso Bis Neo Ortho Cyclo

19.5 Prefixes that are disregarded for purposes of alphabetical order are the following:

n-	(normal-)
sec-	(secondary-)
tert-	(tertiary-)
o-	(ortho-)
m-	(meta-)
p-	(para-)
N-	
O-	
S-	
sym-	(symmetrical)
uns-	(unsymmetrical)
dl-	
D-	
L-	
cis-	
trans-	
(E)-	
(Z)-	
alpha-	( $\alpha$ -)
beta-	( $\beta$ -)
gamma-	( $\gamma$ -)
epsilon-	( $\epsilon$ -)
omega-	( $\omega$ -)

19.6 The Index utilizes a note after the index name for some entries (shown as (a) or (b)) which indicates that the following qualifications apply:

- (a) This Index Name represents a subset of the corresponding Product Name.
- (b) The Product Name corresponding to this Index Name contains a carbon chain length qualification. Since the Index Name should always represent a subset or be an exact synonym of the corresponding Product Name, the carbon chain length characteristics should be checked for any product identified by this Index Name.

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acedimethylamide	N,N-DIMETHYLACETAMIDE	17
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<b>AMINOETHYLDIETHANOLAMINE/AMINOETHYLETHANOLAMINE SOLUTION</b>		17
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<b>N-AMINOETHYLPIPERAZINE</b>		17
2-Aminoisobutane (a)	<b>BUTYLAMINE (ALL ISOMERS)</b>	17
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2-Amino-1-methylbenzene	<b>O-TOLUIDINE</b>	17
<b>2-AMINO-2-METHYL-1-PROPANOL</b>		17
3-Aminomethyl-3,5,5-trimethylcyclohexylamine	<b>ISOPHORONEDIAMINE</b>	17
Aminophen	<b>ANILINE</b>	17
1-Aminopropane	<b>N-PROPYLAMINE</b>	17
2-Aminopropane	<b>ISOPROPYLAMINE</b>	17
2-Aminopropane (70% or less) solution	<b>ISOPROPYLAMINE (70% OR LESS) SOLUTION</b>	17
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1-Aminopropan-2-ol	<b>ISOPROPANOLAMINE</b>	17
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o-Aminotoluene	<b>O-TOLUIDINE</b>	17
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sec-Amyl acetate (a)	<b>AMYL ACETATE (ALL ISOMERS)</b>	17
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<b>N-AMYL ALCOHOL</b>		17
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Amylcarbinol	<b>HEXANOL</b>	17
Amylene hydrate	<b>TERT-AMYL ALCOHOL</b>	17
<b>TERT-AMYL ETHYL ETHER</b>		17
Amyl ethyl ketone	<b>ETHYL AMYL KETONE</b>	17
<b>TERT-AMYL METHYL ETHER</b>		17
n-Amyl methyl ketone	<b>METHYL AMYL KETONE</b>	17
n-Amyl propionate	<b>N-PENTYL PROPIONATE</b>	17
Anaesthetic ether	<b>DIETHYL ETHER (*)</b>	17
<b>ANILINE</b>		17
Aniline oil	<b>ANILINE</b>	17
Anilinobenzene	<b>DIPHENYLAMINE (MOLTEN)</b>	17
Anthracene oil (coal tar fraction) (a)	<b>COAL TAR</b>	17
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1,4-Benzenedicarboxylic acid, butyl ester	<b>DIBUTYL TEREPHTHALATE</b>	17
1,2-Benzenedicarboxylic acid, diethyl ester	<b>DIETHYL PHTHALATE</b>	17

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Benzol	BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)	17
Benzole	BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)	17
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(2-Benzothiazolylthio) sodium solution	MERCAPTOBENZOTHIAZOL, SODIUM SALT SOLUTION	17
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<b>BENZYL CHLORIDE</b>		17
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<b>BIO-FUEL BLENDS OF DIESEL/GAS OIL AND VEGETABLE OIL (&gt;25% BUT &lt;99% BY VOLUME)</b>		17
<b>BIO-FUEL BLENDS OF GASOLINE AND ETHYL ALCOHOL (&gt;25% BUT &lt;99% BY VOLUME)</b>		17
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Bis(methylcyclopentadiene)	METHYLCYCLOPENTADIENE DIMER	17
2,5-Bis(alkyl(C7+)thio)-1,3,4-thiadiazole	ALKYL DITHIOTHIAZADIAZOLE (C6-C24)	17
Bis(2-aminoethyl)amine	DIETHYLENETRIAMINE	17
N,N'-Bis(2-aminoethyl)ethane-1,2-diamine	TRIETHYLENETETRAMINE	17
N,N'-Bis(2-aminoethyl)ethylenediamine	TRIETHYLENETETRAMINE	17
N,N-Bis(2-(bis(carboxymethyl)amino)ethyl)glycine, pentasodium salt solution	DIETHYLENETRIAMINEPENTAACETIC ACID, PENTASODIUM SALT SOLUTION	17
Bis(2-butoxyethyl) ether	DIETHYLENE GLYCOL DIBUTYL ETHER	17
N,N- Bis(carboxymethyl)glycine trisodium salt solution	NITRILOTRIACETIC ACID, TRISODIUM SALT SOLUTION	17
Bis(chloroethyl) ether	DICHLOROETHYL ETHER	17
Bis(2-chloroethyl) ether	DICHLOROETHYL ETHER	17
Bis (2-chloroisopropyl) ether	2,2'-DICHLOROISOPROPYL ETHER	17
Bis(2-chloro-1-methylethyl) ether	2,2'-DICHLOROISOPROPYL ETHER	17
Bis[2-(2,3-epoxypropoxy)phenyl]methane	DIGLYCIDYL ETHER OF BISPHENOL F	17
2,2-Bis[4-(2,3-epoxypropoxy)phenyl]propane	DIGLYCIDYL ETHER OF BISPHENOL A	17
Bis(2-ethoxyethyl) ether	DIETHYLENE GLYCOL DIETHYL ETHER	17
Bis(2-ethylhexyl) adipate	DI-(2-ETHYLHEXYL) ADIPATE	17
Bis (2-ethylhexyl)-1-4-benzenedicarboxylate	BIS(2-ETHYLHEXYL) TEREPHTHALATE	17

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Bis(2-hydroxyethyl)ammonium 2,4-dichlorophenoxyacetate solution	2,4-DICHLOROPHENOXYACETIC ACID, DIETHANOLAMINE SALT SOLUTION	17
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Bis(2-hydroxypropyl)amine	DIISOPROPANOLAMINE	17
Bis(6-methylheptyl) phthalate	DIOCTYL PHTHALATE	17
Blackstrap molasses (a)	MOLASSES	18
Blend of propoxylated polyether polyols with >10% additives	GLUCITOL/GLYCEROL BLEND PROPOXYLATED (CONTAINING 10% OR MORE AMINES)	17
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Butaldehyde (a)	BUTYRALDEHYDE (ALL ISOMERS)	17
Butanal (a)	BUTYRALDEHYDE (ALL ISOMERS)	17
n-Butanal (a)	BUTYRALDEHYDE (ALL ISOMERS)	17
1,3-Butanediol (a)	BUTYLENE GLYCOL	17
Butane-1,3-diol (a)	BUTYLENE GLYCOL	17
1,4-Butanediol (a)	BUTYLENE GLYCOL	17
Butane -1,4-diol (a)	BUTYLENE GLYCOL	17
2,3-Butanediol (a)	BUTYLENE GLYCOL	17
Butane-2,3-diol (a)	BUTYLENE GLYCOL	17
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Butanol	N-BUTYL ALCOHOL	18
1-Butanol	N-BUTYL ALCOHOL	18
Butanol-1	N-BUTYL ALCOHOL	18
Butan-1-ol	N-BUTYL ALCOHOL	18
2-Butanol	SEC-BUTYL ALCOHOL	18
Butan-2-ol	SEC-BUTYL ALCOHOL	18
Butanol acetate (a)	BUTYL ACETATE (ALL ISOMERS)	17
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Columbian spirits	METHYL ALCOHOL (*)	17
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Dimethyl ketone	ACETONE	18
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<b>DI-N-PROPYLAMINE</b>		17
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<b>S-ETHYL DIPROPYLTHIOCARBAMATE</b>		17
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<b>ETHYLENE GLYCOL</b>		17
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Triacetin	GLYOXAL SOLUTION (40% OR LESS)	17
3,6,9-Triazaundecamethylenediamine	TETRAETHYLENE PENTAMINE	17
3,6,9-Triazaundecane-1,11-diamine	TETRAETHYLENE PENTAMINE	17
<b>TRIBUTYL PHOSPHATE</b>		17
<b>1,2,3-TRICHLOROBENZENE (MOLTEN)</b>		17
<b>1,2,4-TRICHLOROBENZENE</b>		17
<b>1,1,1-TRICHLOROETHANE</b>		17
<b>1,1,2-TRICHLOROETHANE</b>		17
beta-Trichloroethane	1,1,2-TRICHLOROETHANE	17
Trichloroethene	TRICHLOROETHYLENE	17
<b>TRICHLOROETHYLENE</b>		17
Trichloromethane	CHLOROFORM	17
<b>1,2,3-TRICHLOROPROPANE</b>		17
<b>1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE</b>		17
<b>TRICRESYL PHOSPHATE (CONTAINING 1% OR MORE ORTHO-ISOMER)</b>		17
<b>TRICRESYL PHOSPHATE (CONTAINING LESS THAN 1% ORTHO-ISOMER)</b>		17
<b>TRIDECANE</b>		17
<b>TRIDECANOIC ACID</b>		17
Tridecanol (a)	ALCOHOLS (C13+)	17
Tridecene (a)	OLEFINS (C13+, ALL ISOMERS)	17
Tridecoic acid	TRIDECANOIC ACID	17
<b>TRIDECYL ACETATE</b>		17
Tridecyl alcohol (a)	ALCOHOLS (C13+)	17
Tridecylbenzene	ALKYL(C9+)BENZENES	17
Tridecylic acid	TRIDECANOIC ACID	17
Tridecylic acid (a)	FATTY ACID (SATURATED C13+)	17
Tri(dimethylphenyl) phosphate (all isomers)	TRIXYLYL PHOSPHATE	17
<b>TRIETHANOLAMINE</b>		17
<b>TRIETHYLAMINE</b>		17
<b>TRIETHYLBENZENE</b>		17
<b>TRIETHYLENE GLYCOL</b>		18
Triethylene glycol butyl ether (a)	POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER	17

<b>Index Name</b>	<b>Product Name</b>	<b>Chapter</b>
Triethylene glycol ethyl ether (a)	POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER	17
Triethylene glycol methyl ether (a)	POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER	17
Triethylene glycol monobutyl ether (a)	POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER	17
<b>TRIETHYLENETETRAMINE</b>		17
<b>TRIETHYL PHOSPHATE</b>		17
<b>TRIETHYL PHOSPHITE</b>		17
Triformol	1,3,5-TRIOXANE	17
Triglycol	TRIETHYLENE GLYCOL	18
Trihydroxypropane	GLYCERINE	17
Trihydroxytriethylamine	TRIETHANOLAMINE	17
<b>TRISOPROPANOLAMINE</b>		17
<b>TRISOPROPYLATED PHENYL PHOSPHATES</b>		17
<b>TRIMETHYLACETIC ACID</b>		17
<b>TRIMETHYLAMINE SOLUTION (30% OR LESS)</b>		17
<b>TRIMETHYLBENZENE (ALL ISOMERS)</b>		17
1,2,3-Trimethylbenzene (a)	TRIMETHYLBENZENE (ALL ISOMERS)	17
1,2,4-Trimethylbenzene (a)	TRIMETHYLBENZENE (ALL ISOMERS)	17
1,3,5-Trimethylbenzene (a)	TRIMETHYLBENZENE (ALL ISOMERS)	17
2,6,6-Trimethylbicyclo[3.1.1]hept-2-ene	ALPHA-PINENE	17
Trimethylcarbinol	TERT-BUTYL ALCOHOL	17
1,1,3-Trimethyl-3-cyclohexene-5-one	ISOPHORONE	17
3,5,5-Trimethylcyclohex-2-enone	ISOPHORONE	17
3,5,5-Trimethylcyclohex-2-en-one	ISOPHORONE	17
<b>TRIMETHYLOL PROPANE PROPOXYLATED</b>		17
2,2,4-Trimethylpentane (a)	OCTANE (ALL ISOMERS)	17
<b>2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE</b>		17
2,2,4-Trimethylpentane-1,3-diol diisobutyrate	2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE	17
<b>2,2,4-TRIMETHYL-1,3-PENTANEDIOL-1-ISOBUTYRATE</b>		17
2,4,4-Trimethylpentene-1	DIISOBUTYLENE	17
2,4,4-Trimethylpent-1-ene	DIISOBUTYLENE	17
2,4,4-Trimethylpentene-2	DIISOBUTYLENE	17
2,4,4-Trimethylpent-2-ene	DIISOBUTYLENE	17
2,4,6-Trimethyl-1,3,5-trioxane	PARALDEHYDE	17
2,4,6-Trimethyl-s-trioxane	PARALDEHYDE	17
Trioxan	1,3,5-TRIOXANE	17
<b>1,3,5-TRIOXANE</b>		17
5,8,11-Trioxapentadecane	DIETHYLENE GLYCOL DIBUTYL ETHER	17
3,6,9-Trioxaundecane	DIETHYLENE GLYCOL DIETHYL ETHER	17
Trioxymethylene	1,3,5-TRIOXANE	17
Tripropylene	PROPYLENE TRIMER	17
<b>TRIPROPYLENE GLYCOL</b>		17
Tripropylene glycol methyl ether (a)	POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER	17

<b>Index Name</b>	<b>Product Name</b>	<b>Chapter</b>
Tris(dimethylphenyl) phosphate (all isomers)	TRIXYLYL PHOSPHATE	17
Tris(2-hydroxyethyl)amine	TRIETHANOLAMINE	17
2,4-D-tris(2-hydroxy-2-methylethyl)ammonium	2,4-DICHLOROPHENOXYACETIC ACID, TRIISOPROPANOLAMINE SALT SOLUTION	17
Tris(2-hydroxypropyl)amine	TRIISOPROPANOLAMINE	17
Tris(2-hydroxy-1-propyl)amine	TRIISOPROPANOLAMINE	17
Tris(2-hydroxypropyl)ammonium 2,4-dichlorophenoxyacetate solution	2,4-DICHLOROPHENOXYACETIC ACID, TRIISOPROPANOLAMINE SALT SOLUTION	17
Trisodium 2-[carboxylatomethyl(2-hydroxyethyl)amino]ethyliminodi(acetate) solution	N-(HYDROXYETHYL)ETHYLENEDIAMINETRIACETIC ACID, TRISODIUM SALT SOLUTION	17
Trisodium N-(carboxymethyl)-N'-(2-hydroxyethyl)-N,N'-ethylenediglycine solution	N-(HYDROXYETHYL)ETHYLENEDIAMINETRIACETIC ACID, TRISODIUM SALT SOLUTION	17
Trisodium N-(2-hydroxyethyl)ethylenediamine-N,N',N'-triacetate solution	N-(HYDROXYETHYL)ETHYLENEDIAMINETRIACETIC ACID, TRISODIUM SALT SOLUTION	17
Trisodium nitrilotriacetate solution	NITRILOTRIACETIC ACID, TRISODIUM SALT SOLUTION	17
Tritolyl phosphate, containing less than 1% ortho- isomer	TRICRESYL PHOSPHATE (CONTAINING LESS THAN 1% ORTHO-ISOMER)	17
Tritolyl phosphate, containing 1% or more ortho- isomer	TRICRESYL PHOSPHATE (CONTAINING 1% OR MORE ORTHO-ISOMER)	17
Trixylenyl phosphate	TRIXYLYL PHOSPHATE	17
<b>TRIXYLYL PHOSPHATE</b>		17
<b>TUNG OIL</b>		17
<b>TURPENTINE</b>		17
Turpentine oil	TURPENTINE	17
Turps	TURPENTINE	17
Type A Zeolite slurry (a)	SODIUM ALUMINOSILICATE SLURRY	17
1-Undecanecarboxylic acid	LAURIC ACID	17
N-Undecane (a)	N-ALKANES (C10-C20)	17
<b>UNDECANOIC ACID</b>		17
Undecan-1-ol	UNDECYL ALCOHOL	17
<b>1-UNDECENE</b>		17
Undec-1-ene	1-UNDECENE	17
<b>UNDECYL ALCOHOL</b>		17
Undecylbenzene	ALKYL(C9+)BENZENES	17
Undecylic acid	UNDECANOIC ACID	17
n-Undecylic acid	UNDECANOIC ACID	17
uns-Trimethylbenzene (a)	TRIMETHYLBENZENE (ALL ISOMERS)	17
unsym-Trichlorobenzene	1,2,4-TRICHLOROBENZENE	17
<b>UREA/AMMONIUM NITRATE SOLUTION</b>		17
<b>UREA/AMMONIUM PHOSPHATE SOLUTION</b>		17
<b>UREA SOLUTION</b>		17
<b>USED COOKING OIL (M)</b>		17
<b>USED COOKING OIL (TRIGLYCERIDES, C16-C18 AND C18 UNSATURATED)** (M)</b>		17
Valeral	VALERALDEHYDE (ALL ISOMERS)	17
<b>VALERALDEHYDE (ALL ISOMERS)</b>		17

<b>Index Name</b>	<b>Product Name</b>	<b>Chapter</b>
n-Valeraldehyde	VALERALDEHYDE (ALL ISOMERS)	17
Valerianic acid	PENTANOIC ACID	17
Valeric acid	PENTANOIC ACID	17
n-Valeric acid	PENTANOIC ACID	17
Valeric aldehyde	VALERALDEHYDE (ALL ISOMERS)	17
Valerone	DIISOBUTYL KETONE	17
Vaseline (cosmetic)	PARAFFIN WAX, HIGHLY-REFINED	17
<b>VEGETABLE ACID OILS (M)</b>		17
<b>VEGETABLE FATTY ACID DISTILLATES (M)</b>		17
<b>VEGETABLE OIL MIXTURES, CONTAINING LESS THAN 15% FREE FATTY ACID (M)</b>		17
<b>VEGETABLE PROTEIN SOLUTION (HYDROLYSED)</b>		18
Vinegar acid	ACETIC ACID	17
Vinegar naphtha	ETHYL ACETATE	17
<b>VINYL ACETATE</b>		17
Vinylbenzene	STYRENE MONOMER	17
Vinylcarbinol	ALLYL ALCOHOL	17
Vinyl cyanide	ACRYLONITRILE	17
vinyl ethanoate	VINYL ACETATE	17
<b>VINYL ETHYL ETHER</b>		17
Vinylformic acid	ACRYLIC ACID	17
<b>VINYLDENE CHLORIDE</b>		17
<b>VINYL NEODECANOATE</b>		17
<b>VINYLTOLUENE</b>		17
Vinytoluene (all isomers)	VINYLTOLUENE	17
Vinyl trichloride	1,1,2-TRICHLOROETHANE	17
Vitriol brown oil	SULPHURIC ACID	17
<b>WATER</b>		18
Water glass solutions	SODIUM SILICATE SOLUTION	17
White bole	KAOLIN SLURRY	18
White caustic solution	SODIUM HYDROXIDE SOLUTION (*)	17
<b>WHITE SPIRIT, LOW (15-20%) AROMATIC</b>		17
White tar	NAPHTHALENE (MOLTEN)	17
Wine (a)	ALCOHOLIC BEVERAGES, N.O.S.	18
Wintergreen oil	METHYL SALICYLATE	17
Wood alcohol	METHYL ALCOHOL (*)	17
<b>WOOD LIGNIN WITH SODIUM ACETATE/OXALATE</b>		17
Wood naphtha	METHYL ALCOHOL (*)	17
Wood spirit	METHYL ALCOHOL (*)	17
<b>XYLENES</b>		17
<b>XYLENES/ETHYLBENZENE (10% OR MORE) MIXTURE</b>		17
<b>XYLENOL</b>		17
Xylenol (all isomers)	XYLENOL	17
2,3-Xylenol (a)	XYLENOL	17
2,4-Xylenol (a)	XYLENOL	17

<b>Index Name</b>	<b>Product Name</b>	<b>Chapter</b>
2,5-Xylenol (a)	<b>XYLENOL</b>	17
2,6-Xylenol (a)	<b>XYLENOL</b>	17
3,4-Xylenol (a)	<b>XYLENOL</b>	17
3,5-Xylenol (a)	<b>XYLENOL</b>	17
Xylols	<b>XYLENES</b>	17
<b>ZINC ALKARYL DITHIOPHOSPHATE (C7-C16)</b>		17
<b>ZINC ALKENYL CARBOXAMIDE</b>		17
<b>ZINC ALKYL DITHIOPHOSPHATE (C3-C14)</b>		17
Zinc bromide drilling brine	<b>DRILLING BRINES (CONTAINING ZINC CHLORIDE)</b>	17
z-Octadec-9-enamine	<b>OLEYLAMINE</b>	17
(Z)-Octadec-9-enoic acid	<b>OLEIC ACID</b>	17
Z-Octadec-9-enoic acid	<b>OLEIC ACID</b>	17
(Z)-Octadec-9-enylamine	<b>OLEYLAMINE</b>	17

”

7 The complete text of chapter 21 is replaced by the following:

## **"Chapter 21**

### **Criteria for assigning carriage requirements for products subject to the IBC Code**

#### **21.1 Introduction**

21.1.1 The following criteria are used for the determination of pollution classification and assignment of appropriate carriage requirements for bulk liquid cargoes being assessed for entry into the IBC Code or lists 1, 3 or 4 of the MEPC.2/Circular.

21.1.2 In developing such criteria, every effort has been made to follow the criteria and cut-off points developed under the Globally Harmonized System (GHS).

21.1.3 Although the criteria are intended to be closely defined in order to establish a uniform approach, it must be emphasized that where human experience or other factors indicate the need for alternative arrangements, these shall always be taken into account. Where deviations from the criteria have been recognized, they shall be properly recorded with justifications.

#### **21.2 Contents**

21.2.1 This chapter contains the following:

- .1 minimum safety and pollution criteria for products subject to chapter 17 of the IBC Code;
- .2 criteria used to assign the minimum carriage requirements for products that meet the safety or pollution criteria to make them subject to chapter 17 of the IBC Code;
- .3 criteria used for determining special requirements in chapter 15 of the IBC Code to be included in *column o* of chapter 17 of the IBC Code;
- .4 criteria used for determining special requirements in chapter 16 of the IBC Code to be included in *column o* of chapter 17 of the IBC Code;
- .5 definitions of properties used within this chapter;
- .6 information on the use of the GESAMP Hazard Ratings; and
- .7 information on the application of the SVC/LC<sub>50</sub> ratio method.

21.2.2 The information included in parentheses following the classification criteria throughout this chapter refers to the GESAMP Hazard Profile ratings set out in appendix I of MARPOL Annex II under the "Abbreviated legend to the revised GESAMP Hazard Evaluation procedure". The full listing of GESAMP Hazard Profile ratings for evaluated substances are published annually in the GESAMP Composite List as a PPR circular. It should be noted that ratings in parentheses (based on estimation methods applied by GESAMP) are considered as equivalent to ratings without parentheses for the purpose of assigning carriage requirements.



### **21.3 Minimum safety and pollution criteria for products subject to chapter 17 of the IBC Code**

21.3.1 Products are deemed to be hazardous and subject to chapter 17 of the IBC Code if they meet one or more of the following criteria:

- .1 inhalation LC<sub>50</sub>/ATE ≤ 20 mg/L/4h (see paragraph 21.7.1.3) (C3 = 1, 2, 3 or 4);
- .2 dermal LD<sub>50</sub>/ATE ≤ 2000 mg/kg (see paragraph 21.7.1.2) (C2 = 1, 2, 3, or 4);
- .3 oral LD<sub>50</sub>/ATE ≤ 2000 mg/kg (see paragraph 21.7.1.1) (C1 = 1, 2, 3, or 4);
- .4 toxic to mammals by prolonged exposure (see paragraph 21.7.2) (D3 = C, M, R, N, T, or I);
- .5 cause skin sensitization (see paragraph 21.7.3) (D3 = Ss);
- .6 cause respiratory sensitization (see paragraph 21.7.4) (D3 = Sr);
- .7 corrosive to skin (see paragraph 21.7.5) (D1 = 3, 3A, 3B, or 3C);
- .8 with a Water Reactive Index (WRI) of ≥ 1 (see paragraph 21.7.6);
- .9 require inertion, inhibition, stabilization, temperature control or tank environmental control in order to prevent a hazardous reaction (see definitions in paragraph 21.7.10);
- .10 flashpoint < 23°C; and have an explosive/flammability range (expressed as a percentage by volume in air) of ≥ 20%;
- .11 auto-ignition temperature of ≤ 200°C; and
- .12 classified as pollution category X or Y or meeting the criteria for rules 11 to 13 in table 2 in paragraph 21.4.5.2.

### **21.4 Criteria used to assign the minimum carriage requirements for products that meet the minimum safety or pollution criteria to make them subject to chapter 17 of the IBC Code**

#### **21.4.1 Column a – Product name**

21.4.1.1 A standardized chemical name, preferably assigned on the basis of the Chemical Abstracts Service (CAS) or the International Union of Pure and Applied Chemistry (IUPAC) system, shall be used as far as possible. However, where this is unnecessarily complex, then a technically correct and unambiguous alternative name may be used.

#### **21.4.2 Column b – Deleted**

#### **21.4.3 Column c – Pollution category**

21.4.3.1 *Column c* identifies the pollution category assigned to each product in accordance with MARPOL Annex II, based on table 1 below (see MARPOL Annex II, appendix I).

**Table 1 – Guidelines for the categorization of Noxious Liquid Substances**

Rule	A1 Bio- accumulation	A2 Bio- degradation	B1 Acute toxicity	B2 Chronic toxicity	D3 Long-term health effects	E2 Effects on marine wildlife and on benthic habitats	Cat
1			≥ 5				X
2	≥ 4		4				
3		NR	4				
4	≥ 4	NR			CMRTNI <sup>1</sup>		Y
5			4				
6			3				
7			2				
8	≥ 4	NR		Not 0			
9				≥ 1			
10						Fp, F or S If not Inorganic	
11					CMRTNI <sup>1</sup>		
12	Any product not meeting the criteria of rules 1 to 11 and 13						Z
13	All products identified as: ≤ 2 in column A1; R in column A2; blank in column D3; not Fp, F or S (if not organic) in column E2; and 0 (zero) in all other columns of the GESAMP Hazard Profile						OS

#### 21.4.4 Column d – Hazards

21.4.4.1 An "S" is assigned to *column d* if any of the safety criteria described in paragraphs 21.3.1.1 to 21.3.1.11 are met.

21.4.4.2 A "P" is assigned to *column d* if the product meets the criteria for assigning Ship Type 1 to 3 as defined by rules 1 to 14 in the table 2.

#### 21.4.5 Column e – Ship Type

21.4.5.1 Assignment of Ship Types is carried out from both a pollution and safety perspective. The basic criteria for assigning Ship Types from a pollution perspective is carried out based on the GESAMP Hazard Profile, shown in table 2. An explanation of the details in the columns is provided in appendix I of MARPOL Annex II.

21.4.5.2 The following criteria are used to assign the Ship Type:

##### *Ship Type 1:*

- Inhalation LC<sub>50</sub>/ATE ≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC<sub>50</sub> ≥ 20; and/or
- Dermal LD<sub>50</sub>/ATE ≤ 50 mg/kg (C2 = 4); and/or
- WRI = 3; and/or
- Auto-ignition temperature ≤ 65°C; and/or
- Explosive range ≥ 50% v/v in air and the flashpoint < 23°C; and/or
- Rules 1 or 2 of the table 2 shown in 21.4.5.2 (below).

<sup>1</sup> Applies if the D3 rating contains any of these letters or any combination thereof.

*Ship Type 2:*

Inhalation LC<sub>50</sub>/ATE ≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC<sub>50</sub> < 20; or  
 Inhalation LC<sub>50</sub>/ATE > 0.5 mg/L/4h – ≤ 2mg/L/4h (C3 = 3) and SVC/LC<sub>50</sub> ≥ 2 (see note); and/or  
 Dermal LD<sub>50</sub>/ATE > 50 mg/kg – ≤ 200 mg/kg (C2 = 3); and/or  
 WRI = 2; and/or  
 Auto-ignition temperature ≤ 200°C; and/or  
 Explosive range ≥ 40% v/v in air and the flashpoint < 23°C; and/or  
 Any product meeting the criteria of rules 3 to 10 in table 2.

**Note:** Products with a density >1025 kg/m<sup>3</sup> (sinkers) or a water solubility of >50% (dissolvers) that are assigned to Ship Type 2 based on the inhalation toxicity criteria, may be re-assigned to Ship Type 3.

*Ship Type 3:*

Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to chapter 17 of the IBC Code not meeting the requirements for Ship Types 1 or 2 and not meeting rule 15 of table 2 shown in 21.4.5.2 (below).

**Table 2 – Assignment of Ship Types based on the GESAMP Hazard Profile**

Rule	A1	A2	B1	B2	D3	E2	Ship Type
1			≥ 5				1
2	≥ 4	NR	4		CMRTNI <sup>2</sup>		
3	≥ 4	NR			CMRTNI <sup>2</sup>		
4			4				2
5	≥ 4		3				
6		NR	3				
7				≥ 1			
8						Fp	
9					CMRTNI <sup>2</sup>	F	
10			≥ 2			S	3
11	≥ 4						
12		NR					
13			≥ 1				
14	All other category Y Substances						NA
15	All other category Z Substances All "Other Substances" (OS)						

**21.4.6 Column f – Tank type**

21.4.6.1 The tank type is assigned according to the following criteria:

Tank type 1G: Inhalation LC<sub>50</sub>/ATE ≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC<sub>50</sub> ≥ 1000; and/or  
 Dermal LD<sub>50</sub>/ATE ≤ 50 mg/kg (C2 = 4); and/or;  
 WRI=3; and/or  
 Auto-ignition temperature ≤ 65°C; and/or

<sup>2</sup> Applies if the D3 rating contains any of these letters or any combination thereof.

Explosive range  $\geq 40\%$  v/v in air and the flashpoint  $< 23^{\circ}\text{C}$ .  
Based on expert judgement, tank type 1G may be required for specific products (e.g. for molten sulphur, hydrochloric acid).

Tank type 2G: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to chapter 17 or the IBC Code not meeting the requirements for tank type 1G.

#### 21.4.7 *Column g* – Tank vents

21.4.7.1 The tank venting arrangements are assigned according to the following criteria:

Controlled: Inhalation  $\text{LC}_{50}/\text{ATE} \leq 10 \text{ mg/L/4h}$  (C3 = 2, 3 or 4), unless in accordance with 21.7.12; and/or  
Toxic to mammals by prolonged exposure (D3 = C, M, R, T, N, or I); and/or  
Respiratory sensitizer (D3 = Sr, see also paragraph 21.7.4); and/or  
Special carriage control needed; and/or  
Flashpoint  $\leq 60^{\circ}\text{C}$ ; and  
Corrosive to skin ( $\leq 4\text{h}$  exposure). (D1 = 3A, 3B, or 3C).

Open: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to chapter 17 or the IBC Code not meeting the requirements for controlled tank vents.

#### 21.4.8 *Column h* – Tank environmental control

21.4.8.1 The tank environmental control conditions are assigned according to the following criteria:

Inert: Auto-ignition temperature  $\leq 200^{\circ}\text{C}$ ; and/or  
Reacts with air to cause a hazard; and/or  
Explosive range  $\geq 40\%$  and the flashpoint  $< 23^{\circ}\text{C}$ .  
Dry: WRI  $> 1$   
Pad: Only applies to specific products identified on a case by case basis.  
Vent: Only applies to specific products identified on a case by case basis.  
No: Where the above criteria do not apply (inerting requirements may be required under SOLAS).

#### 21.4.9 *Column i* – Electrical equipment

21.4.9.1 If the flashpoint of the product is  $\leq 60^{\circ}\text{C}$  or the product is heated to within  $15^{\circ}\text{C}$  of its flashpoint then the electrical equipment required are assigned according to the following criteria, otherwise "-" is assigned in column *i'* and *i''*:

##### .1 *Column i'* – Temperature class:

T1	Auto-ignition temperature $\geq 450^{\circ}\text{C}$
T2	Auto-ignition temperature $\geq 300^{\circ}\text{C}$ but $< 450^{\circ}\text{C}$
T3	Auto-ignition temperature $\geq 200^{\circ}\text{C}$ but $< 300^{\circ}\text{C}$
T4	Auto-ignition temperature $\geq 135^{\circ}\text{C}$ but $< 200^{\circ}\text{C}$
T5	Auto-ignition temperature $\geq 100^{\circ}\text{C}$ but $< 135^{\circ}\text{C}$
T6	Auto-ignition temperature $\geq 85^{\circ}\text{C}$ but $< 100^{\circ}\text{C}$

.2 **Column i'' – Apparatus group:**

Apparatus group	MESG at 20°C (mm)	MIC ratio product/methane
IIA	> 0.90	> 0.80
IIB	> 0.50 to ≤ 0.90	> 0.45 to ≤ 0.80
IIC	≤ 0.50	≤ 0.45

- .1 The tests shall be carried out in accordance with the procedures described in IEC 60079-1-1:2002 and IEC 79-3.
- .2 For gases and vapours it is sufficient to make only one determination of either the Maximum Experimental Safe Gap (MESG) or the Minimum Igniting Current (MIC) provided that:
- for Group IIA: the MESG > 0.90 mm or the MIC ratio > 0.80  
for Group IIB: the MESG is > 0.50 mm and ≤ 0.90 mm; or the MIC ratio is > 0.50 and ≤ 0.80  
for Group IIC: the MESG is ≤ 0.50 mm or the MIC ratio is ≤ 0.45
- .3 It is necessary to determine both the MESG and the MIC ratio when:
- .1 the MIC ratio determination only has been made, and the ratio is between 0.80 and 0.90, when an MESG determination will be required;
- .2 the MIC ratio determination only has been made, and the ratio is between 0.45 and 0.50, when an MESG determination will be required; or
- .3 the MESG only has been found, and is between 0.50 mm and 0.55 mm, when an MIC ratio determination will be required.

.3 **Column i''' Flashpoint:**

> 60°C	Yes
≤ 60°C	No
Non-flammable	NF

**21.4.10 Column j – Gauging**

21.4.10.1 The gauging equipment is assigned according to the following criteria:

- Closed: Inhalation LC<sub>50</sub>/ATE ≤ 2 mg/L/4h (C3 = 3 or 4), unless in accordance with 21.7.12; and/or  
Dermal LD<sub>50</sub>/ATE ≤ 1000 mg/kg (C2 = 2, 3 or 4); and/or  
Toxic to mammals by prolonged exposure (D3 = C, M, R, T, N, or I); and/or  
Respiratory sensitizer (D3 = Sr, see also paragraph 21.7.4); and/or  
Severely corrosive to skin (≤ 3 min exposure) (D1= 3C).

- Restricted: Inhalation LC<sub>50</sub>/ATE >2 - ≤10 mg/L/4h (C3 = 2), unless in accordance with 21.7.12; and/or  
Special carriage control indicates inerting required; and/or  
Highly corrosive to skin (> 3 min - ≤1h exposure) (D1 = 3B); and/or  
Flashpoint ≤ 60°C.
- Open: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to chapter 17 or the IBC Code not meeting the requirements for closed or restricted gauging.

#### 21.4.11 *Column k – Vapour detection*

21.4.11.1 The vapour detection equipment is assigned according to the following criteria:

- Toxic (T): Inhalation LC<sub>50</sub>/ATE ≤ 10 mg/L/4h (C3 = 2, 3, or 4), unless in accordance with 21.7.12, and/or  
Respiratory sensitizer (D3 = Sr, see also paragraph 21.7.4);  
and/or  
Toxic to mammals by prolonged exposure (D3 = C, M, R, T, N, or I).
- Flammable (F): Flashpoint ≤ 60°C
- No (No): Where the above criteria do not apply

#### 21.4.12 *Column l – Fire protection equipment*

21.4.12.1 The appropriate firefighting media are defined as being appropriate according to the following criteria related to the properties of the product:

- |                                  |    |  |
|----------------------------------|----|--|
| Solubility > 10% (> 100000 mg/L) | A  | Alcohol-resistant foam.  |
| Solubility ≤ 10% (≤ 100000 mg/L) | A  | Alcohol-resistant foam; and/or   |
|                                  | B  | Regular foam.  |
| WRI = 0                          | C  | Water spray (generally used as a coolant and can be used with A and/or B providing that the WRI = 0).                      |
| WRI ≥1                           | D  | Dry chemical.  |
|                                  | No | No requirements under this Code. This applies where a product is identified as NF in column i" (see paragraph 21.4.9.1.3). |

**Note:** all appropriate media shall be listed.

#### 21.4.13 *Column m – Deleted*

#### **21.4.14 Column n – Emergency equipment**

21.4.14.1 The requirement to have personnel emergency equipment on board is identified by "Yes" in *column n* according to the following criteria:

Inhalation  $LC_{50}/ATE \leq 2$  mg/L/4h (C3 = 3 or 4); unless in accordance with 21.7.12;  
and/or  
Respiratory sensitizer (D3 = Sr, see also paragraph 21.7.4); and/or  
Severely corrosive to skin ( $\leq 3$  min exposure) (D1 = 3C); and/or  
WRI = 2

No: indicates that the above criteria do not apply.

#### **21.5 Column o – Criteria for special requirements in chapter 15**

21.5.1 The assignment of special requirements in *column o* shall normally follow clear criteria based on the data supplied in the reporting form. Where it is considered appropriate to deviate from such criteria, this shall be clearly documented in such a way that it can easily be retrieved on demand.

21.5.2 The criteria for making reference to the special requirements identified in chapters 15 and 16 are defined below with comments where relevant.

##### **21.5.3 Paragraphs 15.2 to 15.10 and 15.20**

21.5.3.1 Paragraphs 15.2 to 15.10 and 15.20 identify specific products by name with special carriage requirements that cannot be easily accommodated in any other way.

##### **21.5.4 Paragraph 15.11 – Acids**

21.5.4.1 Paragraph 15.11 applies to all acids unless they:

- .1 are organic acids – when only paragraphs 15.11.2 to 15.11.4 and paragraphs 15.11.6 to 15.11.8 apply; or
- .2 do not evolve hydrogen – when paragraph 15.11.5 need not apply.

##### **21.5.5 Paragraph 15.12 – Toxic products**

21.5.5.1 All of paragraph 15.12 is added to *column o* according to the following criteria:

Inhalation  $LC_{50}/ATE \leq 2$  mg/L/4h (C3 = 3 or 4), unless in accordance with 21.7.12;  
and/or  
the product is a respiratory sensitizer (D3 = Sr, see also paragraph 21.7.4); and/or  
the product is toxic to mammals by prolonged exposure (D3 = C, M, R, T, N, or I).

21.5.5.2 Paragraphs 15.12.3 and 15.12.4 are added to *column o* according to the following criterion:

Inhalation  $LC_{50}/ATE > 2 - \leq 10$  mg/L/4h (C3 = 2), unless in accordance with 21.7.12.

21.5.5.3 Paragraph 15.12.3.2 is added to *column o* according to the following criteria:

Dermal  $LD_{50}/ATE \leq 1000$  mg/kg (C2 = 2, 3, or 4); and/or  
Oral  $LD_{50}/ATE \leq 300$  mg/kg (C1 = 2, 3, or 4).

### **21.5.6 Paragraph 15.13 – Cargoes protected by additives**

21.5.6.1 The requirement to assign paragraph 15.13 to *column o* is based on the information related to the product's tendency to polymerize, decompose, oxidize or undergo other chemical changes which may cause a hazard under normal carriage conditions, but which would be prevented by the addition of appropriate additives.

### **21.5.7 Paragraph 15.14 – Cargoes with a vapour pressure greater than atmospheric at 37.8°C**

21.5.7.1 The requirement to assign paragraph 15.14 to *column o* is based on the following criterion:

Boiling point  $\leq 37.8^{\circ}\text{C}$

### **21.5.8 Paragraph 15.16 – Cargo contamination**

21.5.8.1 Paragraph 15.16.1 is deleted.

21.5.8.2 Paragraph 15.16.2 is added to *column o* according to the following criterion:

WRI > 1

### **21.5.9 Paragraph 15.17 – Increased ventilation requirements**

21.5.9.1 Paragraph 15.17 shall be added to *column o* according to the following criteria:

Inhalation  $\text{LC}_{50}/\text{ATE} > 0.5 - \leq 2 \text{ mg/L/4h}$  (C3 = 3), unless in accordance with 21.7.12; and/or  
Respiratory sensitizer (D3 = Sr, see also paragraph 21.7.4); and/or  
Toxic to mammals by prolonged exposure (D3 = C, M, R, T, N, or I); and/or  
Highly to severely corrosive to skin ( $\leq 1\text{h}$  exposure time) (D1 = 3B or 3C).

### **21.5.10 Paragraph 15.18 – Special cargo pump-room requirements**

21.5.10.1 Paragraph 15.18 shall be added to *column o* according to the following criterion:  
Inhalation  $\text{LC}_{50}/\text{ATE} \leq 0.5 \text{ mg/L/4h}$  (C3 = 4), unless in accordance with 21.7.12

### **21.5.11 Paragraph 15.19 – Overflow control**

21.5.11.1 Paragraph 15.19 shall be added to *column o* according to the following criteria:

Inhalation  $\text{LC}_{50}/\text{ATE} \leq 2 \text{ mg/L/4h}$  (C3 = 3 or 4), unless in accordance with 21.7.12; and/or  
Dermal  $\text{LD}_{50}/\text{ATE} \leq 1000 \text{ mg/kg}$  (C2 = 2, 3, or 4); and/or  
Oral  $\text{LD}_{50}/\text{ATE} \leq 300 \text{ mg/kg}$  (C1 = 2, 3, or 4); and/or  
Respiratory sensitizer (D3 = Sr, see also paragraph 21.7.4); and/or  
Severely corrosive to skin ( $\leq 3 \text{ min}$  exposure) (D1 = 3C); and/or  
Auto-ignition temperature  $\leq 200^{\circ}\text{C}$ ; and/or  
Explosive range  $\geq 40\% \text{ v/v}$  in air and flashpoint  $< 23^{\circ}\text{C}$ ; and/or  
Classified as Ship Type 1 on pollution grounds.



21.5.11.2 Only paragraph 15.19.6 shall apply if the product has any of the following properties:

Inhalation  $LC_{50}/ATE > 2 \text{ mg/L/4h} - \leq 10 \text{ mg/L/4h}$  ( $C3 = 2$ ), unless in accordance with 21.7.12; and/or  
Dermal  $LD_{50}/ATE > 1000 \text{ mg/kg} - \leq 2000 \text{ mg/kg}$  ( $C2 = 1$ ); and/or  
Oral  $LD_{50}/ATE > 300 \text{ mg/kg} - \leq 2000 \text{ mg/kg}$  ( $C1 = 1$ ); and/or  
Skin sensitizer ( $D3=Ss$ ); and/or  
Highly corrosive to skin ( $> 3 \text{ min} - \leq 1 \text{ h}$  exposure) ( $D1 = 3B$ ); and/or  
Flashpoint  $\leq 60^{\circ}\text{C}$ ; and/or  
Classified as Ship Type 2 on pollution grounds; and/or  
Pollution category X or Y.

### **21.5.12 Paragraph 15.21 –Temperature sensors**

21.5.12.1 Paragraph 15.21 is added to *column o* according to the heat sensitivity of the product. This requirement is related to pumps in cargo pump-rooms only.

### **21.6 Column o – Criteria for special requirements in chapter 16**

#### **21.6.1 Paragraphs 16.1 to 16.2.5 and 16.3 to 16.5**

21.6.1.1 These apply to all cargoes and so are not referenced specifically in *column o*.

#### **21.6.2 Paragraph 16.2.6**

21.6.2.1 Paragraph 16.2.6 is added to *column o* for products which meet the following criteria: Pollution Category X or Y and viscosity  $\geq 50 \text{ mPa}\cdot\text{s}$  at  $20^{\circ}\text{C}$ .

#### **21.6.3 Paragraph 16.2.9**

21.6.3.1 Paragraph 16.2.9 is added to *column o* for products which meet the following criterion: Melting point  $\geq 0^{\circ}\text{C}$ .

#### **21.6.4 Paragraph 16.6 – Cargo not to be exposed to excessive heat**

21.6.4.1 Paragraphs 16.6.2 to 16.6.4 are added to *column o* for products which are identified as requiring temperature control during carriage.

#### **21.6.5 Paragraph 16.2.7 – Persistent floaters**

Paragraph 16.2.7 is added to *column o* for products which meet the following criteria: Pollution Category Y that are persistent floaters ( $E2 = Fp$ ) with a viscosity greater than or equal to  $50 \text{ mPa}\cdot\text{s}$  at  $20^{\circ}\text{C}$  and/or with a melting point greater than or equal to  $0^{\circ}\text{C}$ .

### **21.7 Definitions**

#### **21.7.1 Acute mammalian toxicity**

$LC_{50}$  is the concentration in air,  $LD_{50}$  is the amount (dose) of test substance, which causes mortality to 50% of a test species. ATE refers to a dose (concentration) range or extrapolated dose (concentration) leading to lethal effects in mammals, equivalent to an  $LC_{50}$  or  $LD_{50}$ .

21.7.1.1 Acutely toxic if swallowed

Oral toxicity (LD <sub>50</sub> /ATE)		GESAMP Hazard Profile Rating C1
Hazard Level	mg/kg	
High	≤ 5	4
Moderately High	> 5 - ≤ 50	3
Moderate	> 50 - ≤ 300	2
Slight	> 300 - ≤ 2000	1
Negligible	> 2000	0

21.7.1.2 Acutely toxic in contact with skin

Dermal toxicity (LD <sub>50</sub> /ATE)		GESAMP Hazard Profile Rating C2
Hazard Level	mg/kg	
High	≤ 50	4
Moderately high	> 50 - ≤ 200	3
Moderate	> 200 - ≤ 1000	2
Slight	> 1000 - ≤ 2000	1
Negligible	> 2000	0

21.7.1.3 Acutely toxic by inhalation

All inhalation toxicity data are assumed to be for vapours and not mists or sprays, unless otherwise indicated.

Inhalation toxicity (LC <sub>50</sub> /ATE)		GESAMP Hazard Profile Rating C3
Hazard level	mg/L/4h	
High	≤ 0.5	4
Moderately high	> 0.5 - ≤ 2	3
Moderate	> 2 - ≤ 10	2
Slight	> 10 - ≤ 20	1
Negligible	> 20	0

**21.7.2 Toxic to mammals by prolonged exposure**

21.7.2.1 A product is classified as *toxic to mammals by prolonged exposure* if it meets any of the following criteria: it is known to be, or suspected of being carcinogenic, mutagenic, reprotoxic, neurotoxic, immunotoxic or exposure below the lethal dose is known to cause Specific Target Organ Toxicity.

21.7.2.2 Such effects may be identified from the GESAMP Hazard Profile of the product (D3 = C, M, R, T, N, or I) or other recognized sources of such information.

**21.7.3 Skin sensitization**

21.7.3.1 A product is classified as a *skin sensitizer*:

- .1 if there is evidence in humans that the substance can induce sensitization by skin contact in a substantial number of persons; or
- .2 where there are positive results from an appropriate test.

21.7.3.2 Such effects are identified in the GESAMP Hazard Profile for the product (D3 = Ss).

#### 21.7.4 Respiratory sensitization

21.7.4.1 A product is classified as a *respiratory sensitizer*:

- .1 if there is evidence in humans that the substance can induce specific respiratory hypersensitivity; and/or
- .2 where there are positive results from an appropriate test; and/or
- .3 where the product does not have a GESAMP Hazard Profile and is identified as a skin sensitizer and there is no evidence to show that it is not a respiratory sensitizer.

21.7.4.2 Such effects are identified in the GESAMP Hazard Profile for the product (D3 = Sr) or other recognized sources of such information, if no profile exists.

#### 21.7.5 Corrosive to skin<sup>3</sup>

Hazard Level	Exposure time to cause full thickness necrosis of skin	GESAMP Hazard Profile Rating D1
Severely corrosive to skin	≤ 3 min	3C
Highly corrosive to skin	> 3 min - ≤ 1h	3B
Moderately corrosive to skin	> 1h - ≤ 4h	3A

**Note:** A rating of 3 or (3) in the D1 column of the GESAMP Hazard Profile without any additional letter notation (A, B or C), means that the severity of corrosivity has not been established. For such cases, a rating of 3 or (3) is understood to be equivalent to a rating of 3B for the purpose of assigning carriage requirements.

#### 21.7.6 Water reactive substances

21.7.6.1 These are classified as follows:

Water Reactive Index (WRI)	Definition
3	Any chemical which is extremely reactive with water and produces large quantities of flammable, toxic or corrosive gas or aerosol
2	Any chemical which, in contact with water, may produce a toxic, flammable or corrosive gas or aerosol
1	Any chemical which, in contact with water, may generate heat or produce a non-toxic, non-flammable or non-corrosive gas
0	Any chemical which, in contact with water, would not undergo a reaction to justify a value of 1, 2 or 3

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<sup>3</sup> Products that are corrosive to skin are also deemed to be corrosive by inhalation.

### **21.7.7 Air reactive substances**

21.7.7.1 Air reactive substances are products that react with air to cause a potentially hazardous situation, e.g. the formation of peroxides that may cause an explosive reaction.

### **21.7.8 Electrical apparatus – Temperature class**

(for products which either have a flashpoint of  $\leq 60^{\circ}\text{C}$  or are heated to within  $15^{\circ}\text{C}$  of their flashpoint)

21.7.8.1 The temperature class is defined by the International Electrotechnical Commission (IEC) as:

"The highest temperature attained under practical conditions of operation within the rating of the apparatus (and recognized overloads, if any, associated therewith) by any part of any surface, the exposure of which to an explosive atmosphere may involve a risk."

21.7.8.2 The temperature class of the electrical apparatus is assigned by selecting the Maximum Surface Temperature which is closest to, but less than, the product's auto-ignition temperature (see 21.4.9.1.1).

### **21.7.9 Electrical apparatus – Apparatus group**

(for products with a flashpoint of  $\leq 60^{\circ}\text{C}$ )

21.7.9.1 This refers to intrinsically safe and associated electrical apparatus for explosive gas atmospheres which the IEC divide into the following groups:

Group I: for mines susceptible to firedamp (not used by IMO); and

Group II: for applications in other industries – further sub-divided according to its Maximum Experimental Safe Gap (MESG) and/or the Minimum Igniting Current (MIC) of the gas/vapour into groups IIA, IIB and IIC.

21.7.9.2 This property cannot be determined from other data associated with the product; it has to be either measured or assigned by assimilation with related products in a homologous series.

### **21.7.10 Special carriage control conditions**

21.7.10.1 Special carriage control conditions refer to specific measures that need to be taken in order to prevent a hazardous reaction. They include:

- .1 *Inhibition*: the addition of a compound (usually organic) that retards or stops an undesired chemical reaction such as corrosion, oxidation or polymerization;
- .2 *Stabilization*: the addition of a substance (stabilizer) that tends to keep a compound, mixture or solution from changing its form or chemical nature. Such stabilizers may retard a reaction rate, preserve a chemical equilibrium, act as antioxidants, keep pigments and other components in emulsion form or prevent the particles in colloidal suspension from precipitating;
- .3 *Inertion*: the addition of a gas (usually nitrogen) in the ullage space of a tank that prevents the formation of a flammable cargo/air mixture;

- .4 *Temperature control*: the maintenance of a specific temperature range for the cargo in order to prevent a hazardous reaction or to keep the viscosity low enough to allow the product to be pumped; and
- .5 *Padding and venting*: only applies to specific products identified on a case by case basis.

### 21.7.11 Flammable cargoes

21.7.11.1 A cargo is defined as flammable according to the following criteria:

IBC Code descriptor	Flashpoint (degrees Centigrade)
Highly flammable	< 23
Flammable	≤ 60 but ≥ 23

21.7.11.2 It should be noted that flashpoints of mixtures and aqueous solutions need to be measured unless all of the components are non-flammable.

21.7.11.3 It should be noted that the carriage of bulk liquid cargoes that have a flashpoint of ≤ 60°C are subject to other SOLAS regulations.

### 21.7.12 Application of the SVC/LC<sub>50</sub> ratio method

21.7.12.1 If the vapour pressure and the molecular weight of a substance are known, an estimate of the maximum vapour concentration in a closed compartment (e.g. a tank) can be calculated. This is called the Saturated Vapour Concentration (SVC).

21.7.12.2 The hazard quotient SVC/LC<sub>50</sub><sup>4</sup> is a substance specific value for the velocity of a vapour for achieving a hazardous concentration when emerging from a liquid source (e.g. leak, spillage or tank ventilation), and can be used in the assignment of specific carriage requirements related to inhalation toxicity.

21.7.12.3 If a solid substance is transported in an aqueous solution, the vapour pressure<sup>5</sup> of this solid rather than that of water may be used in the calculation of the SVC/LC<sub>50</sub> ratio.

#### 21.7.12.4 Application of the SVC/LC<sub>50</sub> ratio for assigning Ship Type and Tank type

21.7.12.4.1 For the assignment of Ship Type and tank type, as set out in paragraphs 21.4.5 and 21.4.6, the application of the SVC/LC<sub>50</sub> ratio method is optional. Should this method be used, the vapour pressure at 20°C shall be used when calculating the SVC/LC<sub>50</sub> ratio.

21.7.12.4.2 The SVC mg/L of a substance should be calculated as follows:

$$SVC(mg / L) = \left( \frac{\text{Vapour pressure @ } 20^{\circ} C (Pa)}{101300 (Pa)} \times 10^6 \right) \times \frac{M_w \left( \frac{g}{mol} \right)}{24(L/mol) \times 1000}$$

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<sup>4</sup> ATE values can be considered as equivalent to LC<sub>50</sub> values. See paragraph 21.7.1.

<sup>5</sup> If this data is not available, an estimate may be used.

where  $M_w$  is the molecular weight of the substance.

21.7.12.4.3 The SVC/LC<sub>50</sub> ratio should be calculated as follows:

$$SVC/LC_{50} = \frac{SVC (mg/L)}{LC_{50} mg/L/4h}$$

### 21.7.12.5 Application of the SVC/LC<sub>50</sub> ratio for assigning carriage requirements

21.7.12.5.1 For the carriage requirements listed in 21.7.12.5.5, the application of the SVC/LC<sub>50</sub> ratio method is optional. If the SVC/LC<sub>50</sub> ratio method is used in the assignment of these carriage requirements, the vapour pressure at 40°C shall be used when calculating the SVC/LC<sub>50</sub> ratio. If the carriage temperature is higher than 40°C, then the SVC/LC<sub>50</sub> ratio should be calculated at that temperature.

21.7.12.5.2 The SVC (mg/l) of a substance should be calculated as follows:

$$SVC(mg/L) = \left( \frac{\text{Vapour pressure@ } 40^{\circ} C (Pa)}{101300(Pa)} \times 10^6 \right) \times \frac{M_w \left( \frac{g}{mol} \right)}{26 (L/mol) \times 1000}$$

where  $M_w$  is the molecular weight of the substance.

21.7.12.5.3 The SVC/LC<sub>50</sub> ratio should be calculated as follows:

$$SVC/LC_{50} = \frac{SVC (mg/L)}{LC_{50} mg/L/4h}$$

21.7.12.5.4 The SVC (mg/L) formula described in 21.7.12.5.2 is standardized for calculations at 40°C. When using the vapour pressure at higher temperatures in the calculations, the formula must be amended accordingly.

21.7.12.5.5 For the following carriage requirements, the SVC/LC<sub>50</sub> ratio method, calculated at 40°C or higher, may be used as an alternative to the acute inhalation toxicity criteria given in paragraphs 21.4 and 21.5:

#### .1 **Column g – Tank vents**

Assignment of controlled venting is not required based on the inhalation hazard only, if:

Inhalation LC<sub>50</sub>/ATE ≤ 10 mg/L/4h (C3 = 2, 3, or 4) and SVC/LC<sub>50</sub> < 0.2

#### .2 **Column j – Gauging**

Closed gauging is not required based on the inhalation hazard only, if:

Inhalation LC<sub>50</sub>/ATE ≤ 2 mg/L/4h (C3 = 3 or 4) and SVC/LC<sub>50</sub> < 0.2 but restricted gauging is required.

Restricted gauging is not required based on the inhalation hazard only, if:

Inhalation  $LC_{50}/ATE > 2 - \leq 10$  mg/L/4h (C3 = 2) and  $SVC/LC_{50} < 0.2$

.3 **Column k – Vapour detection**

Assignment of toxic vapour detection is not required based on the inhalation hazard only, if:

Inhalation  $LC_{50}/ATE \leq 10$  mg/L/4h (C3 = 2, 3, or 4) and  $SVC/LC_{50} < 0.2$

.4 **Column n – Emergency Equipment**

Inhalation  $LC_{50}/ATE \leq 2$  mg/L/4h (C3 = 3 or 4) and  $SVC/LC_{50} < 0.2$

.5 **Column o – Special requirements in chapter 15**

15.12.1 and 15.12.2 are not required based on the inhalation hazard only, if:

Inhalation  $LC_{50}/ATE \leq 2$  mg/L/4h (C3 = 3 or 4) and  $SVC/LC_{50} < 0.2$

15.12.3 and 15.12.4 are not required based on the inhalation hazard only, if:

Inhalation  $LC_{50}/ATE > 2 - \leq 10$  mg/L/4h (C3 = 2) and  $SVC/LC_{50} < 0.2$

15.17 is not required based on the inhalation hazard only, if:

Inhalation  $LC_{50}/ATE \leq 0.5$  mg/L/4h (C3 = 4) and  $SVC/LC_{50} < 0.2$

15.18 is not required based on the inhalation hazard only if:

Inhalation  $LC_{50}/ATE \leq 0.5$  mg/L/4h (C3 = 4) and  $SVC/LC_{50} < 0.2$

15.19 is not required based on the inhalation hazard only, if:

Inhalation  $LC_{50}/ATE \leq 2$  mg/L/4h (C3 = 3 or 4) and  $SVC/LC_{50} < 0.2$ , but 15.19.6 applies

15.19.6 is not required based on the inhalation hazard only, if:

Inhalation  $LC_{50}/ATE > 2 - \leq 10$  mg/L/4h (C3 = 2) and  $SVC/LC_{50} < 0.2$ "

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**ANNEX 12**

**RESOLUTION MSC.465(101)  
(adopted on 14 June 2019)**

**RECOMMENDED INTERIM MEASURES TO ENHANCE THE SAFETY OF SHIPS  
RELATING TO THE USE OF OIL FUEL**

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO resolution A.886(21), by which the Assembly resolved that the function of adopting performance standards and technical specifications, as well as amendments thereto, shall be performed by the Maritime Safety Committee and/or the Marine Environment Protection Committee, as appropriate, on behalf of the Organization,

RECALLING FURTHER resolution A.947(23), by which the Assembly acknowledged the need for increased focus on human-related activities in the safe operation of ships, and the need to achieve and maintain high standards of safety and environmental protection for the purpose of significantly reducing maritime casualties,

NOTING that, while SOLAS regulation II-2/4.2.1 contains provisions related specifically to the minimum flashpoint requirement for marine oil fuel, other aspects relating to fuel oil safety are specified in regulation 18 of MARPOL Annex VI,

NOTING ALSO that regulation 18.9.6 of MARPOL Annex VI provides that Parties to MARPOL Annex VI undertake to inform the Organization, for transmission to Parties and Member States of the Organization, of all cases where fuel oil suppliers have failed to meet the requirements specified in regulations 14 or 18 of the Annex,

NOTING FURTHER that regulation 18.9.4 of MARPOL Annex VI provides that Parties to MARPOL Annex VI undertake to take action as appropriate against fuel oil suppliers that have been found to deliver fuel oil that does not comply with that stated on the bunker delivery note (BDN) and that Appendix V of MARPOL Annex VI contains the minimum mandatory information to be included in the BDN,

MINDFUL that flashpoint is not part of the minimum mandatory information to be included in the BDN,

MINDFUL ALSO that SOLAS regulation VI/5-1 requires that ships are provided with a material safety data sheet (MSDS) prior to the bunkering of oil fuel, where the flashpoint of the oil fuel should be reported (resolution MSC.286(86)),

RECALLING MSC-MEPC.5/Circ.15 on *Delivery of compliant fuel oil by suppliers*, approved by the Marine Environment Protection Committee, at its seventy-fourth session, and the Maritime Safety Committee, at its 101st session,

RECOGNIZING the overall objectives of enhancing the safety of ships relating to use of oil fuel and ensuring that only safe and compliant oil fuel is delivered to ships,



RECOGNIZING ALSO the need to further consider oil fuel safety issues, not limited to the flashpoint, and the need to enhance the Global Integrated Shipping Information System (GISIS) to facilitate reporting of oil fuel safety issues,

HAVING CONSIDERED interim measures to enhance the safety of ships relating to the use of oil fuel at its 101st session,

RECOMMENDS SOLAS Contracting Governments to:

1 INFORM the Organization, for transmission to Parties and Member States of the Organization, of all confirmed cases where oil fuel suppliers delivered oil fuel failing to meet the requirements specified in SOLAS regulation II-2/4.2.1, taking into account regulation 18.9.6 of MARPOL Annex VI;

2 TAKE ACTION as appropriate against oil fuel suppliers in confirmed cases of deliveries of oil fuel that does not comply with the requirements specified in SOLAS regulation II-2/4.2.1, taking into account regulation 18.9.4 of MARPOL Annex VI;

3 ENCOURAGE the widest possible application of the latest edition of relevant industry standards\* and guidance to enhance the safety of ships related to supply and use of oil fuel;

4 INFORM the Organization, for transmission to Parties and Member States of the Organization, of confirmed cases where oil fuel suppliers had delivered fuel that jeopardized the safety of ships or personnel; or adversely affected the performance of the machinery.

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\* ISO 8217:2017 and any subsequent revision thereof, and ISO/PAS 23263 (currently under development).

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## ANNEX 25

### DRAFT AMENDMENTS TO SOLAS CHAPTER II-1<sup>1</sup>

#### Chapter II-1 Construction – Structure, subdivision and stability, machinery and electrical installations

##### PART A GENERAL

#### Regulation 1 *Application*

1 Existing regulation 1.3 is replaced with the following:

"1.3 For the purpose of this chapter:

.1 the expression ships constructed means ships the keels of which are laid or which are at a similar stage of construction;

~~.2~~ the expression ships constructed on or after 1 January 2024 means:

~~.1~~ for which the building contract is placed on or after 1 January 2024;  
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 2024;  
or

~~.3~~ the delivery of which is on or after 1 January 2028.

~~.2 3~~ the expression all ships means ships constructed before, on or after 1 January 2009;

~~.3 4~~ a cargo ship, whenever built, which is converted to a passenger ship shall be treated as a passenger ship constructed on the date on which such a conversion commences."

##### Part A-1 Structure of ships

#### Regulation II-1/3-8 – Towing and mooring equipment

2 Existing regulation 3-8 is replaced with the following:

##### "Towing and mooring equipment

1 Paragraphs 4 to 6 of this regulation apply to ships constructed on or after 1 January 2007.

<sup>1</sup> Deleted text is shown in strike-through and grey shading and new text is shown in grey shading

2 Paragraphs 7 and 8 of this regulation only apply to ships:

- .1 for which the building contract is placed on or after [date of entry into force]; or
- .2 in the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after [date of entry into force plus six months]; or
- .3 the delivery of which is on or after [date of entry into force plus three years].

43 This regulation applies to ships constructed on or after 1 January 2007, but does not apply to emergency towing arrangements provided in accordance with regulation 3-4.

24 Ships shall be provided with arrangements, equipment and fittings of sufficient safe working load to enable the safe conduct of all towing and mooring operations associated with the normal operation of the ship.

35 Arrangements, equipment and fittings provided in accordance with paragraph 24 above shall meet the appropriate requirements of the Administration or an organization recognized by the Administration under regulation I/6.\*

46 Each fitting or item of equipment provided under this regulation shall be clearly marked with any restrictions limitation associated with its safe operation, taking into account the strength of its attachment to the supporting ship's structure and its attachment to it.

7 For ships of 3,000 gross tonnage and above, the mooring arrangement shall be designed, and the mooring equipment including lines shall be selected, in order to ensure occupational safety and safe mooring of the ship, based on the guidelines developed by the Organization.† Ship-specific information shall be provided and kept on board.‡

8 Ships of less than 3,000 gross tonnage should comply with the requirement in paragraph 7 above as far as reasonably practicable, or with applicable national standards of the Administration.

9 For all ships, mooring equipment including lines shall be inspected and maintained in suitable condition for their intended purposes.§

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\* Refer to the *Guidance on shipboard towing and mooring equipment* (MSC.1/Circ.1175) for ships constructed on or after 1 January 2007 but before [date of entry into force] and the *Guidance on shipboard towing and mooring equipment* (MSC.1/Circ.1175/Rev.1) for the ships constructed on or after [date of entry into force].

† Refer to the *Guidelines on the design of mooring arrangements and the selection of appropriate mooring equipment and fittings for safe mooring* (MSC.1/Circ.[...]).

‡ Refer to *Towing and mooring arrangement plan* (MSC.1/Circ.[...]) N.B. insert reference to *Guidelines on the design of mooring arrangements and the selection of appropriate mooring equipment and fittings for safe mooring*.

§ [Refer to the *Guidelines for inspection and maintenance of mooring equipment including lines* (MSC.1/Circ.[...]).

## Part B-1 Stability

3 Existing regulation 7-2 is amended as follows:

### "Regulation 7-2

*Calculation of the factor  $s_i$*

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:

- .1 for cargo ships, the lower edge of openings through which progressive flooding may take place and such flooding is not accounted for in the calculation of factor  $s_i$ . Such openings shall include air pipes, ventilators and openings which are closed by means of weathertight doors or hatch covers; ~~and~~
- .2 any part of the bulkhead deck in passenger ships considered a horizontal evacuation route for compliance with chapter II-2; ~~and~~
- .3 for passenger ships subject to the provisions of regulation 1.1.1.1 and constructed before 1 January 2024, the lower edge of openings through which progressive flooding may take place and such flooding is not accounted for in the calculation of factor  $s_i$ . Such openings shall include air pipes, ventilators and openings which are closed by means of weathertight doors or hatch covers.

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;
- .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; ~~and~~
- .4 for passenger ships constructed on or after 1 January 2024, immersion of the lower edge of openings through which progressive flooding may take place and such flooding is not accounted for in the calculation of factor  $s_i$ . Such openings shall include air pipes, ventilators and openings which are closed by means of weathertight doors or hatch covers.

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, side scuttles of the non-opening type as well as watertight access doors and watertight hatch covers required to be kept closed ~~at sea~~ during navigation in accordance with regulations 22 to 24 need not be considered."

**Part B-2**  
**Subdivision, watertight and weathertight integrity**

4 Existing regulation 12 is amended as follows:

**"Regulation 12**

*Peak and machinery space bulkheads, shaft tunnels, etc.*

6.1 For ships subject to the provisions of regulation 1.1.1.1 and constructed before 1 January 2024, ~~Except as provided in paragraph 6.23,~~ 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 For ships constructed on or after 1 January 2024, except as provided in paragraph 6.3, 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 remotely controlled valve capable of being operated from above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The valve shall be normally closed. If the remote control system should fail during operation of the valve, the valve shall close automatically or be capable of being closed manually from a position above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The valve shall be located at the collision bulkhead on either the forward or aft side, provided the space on the aft side is not a cargo space. The valve shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable."

*Note: Re-number subsequent paragraphs*

5 Existing regulation 13 is amended as follows:

**"Regulation 13**

*Openings in watertight ~~bulkheads~~ boundaries below the bulkhead deck in passenger ships*

1 The number of openings in watertight ~~bulkheads~~ boundaries shall be reduced to the minimum compatible with the design and proper working of the ship, satisfactory means shall be provided for closing these openings.

2.1 Where pipes, scuppers, electric cables, etc., are carried through watertight bulkheads boundaries, arrangements shall be made to ensure the watertight integrity of the bulkheads boundaries.

2.2 Valves not forming part of a piping system shall not be permitted in watertight bulkheads boundaries.

2.3 Lead or other heat sensitive materials shall not be used in systems which penetrate watertight bulkheads boundaries, where deterioration of such systems in the event of fire would impair the watertight integrity of the bulkheads boundaries.

3 No doors, manholes or access openings are permitted in watertight transverse bulkheads dividing a cargo space from an adjoining cargo space, except as provided in paragraph 98.1 and in regulation 14.

4 Subject to paragraph 109, not more than one door, apart from the doors to shaft tunnels, may be fitted in each watertight bulkhead within spaces containing the main and auxiliary propulsion machinery including boilers serving the needs of propulsion. Where two or more shafts are fitted, the tunnels shall be connected by an intercommunicating passage. There shall be only one door between the machinery space and the tunnel spaces where two shafts are fitted and only two doors where there are more than two shafts. All these doors shall be of the sliding type and shall be so located as to have their sills as high as practicable. The hand gear for operating these doors from above the bulkhead deck shall be situated outside the spaces containing the machinery.

5.1 Watertight doors, except as provided in paragraph 98.1 or regulation 14, shall be power-operated sliding doors complying with the requirements of paragraph 76 ~~capable of being closed simultaneously from the central operating console at the navigation bridge in not more than 60 s with the ship in the upright position.~~

5.2 The means of operation whether by power or by hand of any power-operated sliding watertight door shall be capable of closing the door with the ship listed to 15° either way. Consideration shall also be given to the forces which may act on either side of the door as may be experienced when water is flowing through the opening applying a static head equivalent to a water height of at least 1 m above the sill on the centreline of the door.

5.3 Watertight door controls, including hydraulic piping and electric cables, shall be kept as close as practicable to the bulkhead in which the doors are fitted, in order to minimize the likelihood of them being involved in any damage which the ship may sustain. The positioning of watertight doors and their controls shall be such that if the ship sustains damage within one fifth of the breadth of the ship, as defined in regulation 2, such distance being measured at right angles to the centreline at the level of the deepest subdivision draught, the operation of the watertight doors clear of the damaged portion of the ship is not impaired.

~~6 All power-operated sliding watertight doors shall be provided with means of indication which will show at all remote operating positions whether the doors are open or closed. Remote operating positions shall only be at the navigation bridge as required by paragraph 7.1.5 and at the location where hand operation above the bulkhead deck is required by paragraph 7.1.4.~~

- 76.1 Each power-operated sliding watertight door:
- .1 shall have a vertical or horizontal motion;
  - .2 shall, subject to paragraph 409, be normally limited to a maximum clear opening width of 1.2 m. The Administration may permit larger doors only to the extent considered necessary for the effective operation of the ship provided that other safety measures, including the following, are taken into consideration:
    - .2.1 special consideration shall be given to the strength of the door and its closing appliances in order to prevent leakages; and
    - .2.2 the door shall be located inboard the damage zone *B/5*;
  - .3 shall be fitted with the necessary equipment to open and close the door using electric power, hydraulic power or any other form of power that is acceptable to the Administration;
  - .4 shall be provided with an individual hand-operated mechanism. It shall be possible to open and close the door by hand at the door itself from either side, and in addition, close the door from an accessible position above the bulkhead deck with an all-round crank motion or some other movement providing the same degree of safety acceptable to the Administration. Direction of rotation or other movement is to be clearly indicated at all operating positions. The time necessary for the complete closure of the door, when operating by hand gear, shall not exceed 90 s with the ship in the upright position. Visual indicators to show whether the door is open or closed shall be provided at the accessible position above the bulkhead deck.
  - .5 shall be provided with controls for opening and closing the door by power from both sides of the door and also for closing the door by power from the central operating console(s) at the navigation bridge required by paragraph 7.1;
  - .6 shall be provided with an audible alarm, distinct from any other alarm in the area, which will sound whenever the door is closed remotely by power and which shall sound for at least 5 s but no more than 10 s before the door begins to move and shall continue sounding until the door is completely closed. In the case of remote hand operation it is sufficient for the audible alarm to sound only when the door is moving. Additionally, in passenger areas and areas of high ambient noise the Administration may require the audible alarm to be supplemented by an intermittent visual signal at the door; and
  - .7 shall have an approximately uniform rate of closure under power. The closure time, from the time the door begins to move to the time it reaches the completely closed position, shall in no case be less than 20 s or more than 40 s with the ship in the upright position.

76.2 The electrical power required for power-operated sliding watertight doors shall be supplied from the emergency switchboard either directly or by a dedicated distribution board situated above the bulkhead deck. The associated control, indication and alarm circuits shall be supplied from the emergency switchboard either directly or by a dedicated distribution board situated above the bulkhead deck and be capable of being automatically supplied by the transitional source of emergency electrical power required by regulation 42.3.1.3 in the event of failure of either the main or emergency source of electrical power.

76.3 Power-operated sliding watertight doors shall have either:

- .1 a centralized hydraulic system with two independent power sources each consisting of a motor and pump capable of simultaneously closing all doors. In addition, there shall be for the whole installation hydraulic accumulators of sufficient capacity to operate all the doors at least three times, i.e. closed-open-closed, against an adverse list of 15°. This operating cycle shall be capable of being carried out when the accumulator is at the pump cut-in pressure. The fluid used shall be chosen considering the temperatures liable to be encountered by the installation during its service. The power-operating system shall be designed to minimize the possibility of having a single failure in the hydraulic piping adversely affect the operation of more than one door. The hydraulic system shall be provided with a low-level alarm for hydraulic fluid reservoirs serving the power-operated system and a low gas pressure alarm or other effective means of monitoring loss of stored energy in hydraulic accumulators. These alarms are to be audible and visual and shall be situated on the central operating console(s) ~~at the navigation bridge~~ required by paragraph 7.1; or
- .2 an independent hydraulic system for each door with each power source consisting of a motor and pump capable of opening and closing the door. In addition, there shall be a hydraulic accumulator of sufficient capacity to operate the door at least three times, i.e. closed-open-closed, against an adverse list of 15°. This operating cycle shall be capable of being carried out when the accumulator is at the pump cut-in pressure. The fluid used shall be chosen considering the temperatures liable to be encountered by the installation during its service. A low gas pressure group alarm or other effective means of monitoring loss of stored energy in hydraulic accumulators shall be provided at the central operating console(s) ~~on the navigation bridge~~ required by paragraph 7.1. Loss of stored energy indication at each local operating position shall also be provided; or
- .3 an independent electrical system and motor for each door with each power source consisting of a motor capable of opening and closing the door. The power source shall be capable of being automatically supplied by the transitional source of emergency electrical power as required by regulation 42.4.2 - in the event of failure of either the main or emergency source of electrical power and with sufficient capacity to operate the door at least three times, i.e. closed-open-closed, against an adverse list of 15°.

For the systems specified in paragraphs 76.3.1, 76.3.2 and 76.3.3, provision should be made as follows: Power systems for power-operated watertight sliding doors shall be separate from any other power system. A single failure in the electric or hydraulic power-operated systems excluding the hydraulic actuator shall not prevent the hand operation of any door.



76.4 Control handles shall be provided at each side of the bulkhead at a minimum height of 1.6 m above the floor and shall be so arranged as to enable persons passing through the doorway to hold both handles in the open position without being able to set the power closing mechanism in operation accidentally. The direction of movement of the handles in opening and closing the door shall be in the direction of door movement and shall be clearly indicated.

76.5 As far as practicable, electrical equipment and components for watertight doors shall be situated above the bulkhead deck and outside hazardous areas and spaces.

76.6 The enclosures of electrical components necessarily situated below the bulkhead deck shall provide suitable protection against the ingress of water.\*

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\* Refer to the following publication IEC 60529:2003:

- .1 electrical motors, associated circuits and control components; protected to IPX 7 standard;
- .2 door position indicators and associated circuit components; protected to IPX 8 standard; and
- .3 door movement warning signals; protected to IPX 6 standard.

Other arrangements for the enclosures of electrical components may be fitted provided the Administration is satisfied that an equivalent protection is achieved. The water pressure IPX 8 shall be based on the pressure that may occur at the location of the component during flooding for a period of 36 h.

76.7 Electric power, control, indication and alarm circuits shall be protected against fault in such a way that a failure in one door circuit will not cause a failure in any other door circuit. Short circuits or other faults in the alarm or indicator circuits of a door shall not result in a loss of power operation of that door. Arrangements shall be such that leakage of water into the electrical equipment located below the bulkhead deck will not cause the door to open.

76.8 A single electrical failure in the power operating or control system of a power-operated sliding watertight door shall not result in a closed door opening. Availability of the power supply should be continuously monitored at a point in the electrical circuit as near as practicable to each of the motors required by paragraph 76.3. Loss of any such power supply should activate an audible and visual alarm at the central operating console(s) at the navigation bridge required by paragraph 7.1.

87.1 A central operating console for all power-operated sliding watertight doors shall be located in the safety centre in accordance with regulation II-2/23. If the safety centre is located in a separate space adjacent to the navigation bridge, a central operating console shall also be located on the navigation bridge. The central operating console(s) at the navigation bridge shall have a "master mode" switch with two modes of control: a "local control" mode which shall allow any door to be locally opened and locally closed after use without automatic closure, and a "doors closed" mode which shall automatically close any door that is open in not more than 60 s with the ship in an upright position. ~~The "doors closed" mode shall automatically close any door that is open.~~ The "doors closed" mode shall permit doors to be opened locally and shall automatically re-close the doors upon release of the local control mechanism. The "master mode" switch shall normally be in the "local control" mode. The "doors closed" mode shall only be used in an emergency or for testing purposes. ~~Special consideration shall be given to the reliability of the "master mode" switch.~~

87.2 For ships subject to the provisions of regulation 1.1.1.1 and constructed before 1 January 2024, the central operating console at the navigation bridge shall be provided with a diagram showing the location of each door, with visual indicators to show whether each door is open or closed. A red light shall indicate a door is fully open and a green light shall indicate a door is fully closed. When the door is closed remotely the red light shall indicate the intermediate position by flashing. The indicating circuit shall be independent of the control circuit for each door.

7.3 For ships constructed on or after 1 January 2024, the central operating console(s) shall be provided with a diagram showing the location of each power-operated sliding watertight door, with visual indicators to show whether each door is open or closed. A red light shall indicate a door is fully open and a green light shall indicate a door is fully closed. When the door is closed remotely the red light shall indicate the intermediate position by flashing. The indicating circuit shall be independent of the control circuit for each door. Indication shall also be provided to the onboard stability computer, if installed in accordance with regulation II-1/8-1.3.1.

87.34 It shall not be possible to remotely open any door from the central operating console.

98.1 If the Administration is satisfied that such doors are essential, watertight doors of satisfactory construction may be fitted in watertight bulkheads dividing cargo ~~between deck spaces on 'tween decks~~. Such doors may be hinged, rolling or sliding doors but shall not be remotely controlled. They shall be fitted at the highest level and as far from the shell plating as practicable, but in no case shall the outboard vertical edges be situated at a distance from the shell plating which is less than one fifth of the breadth of the ship, as defined in regulation 2, such distance being measured at right angles to the centreline at the level of the deepest subdivision draught.

98.2 Should any such doors be accessible during the voyage, they shall be fitted with a device which prevents unauthorized opening. When it is proposed to fit such doors, the number and arrangements shall receive the special consideration of the Administration.

109 Portable plates on bulkheads shall not be permitted except in machinery spaces. The Administration may permit not more than one power-operated sliding watertight door ~~in each watertight bulkhead~~ larger than those specified in paragraph 76.1.2 to be substituted for these portable plates in each watertight bulkhead, provided these doors are intended to remain closed during navigation except in case of urgent necessity at the discretion of the master. These doors need not meet the requirements of paragraph 76.1.4 regarding complete closure by hand-operated gear in 90 s.

140.1 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."

*Note: Re-number subsequent paragraphs*

6 Existing regulation 15 is amended as follows:

**"Regulation 15**

*Openings in the shell plating below the bulkhead deck of passenger ships and the freeboard deck of cargo ships*

9 For ships subject to the provisions of regulation 1.1.1.1 and constructed before 1 January 2024, Gangway, cargo and fuelling ports fitted below the bulkhead deck of passenger ships and the freeboard deck of cargo ships shall be watertight and in no case be so fitted as to have their lowest point below the deepest subdivision draught.

10 For ships constructed on or after 1 January 2024, cargo ports and other similar openings (e.g. gangway and fuelling ports) in the side of ships below the bulkhead deck of passenger ships and the freeboard deck of cargo ships shall be fitted with doors so designed as to ensure the same watertightness and structural integrity as the surrounding shell plating. Unless otherwise granted by the Administration, these openings shall open outwards. The number of such openings shall be the minimum compatible with the design and proper working of the ship. In no case shall these openings be so fitted as to have their lowest point below the deepest subdivision draught.

~~10.1 The inboard opening of each ash chute, rubbish chute, etc., shall be fitted with an efficient cover.~~

~~10.2 If the inboard opening is situated below the bulkhead deck of passenger ships and the freeboard deck of cargo ships, the cover shall be watertight and, in addition, an automatic non-return valve shall be fitted in the chute in an easily accessible position above the deepest subdivision draught."~~

7 Existing regulation 16 is amended as follows:

**"Regulation 16**

*Construction and initial tests of watertight closures*

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

8 Existing regulation 17 is amended as follows:

**"Regulation 17**

*Internal watertight integrity of passenger ships above the bulkhead deck*

1 For passenger ships subject to the provisions of regulation 1.1.1.1 and constructed before 1 January 2024, The Administration may require that all reasonable and practicable measures shall be taken to limit the entry and spread of water above the bulkhead deck. Such measures may include partial bulkheads or webs. When partial watertight bulkheads and webs are fitted on the bulkhead deck, above or in the immediate vicinity of watertight bulkheads, they shall have watertight shell and bulkhead deck connections so as to restrict the flow of water along the deck when the ship is in a heeled damaged condition. Where the partial watertight bulkhead does not line up with the bulkhead below, the bulkhead deck between shall be made

effectively watertight. Where openings, pipes, scuppers, electric cables etc. are carried through the partial watertight bulkheads or decks within the immersed part of the bulkhead deck, arrangements shall be made to ensure the watertight integrity of the structure above the bulkhead deck.\*

\* Refer to the Guidance notes on the integrity of flooding boundaries above the bulkhead deck of passenger ships for proper application of regulations II-1/8 and 20, paragraph 1, of SOLAS 1974, as amended (MSC/Circ.541, as may be amended).

2 For ships constructed on or after 1 January 2024, the internal watertight subdivision arrangements to limit the entry and spread of water above the bulkhead deck shall be in accordance with the design arrangements necessary for compliance with the stability requirements in parts B-1, and B-2 if applicable. Where pipes, scuppers, electric cables, etc. are carried through internal watertight boundaries that are immersed at any intermediate or final stage of flooding in damage cases that contribute to the attained subdivision index *A*, arrangements shall be made to ensure their watertight integrity.

3 For ships constructed on or after 1 January 2024, doors in internal watertight subdivision arrangements above the bulkhead deck, and also above the worst intermediate or final stage of flooding waterlines, shall be capable of preventing the passage of water when immersed in the required range of positive stability for any damage cases contributing to the attained subdivision index *A*. These doors may remain open provided they can be remotely closed from the navigation bridge. They shall always be ready to be immediately closed."

*Note: Re-number subsequent paragraphs*

9 Existing regulation 17-1 is amended as follows:

**"Regulation 17-1**

*Integrity of the hull and superstructure, damage prevention and control on ro-ro passenger ships*

1.1 ~~Subject to the provisions of paragraphs 1.2 and 1.3, a~~All accesses from the ro-ro deck that lead to spaces below the bulkhead deck shall have a lowest point which is not less than 2.5 m above the bulkhead deck, unless the access is covered by the provisions in paragraphs 1.2 or 1.3.

1.2 Where vehicle ramps are installed to give access to spaces below the bulkhead deck, their openings shall be able to be closed weathertight to prevent ingress of water below, ~~alarmed and indicated to the navigation bridge~~ and fitted with alarms and open/close indicators on the navigation bridge. The means of closure shall be watertight if the deck is intended as a watertight horizontal boundary under regulation 7-2.6.

1.3 ~~Subject to regulations 23.3 and 23.6, t~~The Administration may permit the fitting of particular accesses to spaces below the bulkhead deck provided they are necessary for the essential working of the ship, e.g. the movement of machinery and stores, and subject to such accesses being made watertight, ~~alarmed and indicated on the navigation bridge~~ fitted with alarms and open/close indicators on the navigation bridge."

**PART B-4**  
**STABILITY MANAGEMENT**

10 Existing regulation 19 is amended as follows:

**"Regulation 19**

*Damage control information\**

1 There shall be permanently exhibited, or readily available on the navigation bridge, for the guidance of the officer in charge of the ship, plans showing clearly for each deck and hold the boundaries of the watertight compartments, the openings therein with the means of closure and position of any controls thereof, and the arrangements for the correction of any list due to flooding. In addition, booklets containing the aforementioned information shall be made available to the officers of the ship.

2 General precautions to be included shall consist of a listing of equipment, conditions and operational procedures, considered by the Administration to be necessary to maintain watertight integrity under normal ship operations.

3 Specific precautions to be included shall consist of a listing of elements (i.e. closures, security of cargo, sounding of alarms, etc.) considered by the Administration to be vital to the survival of the ship, passengers and crew.

4 In case of ships to which damage stability requirements of part B-1 apply, damage stability information shall provide the master a simple and easily understandable way of assessing the ship's survivability in all damage cases involving a compartment or group of compartments.

5 For passenger ships constructed on or after 1 January 2024, and to which regulation 8-1.3 applies, the damage control information shall include a reference to activation of damage stability support from the onboard stability computer, if installed, and to shore-based support when provided."

11 Existing regulation 21 is amended as follows:

**"Regulation 21**

*Periodical operation and inspection of watertight doors, etc., in passenger ships*

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."

12 Existing regulation 22 is amended as follows:

**"Regulation 22**

*Prevention and control of water ingress, etc.*

5 Watertight doors fitted in watertight bulkheads dividing cargo ~~between deck spaces on 'tween decks~~ in accordance with regulation 13.98.1 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 For ships subject to the provisions of regulation 1.1.1.1 and constructed before 1 January 2024, 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 the voyage commences, and shall be kept closed during navigation.

7 For ships constructed on or after 1 January 2024, gangway, cargo and fuelling ports fitted below the bulkhead deck of passenger ships and the freeboard deck of cargo ships and all watertight hatches shall be effectively closed and secured watertight before the voyage commences, and shall be kept closed during navigation. However, the master may permit a watertight hatch to be opened during navigation for a limited period of time sufficient to permit passage or for access. It shall then be closed.

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.

~~16 When a rubbish chute, etc. is not in use, both the cover and the valve required by regulation 15.10.2 shall be kept closed and secured."~~

*Note: Re-number subsequent paragraphs.*

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## ANNEX 14

### DRAFT AMENDMENTS TO THE IGF CODE<sup>1</sup>

#### PART A-1

#### SPECIFIC REQUIREMENTS FOR SHIPS USING NATURAL GAS AS FUEL

##### 6 FUEL CONTAINMENT SYSTEM

##### 6.7 Regulation for pressure relief system

- 1 Regulation 6.7.1.1 is amended to read as follows:

"All fuel storage tanks shall be provided with a pressure relief system appropriate to the design of the fuel containment system and the fuel being carried. Fuel storage hold spaces, interbarrier spaces ~~and tank connection spaces and tank cofferdams~~, which may be subject to pressures beyond their design capabilities, shall also be provided with a suitable pressure relief system. Pressure control systems specified in 6.9 shall be independent of the pressure relief systems."

##### 11 FIRE SAFETY

- 2 A new regulation 11.8 is added after existing regulation 11.7 as follows:

##### **11.8 Regulation for fuel preparation room fire-extinguishing systems**

Fuel preparation rooms containing pumps, compressors or other potential ignition sources shall be provided with a fixed fire-extinguishing system complying with the provisions of SOLAS II-2/10.4.1.1 and taking into account the necessary concentrations/application rate required for extinguishing gas fires."

#### PART B-1

##### 16 MANUFACTURE, WORKMANSHIP AND TESTING

##### 16.3 Welding of metallic materials and non-destructive testing for the fuel containment system

- 3 The existing text of paragraph 16.3.3.5.1 is amended to read as follows:

"16.3.3.5 Each test shall satisfy the following requirements:

- .1 tensile tests: cross-weld tensile strength is not to be less than the specified minimum tensile strength for the appropriate parent materials. For ~~materials such as~~ aluminium alloys, reference shall be made to 6.4.12.1.1.3 with regard to the regulations for weld metal strength of under-matched welds (where the weld metal has a lower tensile strength than the parent metal). In every case, the position of fracture shall be recorded for information;"

\*\*\*

<sup>1</sup> Deleted text is shown in strike-through and grey shading and new text is shown in grey shading.

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**ANNEX 15**

**DRAFT AMENDMENTS TO THE IGC CODE\***

<b>Chapter 6</b>	<b>Materials of construction and quality control</b>
<b>6.5</b>	<b>Welding of metallic materials and non-destructive testing</b>
<b>6.5.3</b>	<b>Welding procedure tests for cargo tanks and process pressure vessels</b>

The existing text of paragraph 6.5.3.5.1 is amended to read as follows:

"6.5.3.5 Each test shall satisfy the following requirements:

- .1 tensile tests: cross-weld tensile strength shall not be less than the specified minimum tensile strength for the appropriate parent materials. For materials such as aluminium alloys, reference shall be made to 4.18.1.3 with regard to the requirements for weld metal strength of under-matched welds (where the weld metal has a lower tensile strength than the parent metal). In every case, the position of fracture shall be recorded for information;"

\*\*\*

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\* Newly inserted text is shown in grey shading.



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**ANNEX 27**

**DRAFT ASSEMBLY RESOLUTION**

**AMENDMENTS TO USE AND FITTING OF RETRO-REFLECTIVE MATERIALS  
ON LIFE-SAVING APPLIANCES (RESOLUTION A.658(16))**

THE ASSEMBLY,

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

RECALLING ALSO resolution MSC.47(66) whereby the Maritime Safety Committee adopted a revised chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, herewith referred to the as "the Convention",

RECALLING FURTHER resolution MSC.47(66) by which the Maritime Safety Committee adopted, inter alia, amendments to the revised chapter III of the Convention to make the provisions of the International Life-Saving Appliance (LSA) Code mandatory under that Convention on or after 1 July 1998,

CONSIDERING that under the provisions of paragraph 1.2.2.7 of the LSA Code, life-saving appliances shall be fitted with retro-reflective material where it will assist in detection and in accordance with the recommendations of the Organization,

RECALLING that the Assembly, when adopting resolution A.658(16) on *Use and fitting of retro-reflective materials on life-saving appliances*, authorized the Committee to keep the recommendation under review and to report as necessary to the Assembly,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its 101st session,

- 1 ADOPTS amendments to the *Use and fitting of retro-reflective materials on life-saving appliances (resolution A.658(16))*, set out in the annex to the present resolution;
- 2 AGREES that the Administration may accept life-saving appliances already fitted with retro-reflective materials in accordance with resolution A.658(16);
- 3 INVITES Contracting Governments to the Convention to bring the above amendments to the attention of all parties concerned.

ANNEX

**AMENDMENTS TO USE AND FITTING OF RETRO-REFLECTIVE MATERIALS  
ON LIFE-SAVING APPLIANCES (RESOLUTION A.658(16))**

Paragraph 4.10 of the annex to resolution A.658(16) is replaced by the following:

"4.10 Accelerated weathering

The photometric performance of the material should be determined according to section 4.2 after the material has been exposed in a sunshine weatherometer for the following periods:

- Type I material: 750 h
- Type II material: 1,500 h

After exposure, the material should be examined for the requirements and characteristics in section 3.2."

\*\*\*

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4 ALBERT EMBANKMENT  
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MSC.1/Circ.1205/Rev.1  
26 June 2019

**REVISED GUIDELINES FOR DEVELOPING OPERATION AND MAINTENANCE  
MANUALS FOR LIFEBOAT SYSTEMS**

1 The Maritime Safety Committee, at its eighty-first session (10 to 19 May 2006), taking into account the number of casualties with lifeboat systems, further recognizing the need to improve manuals for operation and maintenance of lifeboat systems, and having considered proposals by the Sub-Committee on Fire Protection at its fiftieth session, approved the *Guidelines for developing operation and maintenance manuals for lifeboat systems* (MSC.1/Circ.1205).

2 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), approved amendments to the Guidelines prepared by the Sub-Committee on Ship Systems and Equipment, at its sixth session.

3 Member Governments are invited to bring the revised Guidelines set out in the annex to the attention of all parties concerned with their application, as appropriate.

\*\*\*

## ANNEX

### REVISED GUIDELINES FOR DEVELOPING OPERATION AND MAINTENANCE MANUALS FOR LIFEBOAT SYSTEMS

#### 1 Scope and purpose of the Guidelines

1.1 Seafarers often change ships and sometimes are not familiar with the lifeboats on their ships. Casualties with lifeboat systems are often caused by poor understanding of the lifeboat systems, especially release gear systems. User-friendliness of manuals for lifeboat systems is, therefore, important to help prevent casualties.

1.2 The purpose of these Guidelines is to encourage development of user-friendly manuals for operation and maintenance of lifeboat systems including launching appliances. These manuals should be easy to understand. The Guidelines demonstrate the appropriate level of detail and use of illustrations in explaining the safe use of critical systems. Manufacturers of lifeboats and launching/recovery appliances are invited to make manuals easy to understand, taking into account these guidelines. The use of video materials in conjunction with printed manuals can be an effective tool for mariners who may not be inclined to read a manual.

1.3 These Guidelines are not applicable to the emergency instructions required by SOLAS regulation III/8, operating instructions such as posters and signs required by SOLAS regulation III/9 or other brief instructions for operation of lifeboats.

1.4 These guidelines are for manuals to be carried on ships for use by seafarers, and accordingly the section on weekly and monthly inspection and maintenance does not refer to detailed maintenance/repair work. Detailed maintenance/repair work should be conducted by the manufacturer's representative or a person appropriately trained and certified by the manufacturer for the work in accordance with MSC.1/Circ.1206/Rev.1 on *Measures to prevent accidents with lifeboats*.

#### 2 Collaboration of manufacturers of the lifeboat and the launching appliance

A manual for a lifeboat system including launching appliance should be developed with the collaboration of manufacturers of the lifeboat and the launching appliance and preferably be a single document. As a minimum, the use of different words for the same gear/parts of the lifeboat system should be eliminated by the collaboration of manufacturers of the lifeboat and the launching appliance to prevent misunderstanding by seafarers. Hereafter, these Guidelines assume a manual for a lifeboat system including the launching appliance as a minimum, but separate lifeboat, release gear, and launching appliance manuals may be effective if adequately coordinated and using the same style of presentation per these guidelines.

#### 3 Contents of a manual for a lifeboat system

##### 3.1 *Items to be included*

An operation and maintenance manual for a lifeboat system should include, as a minimum, the following items:

- .1 overview and specification of the lifeboat system;
- .2 explanation of the structure and working principle of the major parts of the lifeboat system including release gear systems;

- .3 operation of the lifeboat system; and
- .4 routine inspection and maintenance of the lifeboat system.

### **3.2 Organization, description and layout of manual**

#### **3.2.1 Outline**

It is recommended that a manual for a lifeboat system be developed with the following major divisions:

- .1 General description of the whole lifeboat system.
- .2 Method of checking proper closure of release hooks.
- .3 Launching operation.
- .4 Recovery operation.
- .5 On-load/off-load release gear.
- .6 Inspection and maintenance.

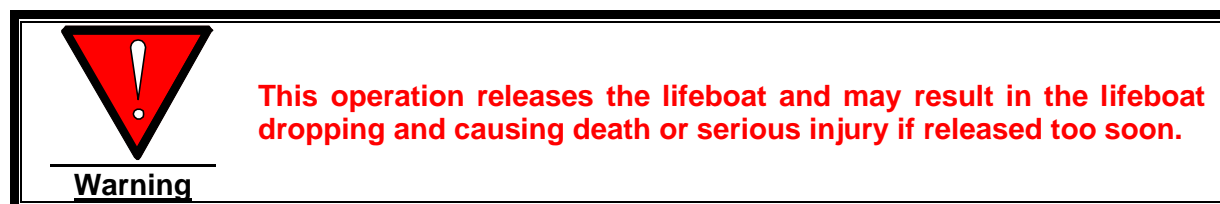
#### **3.2.2 Explanation of major components and their function**

The structure and working principle of the lifeboat's major components, in particular the on-load/off-load release gear, should be explained using figures and preferably three-dimensional perspectives. In addition, the operation of the release gear should be described sequentially, using short phrases written in the active voice.

#### **3.2.3 Operation of lifeboat system including release gear systems**

The operation of the lifeboat system should be described using the following elements:

- .1 flow of the operation should be explained;
- .2 detail of operation should be explained with figures. Operation and relevant movement of the parts of the release gear should be described with illustrations/photos, preferably using annotations and arrows to show direction of movement; and
- .3 hazards, precautions and notes should be identified with symbols specific to the level of risk. As an example of the various levels of risk and the appropriate associated symbols, the following are recommended:
  - .1 For the highest level of risk, such as in the explanation of "on-load release operation", the following symbol (red background) should be used with a warning statement similar to the following:



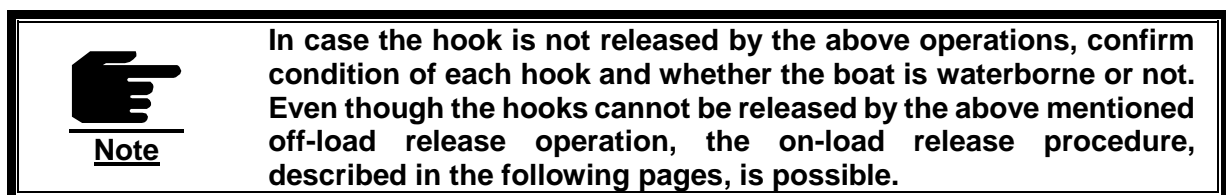
- .2 For the second highest level of risk, such as in the explanation of "davit arm stop release operation", the following symbol (yellow background) should be used with a caution statement similar to the following:



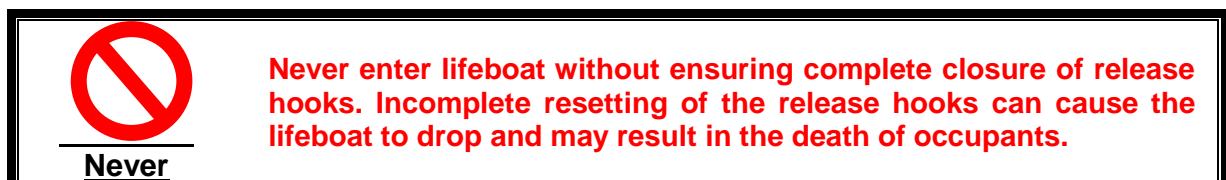
- .3 For less critical mandatory instructions the following symbol (blue background) should be used with appropriate instruction:



- .4 Important notes may be emphasized with symbol and style of instructions similar to the following:



- .5 Prohibited actions should use the following symbol (coloured red) and style of instruction:



Note: International standard symbols (ISO 3864-1 and ISO 7010) and the signs and markings depicted in resolution A.1116(30) are recommended where appropriate, but since these standards, and they fail to indicate different levels of risk, the "graduated" symbols of paragraph 3.2.3.3 are recommended.

### 3.2.4 *Inspection and maintenance*

The items for weekly and monthly inspection/maintenance and other inspection/maintenance should each be explained separately.

## 4 **Improvement of user-friendliness of a manual**

### 4.1 ***Use of figures/photographs***

Figures, preferably coloured, or photographs should be used as far as practicable to make manuals easy to understand.

## **4.2 Use of standard wording**

The following standard wording should be used to explain lifeboat systems where provided, and for each of the applicable items illustrations should be provided to show the items and their location in the lifeboat or on the ship. The use of alternative terms for variety should be avoided, except to further define or clarify a term so that the reader never has to guess what item or system is being discussed.

- .1 Davit/winch:
  - .1 Auto releasing gripe
  - .2 Davit arm
  - .3 Davit arm stop
  - .4 Davit remote control wire handle
  - .5 Frame
  - .6 Maintenance (hanging off) pennant attachment points, if provided
  - .7 Manual gripe, if provided
  - .8 Remote control wire
  - .9 Winch manual brake safety pin
  - .10 Winch hand crank handle
  - .11 Winch centrifugal or lowering brake
  - .12 Winch hand brake or stop brake lever
- .2 Freefall:
  - .1 Roller or sliding pad
  - .2 Sea lashing rope
  - .3 Emergency release device
- .3 Release gear:
  - .1 Hook control cable
  - .2 Hook retainer (lock piece)
  - .3 Hydrostatic interlock
  - .4 Hydrostatic interlock lever, if provided
  - .5 Interlock ("mechanical protection" of on-load release)

- .6 Maintenance (hanging off) pennant attachment points, if provided
- .7 On-load release
- .8 Release handle
- .9 Release handle "closed (locked)" and "open" positions
- .10 Release handle "safety pin"
- .11 Release hook (hook unit) (fore and aft hooks)
- .12 Reset lever, if provided
- .13 Safety latch (keeper)
- .4 Suspension:
  - .1 Foul weather recovery strops
  - .2 Suspension block
  - .3 Suspension link (lifting ring)
- .5 "Officer in charge" of lifeboat

## **5 Example of an operation and maintenance manual for a lifeboat system**

An example of an operation and maintenance manual for a fire-protected lifeboat system is attached in the following pages just for reference. It demonstrates the suitable level of detail that should be expected for manuals. It should be noted that lifeboat systems are different from each other and some specifications in the example manual are not applicable to lifeboat systems of other types. The example attached at appendix is a model manual which is recommended as an example for developing specific manuals for lifeboat systems launched by falls, but the same general principles should be used for manuals for freefall lifeboat systems.



## APPENDIX

### EXAMPLE OPERATION AND MAINTENANCE MANUAL FOR A LIFEBOAT SYSTEM<sup>2</sup>

#### Table of contents

- 1 General
- 2 Method of checking proper closure of release hooks
- 3 Launching operation
  - 3.1 Preparation before launching
  - 3.2 Setting painter
  - 3.3 Release of safety pin for winch hand brake lever
  - 3.4 Release of davit arm stop
  - 3.5 Boarding the lifeboat
  - 3.6 Launching procedure
  - 3.7 Release gear operation
  - 3.8 Painter release and lifeboat operation
- 4 Recovery operation
  - 4.1 Resetting procedure of release hook
  - 4.2 Recovery procedure
  - 4.3 Stowage procedure
- 5 On-load/off-load release gear system
  - 5.1 General
  - 5.2 Fore and aft hook units
  - 5.3 Release handle unit
  - 5.4 Hydrostatic interlock unit
- 6 Inspection and maintenance
  - 6.1 General precautions
  - 6.2 Inspection and maintenance of lifeboat and release gear system
  - 6.3 Inspection and maintenance of launching appliances (davits and winches)

---

<sup>2</sup> Of a lifeboat being launched using falls and a winch, hereinafter referred to as a lifeboat.

## **1 General**

1.1 The lifeboats are stored on the boat davits on both sides of the ship. In case of emergency, the crew can board the lifeboat and escape with the lifeboat directly from its stowage position.

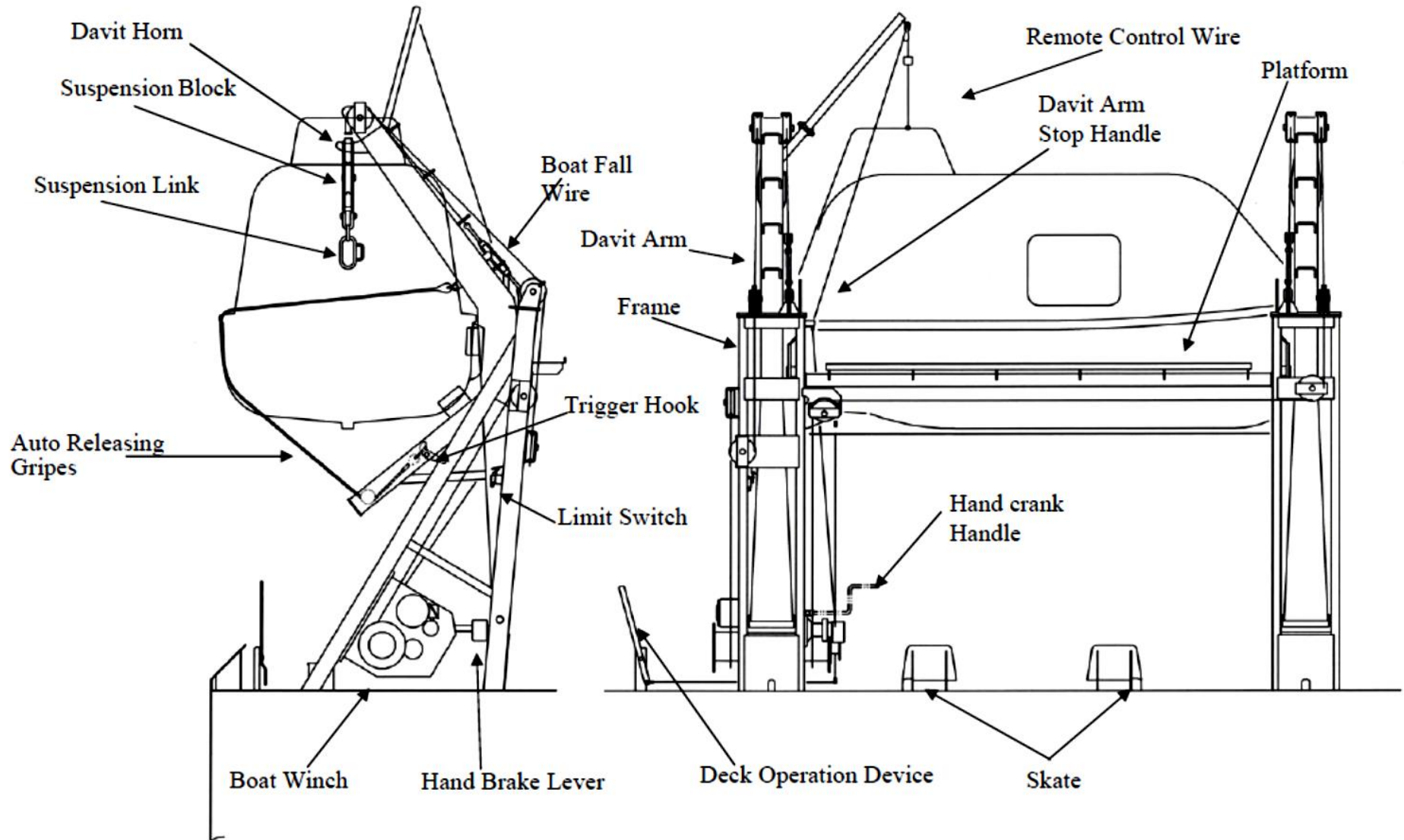
1.2 The launching appliance consists of a boat davit (davit arm, frame, platform, falls, suspension block, and gripes/lashing device) and a boat winch (reduction gears, hand brake and centrifugal brake).

1.3 Swinging out and lowering of the lifeboat can be controlled both from the inside of the lifeboat and at the ship's deck. The lowering speed of the lifeboat can be controlled by operating the remote control wire inside the lifeboat or by operating the remote control lever on the ship's deck. Moreover, it is possible to suspend the lowering operation of the lifeboat at any height.

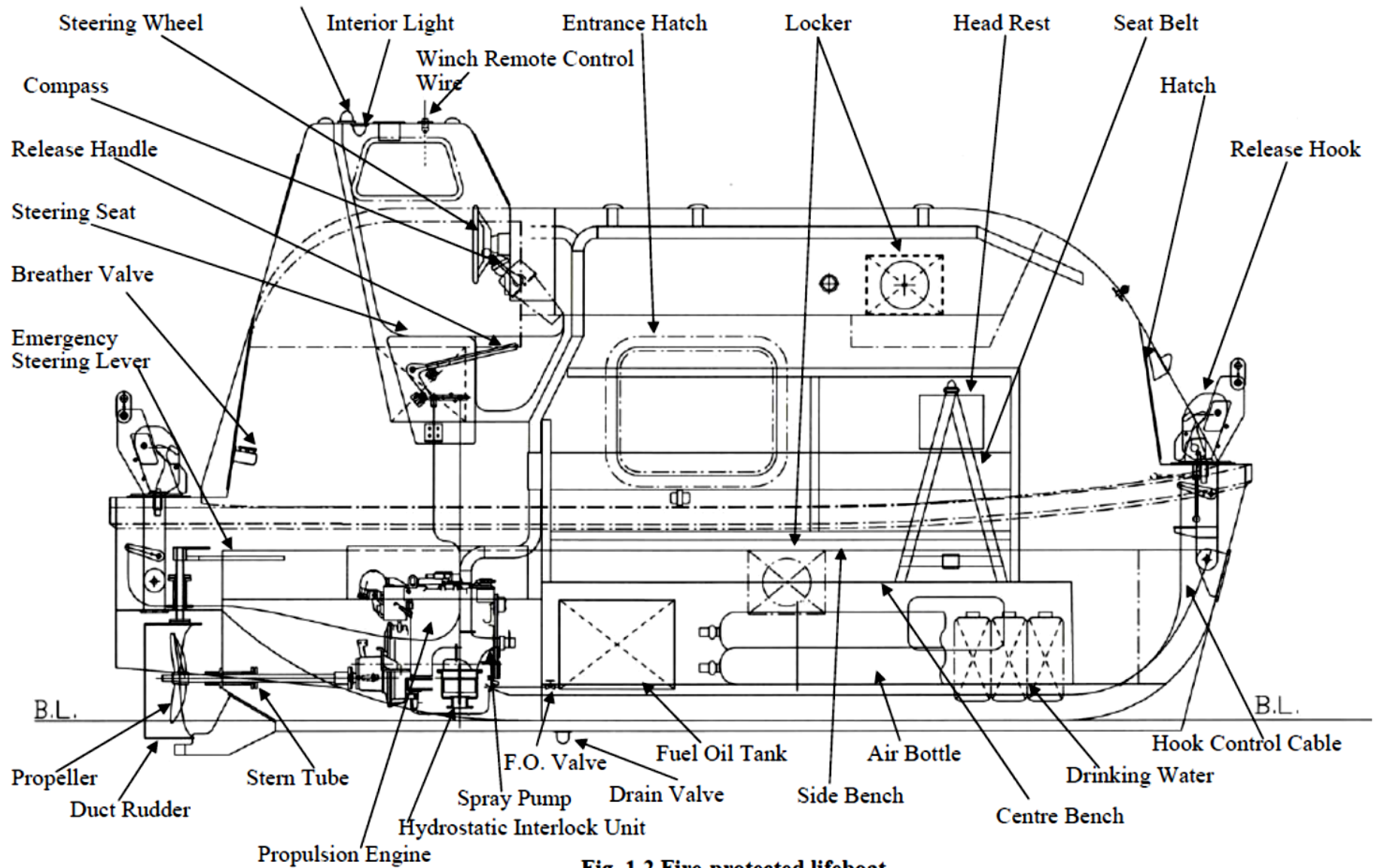
1.4 Recovery of the lifeboat is performed by operating the boat winch with the push-button switch box. When the davit arm reaches a prescribed position, the boat winch is automatically stopped by the limit switch. After the activation of the limit switch, the boat winch is operated manually to wind up the lifeboat to its stowage position. The boat winch is provided with a safety device to prevent the reverse operation of the manual handle.

1.5 The lifeboat is equipped with on-load/off-load release gear which complies with the requirements of the International Life-Saving Appliance (LSA) Code. The release gear system is equipped with a hydrostatic interlock system so that it will normally not release the hooks until the boat is waterborne.

1.6 To avoid possible injury or death, read this manual carefully before using the boat davit, the boat winch, and the on-load/off-load release gear.




**Fig. 1.1 Lifeboat davit arrangement**



**Fig. 1.2 Fire-protected lifeboat**

## 2 Method of checking proper closure of release hooks

2.1 Safe use and operation of lifeboats during drills and inspection and maintenance is dependent on knowing that the release gear is properly reset.

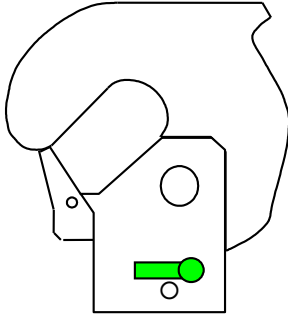
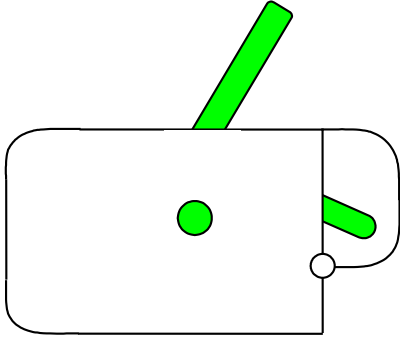


Never enter lifeboat without ensuring complete closure of release hooks. Incomplete resetting of the release hooks can cause the lifeboat to drop resulting in death.

Never


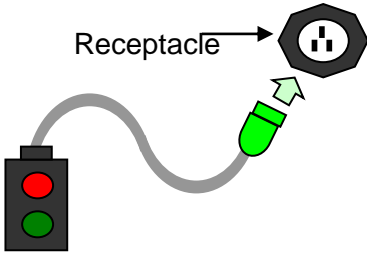


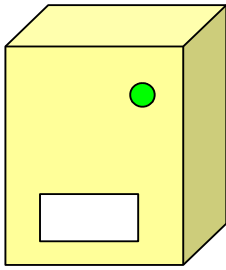


2.2 Purpose of on-load release. The IMO LSA Code requires, among other things, that the lifeboat be fitted with "***on-load release capability which will release the lifeboat with a load on the hooks. The release mechanism shall be so designed that crew members in the lifeboat can clearly observe when the release mechanism is properly and completely reset and ready for lifting.*** . . ." On-load release is needed for launching when there is a current, when the ship is making way, or potentially if there are waves which cause the hydrostatic interlock to only release intermittently. On-load release also allows an empty or fully loaded boat to drop from any height, which can kill or seriously injure the occupants. Therefore it is critical to know that the release gear is properly reset and the release handle secured.

2.3 Ensuring release hook closure. The first thing to check whenever entering the lifeboat when it is (or will be) supported by the falls is properly reset as follows:

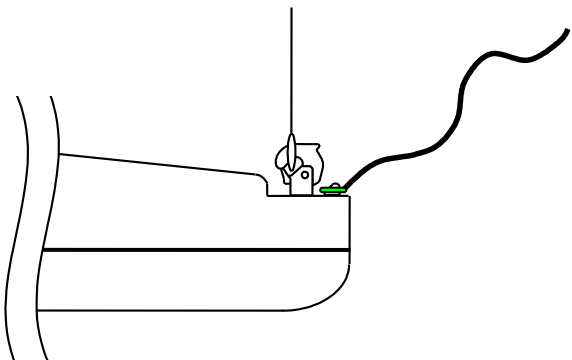
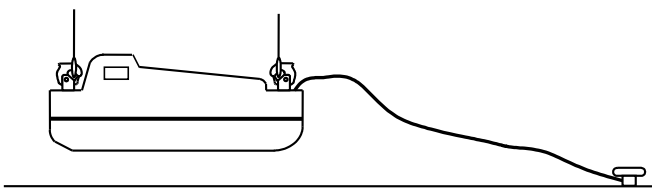
No.	Operation Guide	Schematic Diagram
1	<p>Check that the reset lever on each hook is horizontal and in contact with its stop.</p> <p>&lt;Activity in the lifeboat&gt;</p>	
2	<p>Check that the release handle is in the closed (locked) position and safety pin is installed.</p> <p>&lt;Activity in the lifeboat&gt;</p>	

**3 Launching operation**

**3.1 Preparation before launching**

No.	Operation Guide	Schematic Diagram		
1	<p>Prepare transceivers, and confirm the communication condition.</p> <p>&lt;Activity on the ship&gt;</p>			
2	<p>&lt;In case of drill&gt;</p> <p>Connect the push-button switch for recovering to the receptacle.</p> <p>&lt;Activity on the ship&gt;</p>			
3	<p>&lt;In case of drill&gt;</p> <p>Turn on the power switch of start panel.</p> <table border="1" data-bbox="261 1429 724 1541"> <tr> <td style="text-align: center; vertical-align: middle;"></td> <td>Detach the cable for the storage battery charge.</td> </tr> </table> <p>&lt;Activity on the ship&gt;</p>		Detach the cable for the storage battery charge.	
	Detach the cable for the storage battery charge.			
4	<p>Don life jackets.</p> <p>&lt;Activity on the ship&gt;</p>			

### 3.2 Setting of painter


No.	Operation Guide	Schematic Diagram
1	<p>Confirm the connection of the painter on <b>the painter</b> release device of the lifeboat.</p> <p>&lt;Activity on the lifeboat&gt;</p>	
2	<p>Confirm the connection of <b>the painter</b> as far forward as practicable inboard of the falls but outboard of everything else.</p> <p>&lt;Activity on the ship&gt;</p>	

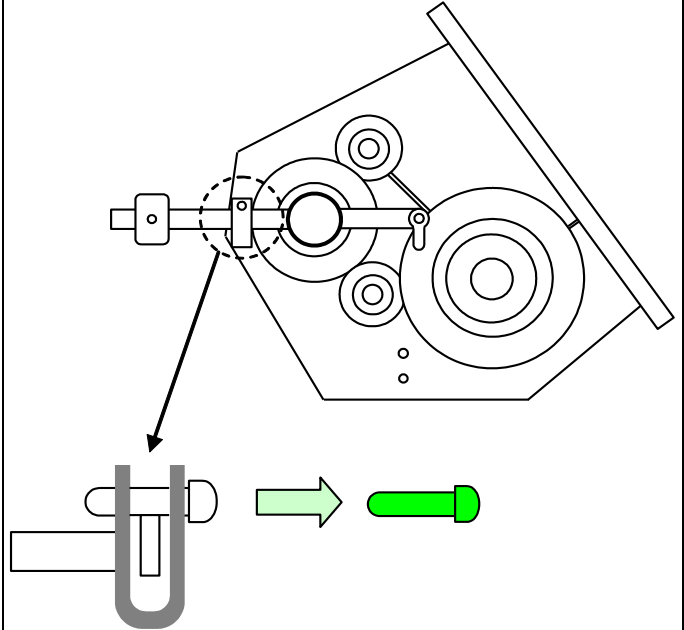


**Caution**

**Ensure the painter is lead as far forward as practicable inboard of the lifeboat falls but outboard of everything else. Failure to do so will result in severe difficulties clearing the vessel during abandonment.**

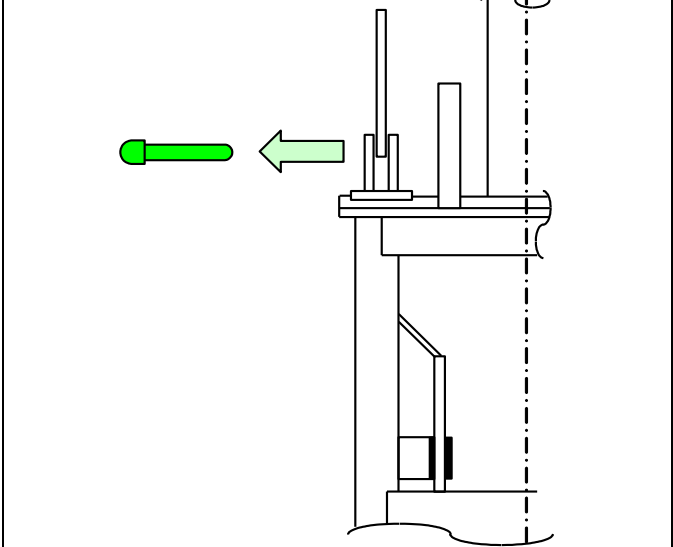
**3.3 Release of safety pin (if fitted) for winch hand brake lever**

 <b>Caution</b>	<p>The safety pin of the winch hand brake should not be pulled out until the completion of the preparation described in paragraphs 3.1 and 3.2.</p>
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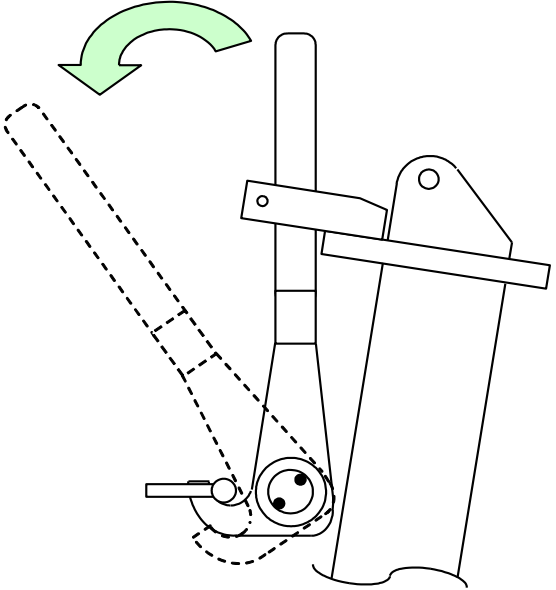
No.	Operation Guide	Schematic Diagram
1	<p>Pull out the safety pin (if fitted). &lt;Activity on the ship&gt;</p>	


**3.4 Release of davit arm stopper**

Go up to the platform of the davit system (platform for boarding the lifeboat).

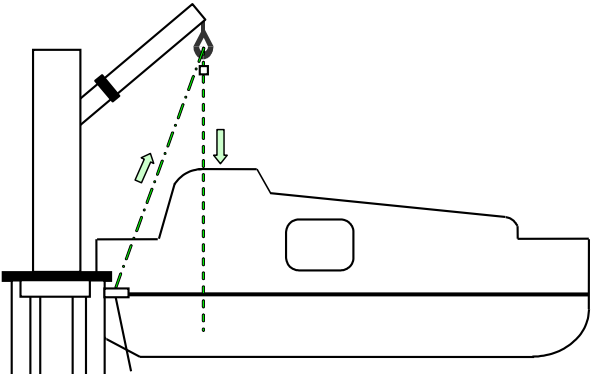
No.	Operation Guide	Schematic Diagram
1	<p>Wind the boat fall manually to take off the slack. Pull out the safety pin of the davit arm stop, if fitted. &lt;Activity on the ship&gt;</p> <p>Note: Safety pins are generally intended only for use during maintenance or in port.</p>	

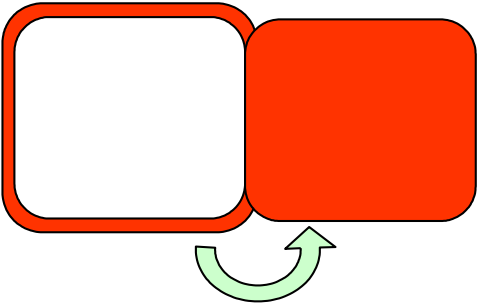
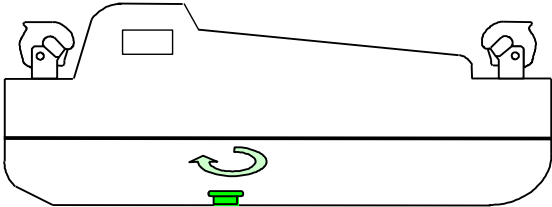
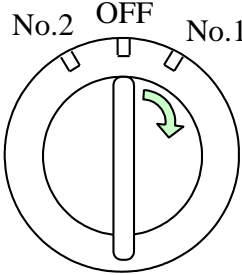
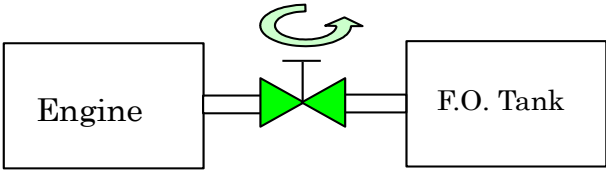
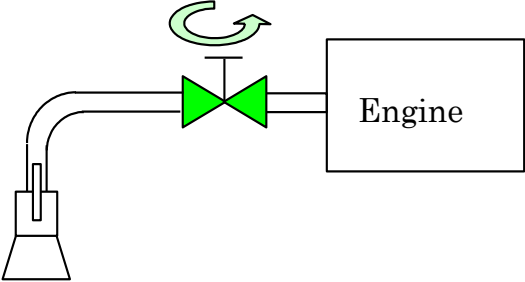


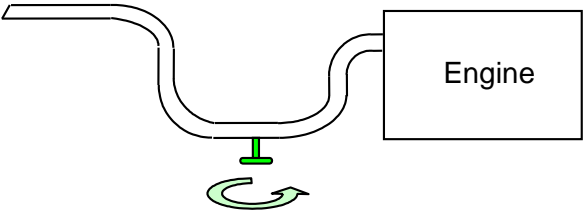
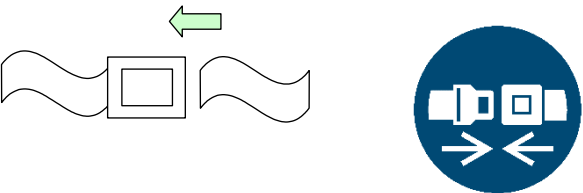
No.	Operation Guide	Schematic Diagram
2	<p>Release the davit arm stop by operating the handle.</p> <p>&lt;Activity on the ship&gt;</p>	


 <p><b>Caution</b></p>	<p>The handle should be fully operated to prevent the davit arm stop from being caught with the lock device.</p>
---	--

### 3.5 Boarding the lifeboat

No.	Operation Guide	Schematic Diagram
1	<p>Confirm that the remote control wire is drawn into the lifeboat.</p> <p>&lt;Activity on the ship&gt;</p>	


No.	Operation Guide	Schematic Diagram
2	<p>Open the lifeboat boarding door and board the lifeboat.</p> <p>&lt;Activity on the ship&gt; and &lt;Activity in the lifeboat&gt;</p>	
3	<p>Ensure the bottom plug is fitted and tight.</p> <p>&lt;Activity in the lifeboat&gt;</p>	
4	<p>Turn on the power supply switch.</p> <p>&lt;Activity in the lifeboat&gt;</p>	
5	<p>Open the fuel oil valve.</p> <p>&lt;Activity in the lifeboat&gt;</p>	
6	<p>Confirm that the cooling seawater valve is open.</p> <p>&lt;Activity in the lifeboat&gt;</p>	

No.	Operation Guide	Schematic Diagram
7	<p>Close the drain valve on exhaust pipe.</p> <p>&lt;Activity in the lifeboat&gt;</p>	 <p>The diagram shows a U-shaped exhaust pipe connected to a box labeled 'Engine'. A green T-shaped drain valve is located at the bottom of the U-shape, with a green circular arrow below it indicating a clockwise rotation to close the valve.</p>
8	<p>Fasten seatbelt.</p> <p>&lt;Activity in the lifeboat&gt;</p>	 <p>The diagram consists of two parts. On the left, a schematic of a seatbelt buckle is shown with a green arrow pointing to the left, indicating the direction to insert the tongue. On the right, there is a circular blue icon containing a white seatbelt and two white arrows pointing towards each other, representing the fastening action.</p>



**Seating positions of persons should be carefully selected to maintain a good trim of the lifeboat.**

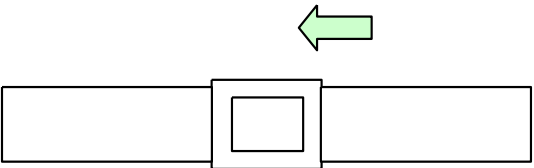
**Caution**

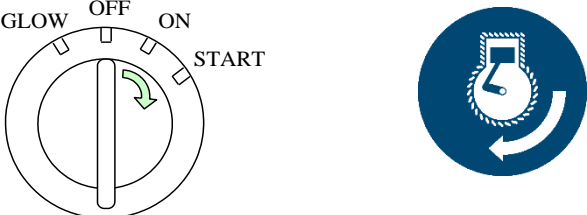
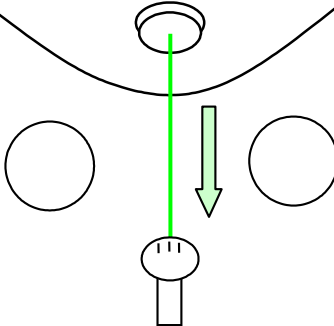



**If the seat belt is not fastened, serious injury or death may occur.**

**Warning**

### 3.6 Launching procedure


No.	Operation Guide	Schematic Diagram
1	<p>Confirm that all crew boarded in the lifeboat are seated and their seatbelts are fastened.</p> <p>&lt;Activity in the lifeboat&gt;</p>	 <p>The diagram shows a schematic of a seatbelt buckle. A green arrow points to the left, indicating the direction to insert the tongue into the buckle.</p>

No.	Operation Guide	Schematic Diagram
2	<p>Start engine. &lt;Activity in the lifeboat&gt;</p>	
3	<p>Pull down the winch remote control wire. &lt;Activity in the lifeboat&gt;</p>	




**Caution**

- Ensure that no gripe or lashing is tangled around the fore and aft hooks.
- Pull down the remote control wire gently and slowly during swinging out of the lifeboat.
- Only pull down the remote control wire fully to lower the boat after swing out is complete.
- The helmsman must tell the crew to standby for splashdown when the lifeboat reaches the vicinity of the water surface.



**Warning**

- When using remote control gear from within the boat never wind the cord or wire around fingers, hand or wrist as this may result in the cutting off of fingers/hand.
- Do not stop the swinging out operation at deck position. Stopping shakes the lifeboat and may cause casualties.
- A rapid swing out may cause dangerous impact on the boat when the davit arm reaches the deck position.
- Inching operation shakes the lifeboat and is dangerous.



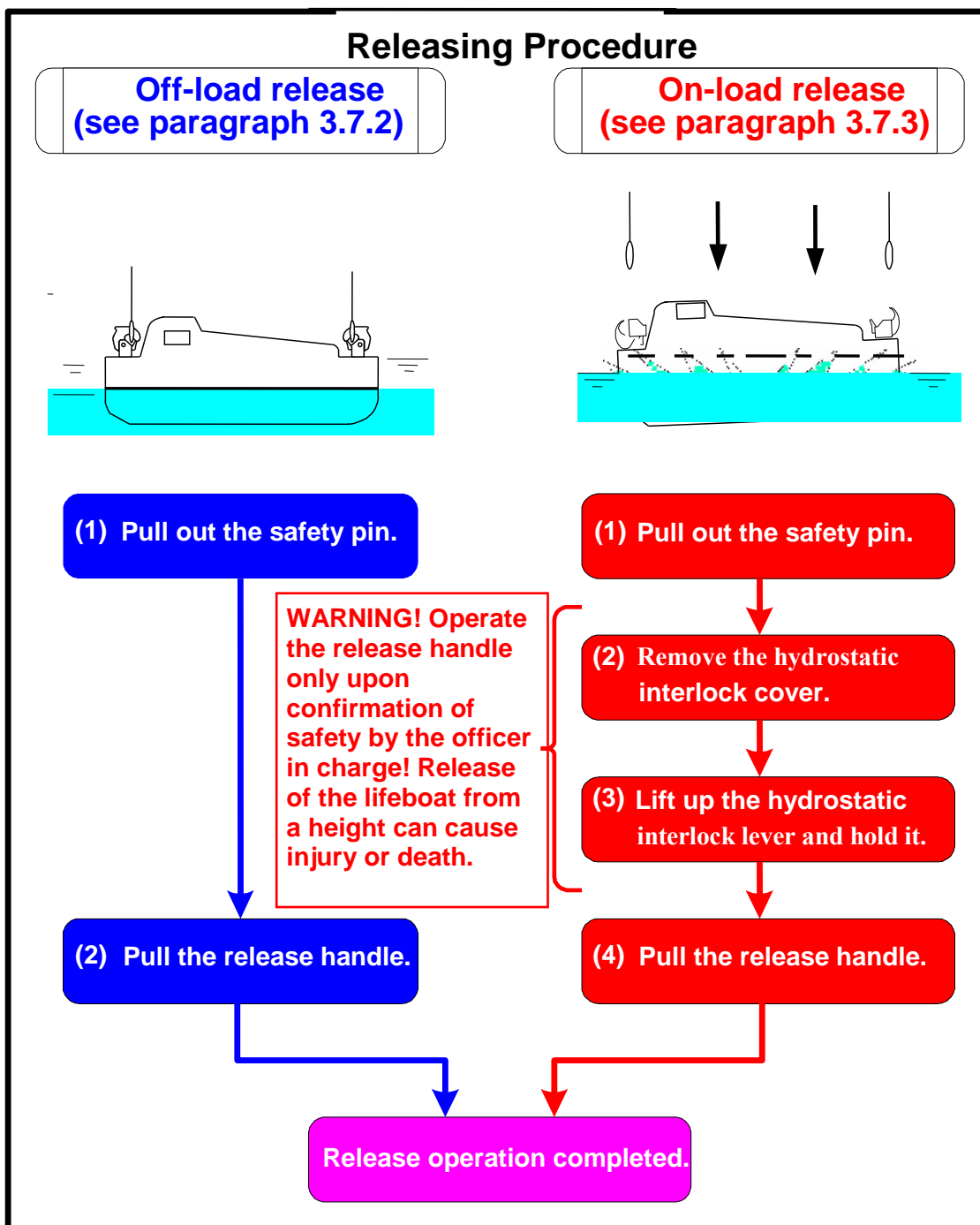
**Note**

During lifeboat drills, the above-mentioned procedures may not be applicable because the lowering operation may be controlled from the ship's deck using the deck operation device.

### 3.7 Release gear operation

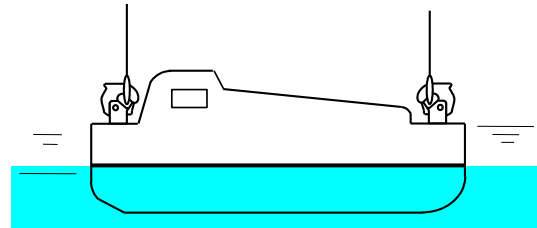
#### 3.7.1 Releasing procedure


A flow chart of the off-load and on-load releasing procedures is shown in the following figure.

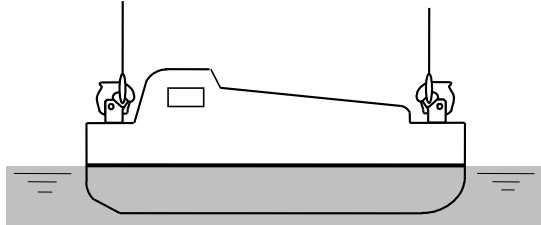
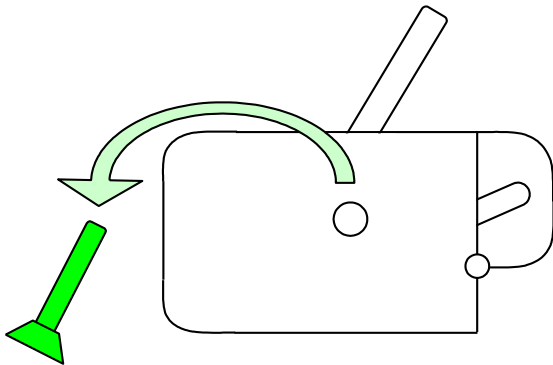
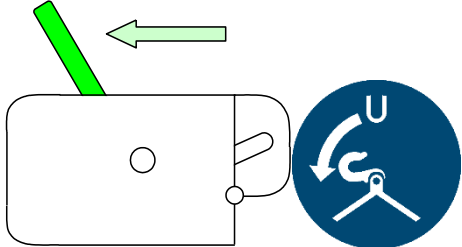



3.7.2 Off-load release

This operation is the normal method of launch and release and is conducted when the lifeboat is fully waterborne.



 <b>Caution</b>	<p><b>Confirm the following before the operation:</b></p> <ul style="list-style-type: none"> <li>• The lifeboat is fully waterborne.</li> <li>• The engine is started.</li> <li>• All crew are in their seats with their seatbelts fastened.</li> </ul>
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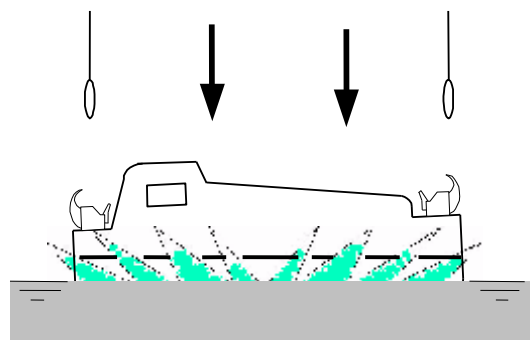
No.	Operation Guide	Schematic Diagram
1	<p>Confirm that the lifeboat is waterborne.</p> <p>&lt;Activity in the lifeboat&gt;</p>	
2	<p>Pull out the release handle safety pin.</p> <p>&lt;Activity in the lifeboat&gt;</p>	
3	<p>Pull the release handle to the fully open position by one action.</p> <p>&lt;Activity in the lifeboat&gt;</p>	


No.	Operation Guide	Schematic Diagram
 <b>Note</b>	<p><b><u>In a case where the hook is not released by the above operations, confirm condition of each hook and whether the boat is waterborne or not. Even though the hooks cannot be released by the off-load</u></b></p>	


No.	Operation Guide	Schematic Diagram
	<p><b>release operation described above, on-load release procedure, described in the following pages, is possible.</b></p>	

3.7.3 On-load release

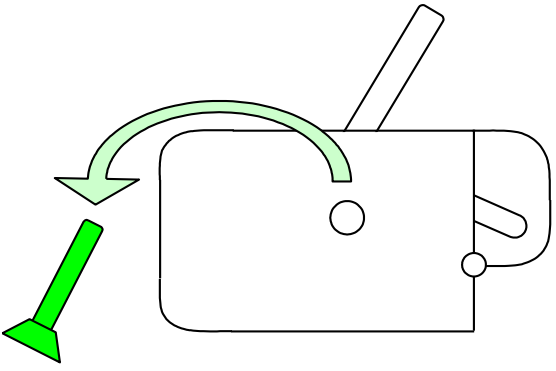
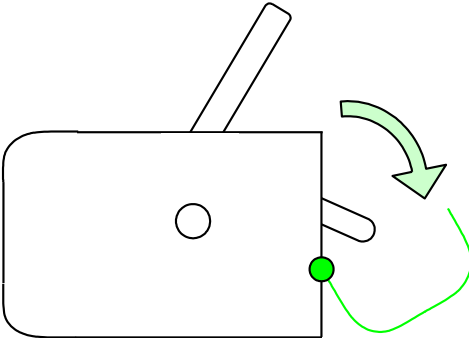
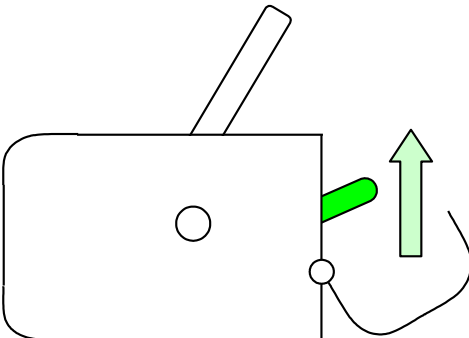
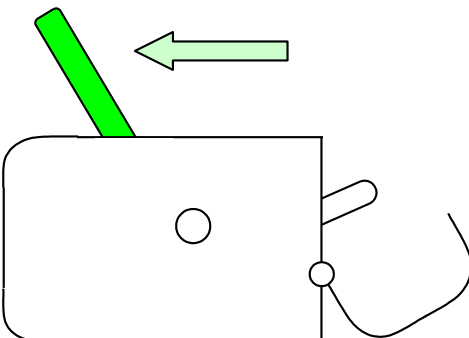
This operation is conducted when the lifeboat is not fully waterborne.



 <p><b>Warning</b></p>	<ul style="list-style-type: none"> <li>• Pay due precautions and conduct the on-load release operation in accordance with orders of the officer in charge.</li> <li>• Operation of the release handle upon insufficient confirmation of safety may result in death or injury due to dropping the lifeboat in the water from a height.</li> </ul>
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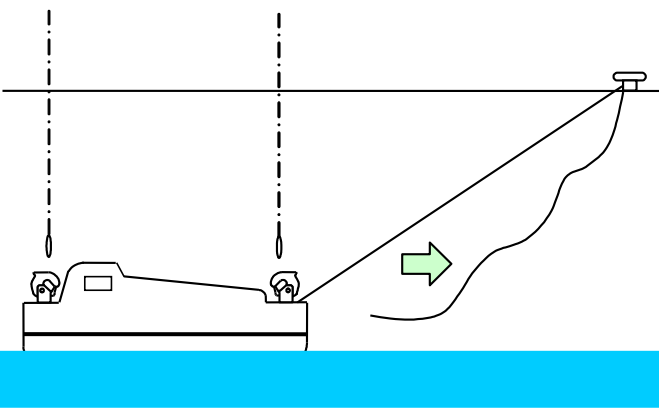
 <p><b>Caution</b></p>	<p><b>Confirm the following before the operation.</b></p> <ul style="list-style-type: none"> <li>• The lifeboat is as close as possible to the water surface.</li> <li>• The engine is started.</li> <li>• All crew are in their seats with their seatbelts fastened.</li> </ul>
---	--

No.	Operation Guide	Schematic Diagram
1	<p>Confirm that the lifeboat is as close as possible to the water surface, but that the hydrostatic interlock is not triggered.</p> <p>&lt;Activity in the lifeboat&gt;</p>	

No.	Operation Guide	Schematic Diagram		
2	<p>Pull out the release handle safety pin.</p> <p>&lt;Activity in the lifeboat&gt;</p>			
3	<p>Open the hydrostatic interlock cover.</p> <table border="1" data-bbox="263 880 730 952"> <tr> <td data-bbox="263 880 383 952">✓</td> <td data-bbox="383 880 730 952">Unlock the latch of the interlock cover.</td> </tr> </table> <p>&lt;Activity in the lifeboat&gt;</p>	✓	Unlock the latch of the interlock cover.	
✓	Unlock the latch of the interlock cover.			
4	<p>Lift the hydrostatic interlock lever fully and hold it.</p> <p>&lt;Activity in the lifeboat&gt;</p>			
5	<p>Pull the release handle to the fully open position by one action.</p> <p>&lt;Activity in the lifeboat&gt;</p>			



### 3.8 Painter release and lifeboat operation

No.	Operation Guide	Schematic Diagram
1	<p>Release <b>the painter</b>.</p> <p>&lt;Activity in the lifeboat&gt;</p>	
2	<p><b>Lifeboat operation</b></p> <p>Ahead, astern, turning, spray, lighting of interior light and canopy light, and other performances.</p> <p>&lt;Activity in the lifeboat&gt;</p>	



**Caution**

- Do not operate the steering gear to turn the lifeboat while the painter is connected.
- The lifeboat should get clear of the ship promptly when the painter has been released.

### 4 Recovery operation

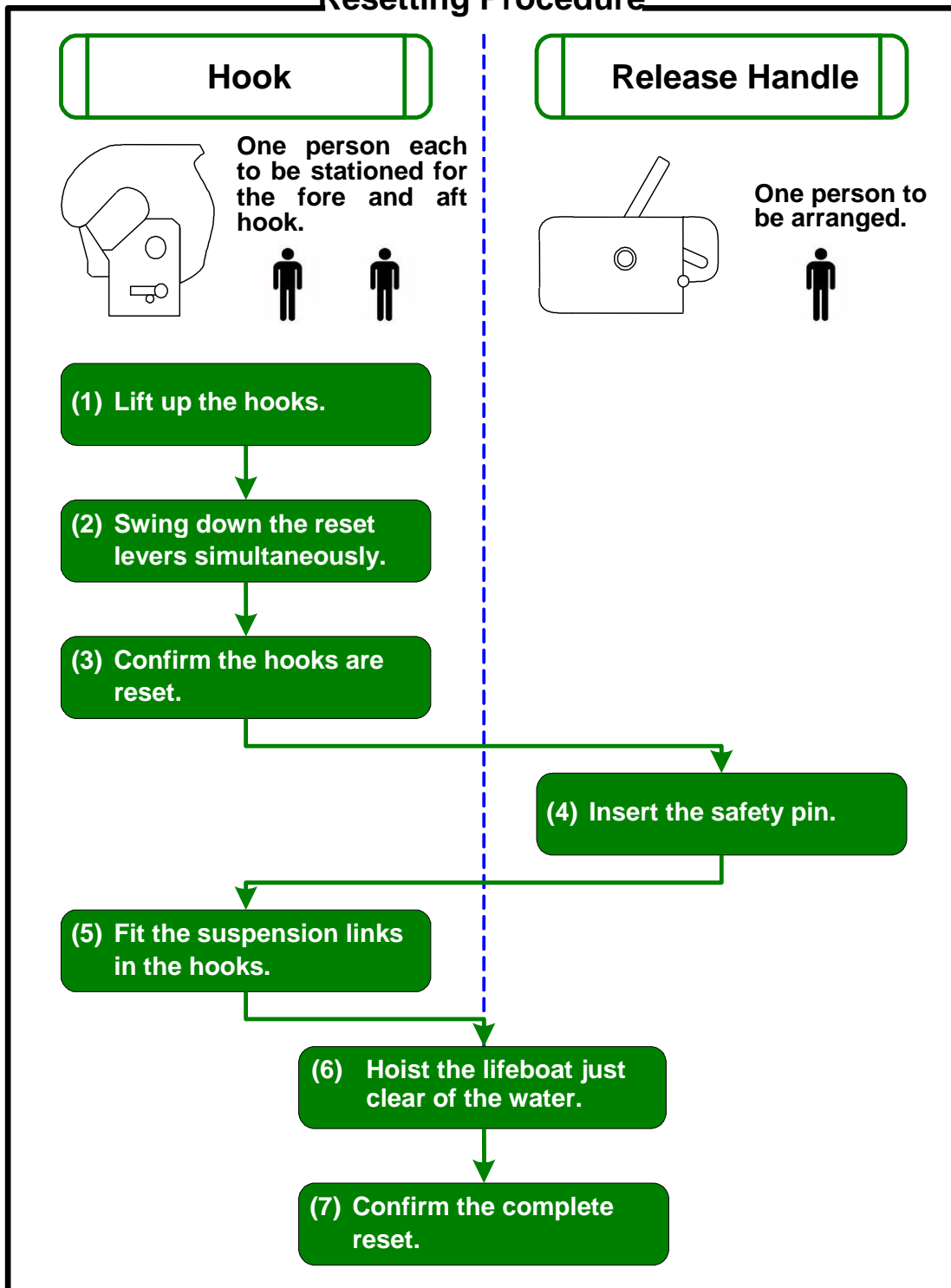
Outline of the resetting procedures is shown in the following figure.



**Warning**

- **Incomplete resetting may result in death or serious injury due to dropping of the lifeboat in the water from a height.**



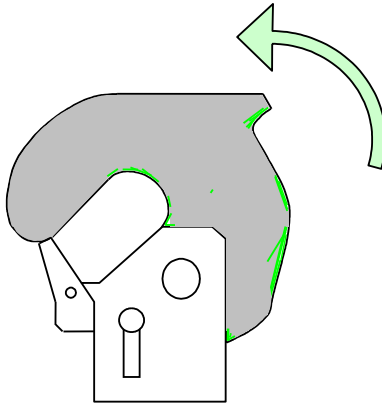



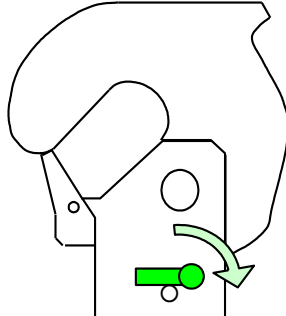



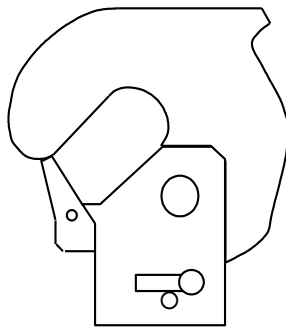

## Resetting Procedure



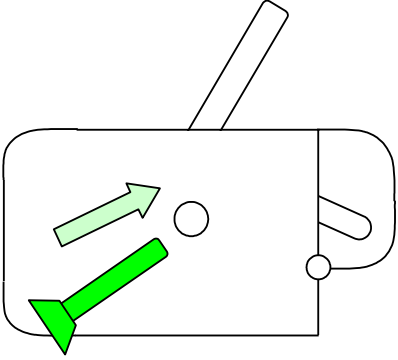



**4.1 Resetting procedure of release hook**

The resetting procedure is to be in accordance with the following steps.


 <b>Note</b>	<p>At least <b>three people</b> are required for the resetting of the hooks.</p>
--	--

No.	Operation Guide	Schematic Diagram		
1	<p>Lift the fore and aft hooks and hold them closed.</p> <table border="1" data-bbox="272 750 732 891"> <tr> <td style="text-align: center; vertical-align: middle;">  </td> <td> <p>A strong effort may be required to lift the hook and force the internal lock piece to engage.</p> </td> </tr> </table> <p>&lt;Activity in the lifeboat&gt;</p>		<p>A strong effort may be required to lift the hook and force the internal lock piece to engage.</p>	
	<p>A strong effort may be required to lift the hook and force the internal lock piece to engage.</p>			
2	<p>Simultaneously swing down the reset levers on both fore and aft hooks in one continuous action to contact with the stop.</p> <table border="1" data-bbox="272 1256 732 1469"> <tr> <td style="text-align: center; vertical-align: middle;">  </td> <td> <p>The release handle returns to its closed (locked) position automatically when the reset levers are swung down.</p> </td> </tr> </table> <p>&lt;Activity in the lifeboat&gt;</p>		<p>The release handle returns to its closed (locked) position automatically when the reset levers are swung down.</p>	
	<p>The release handle returns to its closed (locked) position automatically when the reset levers are swung down.</p>			
3	<p>Confirm the fore and aft hooks are in the normal reset positions.</p> <table border="1" data-bbox="272 1740 732 1845"> <tr> <td style="text-align: center; vertical-align: middle;">  </td> <td> <p>Make sure that the reset lever is in contact with the stop.</p> </td> </tr> </table> <p>&lt;Activity in the lifeboat&gt;</p>		<p>Make sure that the reset lever is in contact with the stop.</p>	
	<p>Make sure that the reset lever is in contact with the stop.</p>			

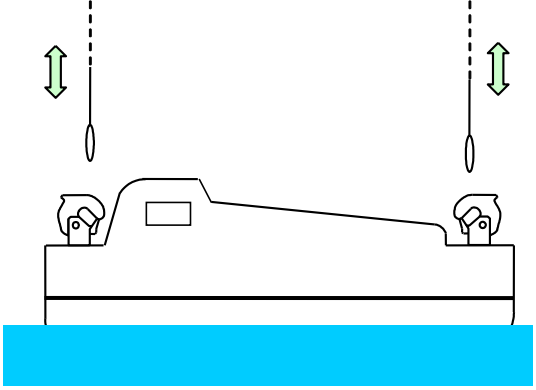
No.	Operation Guide	Schematic Diagram		
4	<p>Make sure that the release handle is in the closed (locked) position and insert the safety pin.</p> <table border="1" data-bbox="272 432 735 611"> <tr> <td data-bbox="272 432 395 611">  </td> <td data-bbox="395 432 735 611"> <p>If the release handle is not in its closed (locked) position, it is not possible to insert the safety pin.</p> </td> </tr> </table> <p>&lt;Activity in the lifeboat&gt;</p>		<p>If the release handle is not in its closed (locked) position, it is not possible to insert the safety pin.</p>	
	<p>If the release handle is not in its closed (locked) position, it is not possible to insert the safety pin.</p>			

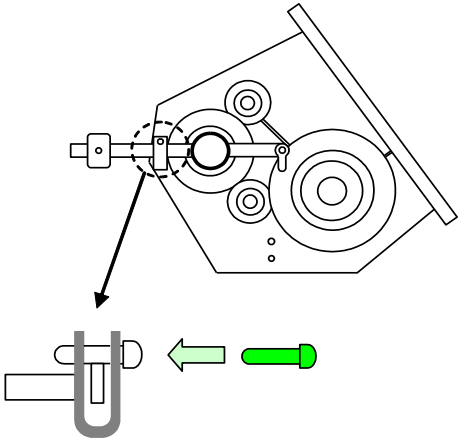
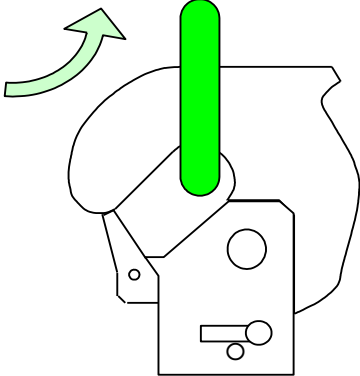


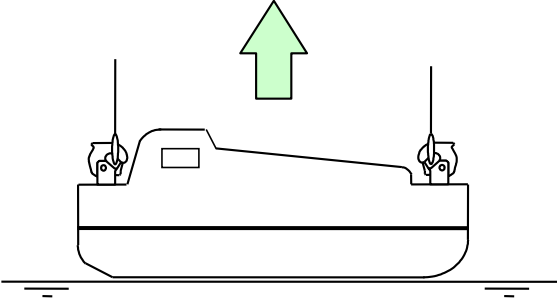

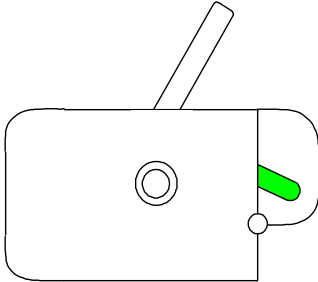
#### 4.2 Recovery procedure

The recovery procedure is to be in accordance with the following steps only after completing the release gear resetting.


 <p><b>Warning</b></p>	<ul style="list-style-type: none"> <li>• <b>Great care must be exercised in reconnecting the hooks that hands and fingers are kept clear.</b></li> <li>• <b>Failure to confirm proper resetting or to follow all steps below may result in death or serious injury due to dropping the lifeboat in water from a height.</b></li> </ul>
--	--


##### 4.2.1 Connection of the suspension link

No.	Operation Guide	Schematic Diagram
1	<p>Manoeuvre the lifeboat to come under boat falls.</p>	
2	<p>Adjust the heights of the suspension links by raising or lowering the boat falls.</p> <p>&lt;Activity on the ship&gt; and &lt;Activity in the lifeboat&gt; under good communication.</p>	

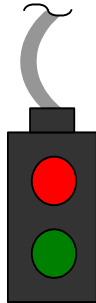
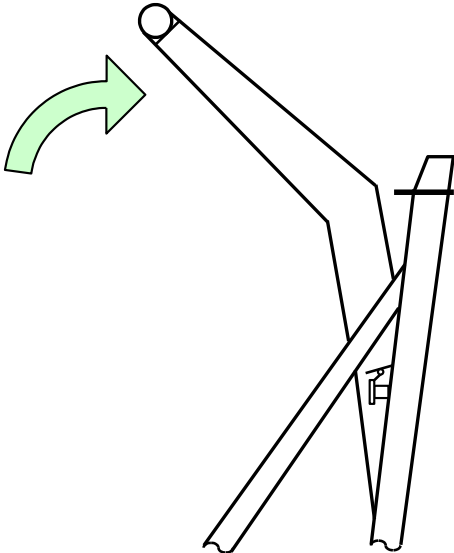
No.	Operation Guide	Schematic Diagram		
3	<p>Insert the <b>safety pin</b> of the boat winch handbrake.</p> <p>&lt;Activity on the ship&gt;</p>			
4	<p>Connect the <b>suspension links</b> of the davit simultaneously to both, fore and aft hooks.</p> <p>&lt;Activity in the lifeboat&gt;</p>			
5	<p>Hoist the lifeboat just clear of the water and stop hoisting.</p> <table border="1" data-bbox="268 1361 726 1464"> <tr> <td data-bbox="268 1361 389 1464" style="text-align: center;">  </td> <td data-bbox="389 1361 726 1464"> <p>Confirm that the fore and aft hooks are properly connected.</p> </td> </tr> </table> <p>&lt;Activity on the ship&gt; and &lt;Activity in the lifeboat&gt;</p>		<p>Confirm that the fore and aft hooks are properly connected.</p>	
	<p>Confirm that the fore and aft hooks are properly connected.</p>			
6	<p>Confirm that the <b>hydrostatic interlock lever</b> has moved to the "locked" position for the lifeboat not being waterborne.</p> <p>&lt;Activity in the lifeboat&gt;</p>			
7	<p>Where the resetting is incomplete, return to the first step.</p>			


**Do not conduct recovery operation of the lifeboat unless the above procedures are fully completed.**

 <b>Caution</b>	<ul style="list-style-type: none"> <li>✓ Do not connect the suspension link of the davit to the hooks until reset of the hooks has been fully completed. It is dangerous to connect the suspension link during the resetting operation of the hook and results an incomplete reset.</li> <li>✓ In case of using recovery strops, it is required to connect the bottom link of the strops instead of the suspension link to the hooks.</li> </ul>
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 <b>Warning</b>	<ul style="list-style-type: none"> <li>✓ Both hooks should be connected simultaneously to prevent damage due to excessive load on one hook.</li> <li>✓ If only one hook is connected, the lifeboat may be suspended by the single hook due to wave action resulting in injury or death.</li> </ul>
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#### 4.2.2 Hoisting the lifeboat

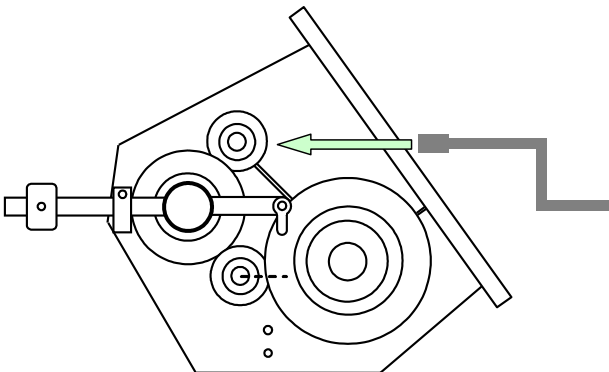
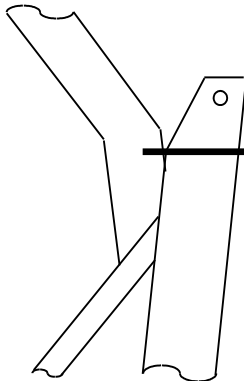
No.	Operation Guide	Schematic Diagram
1	<p>Hoist the lifeboat by operating the winch using the push-button switch following the instruction by the officer in charge.</p> <p>&lt;Activity on the ship&gt;</p>	
2	<p>Hoist the lifeboat until the winch is stopped by the limit switch.</p> <p>&lt;Activity on the ship&gt;</p>	

 <b>Caution</b>	<ul style="list-style-type: none"> <li>• The boat winch stops automatically when the davit arm strikes the limit switch.</li> <li>• Where the limit switch of boat winch does not work correctly, the winch operator should manually stop the hoisting operation immediately.</li> </ul>
---	--

No.	Operation Guide	Schematic Diagram
3	Disembark from the lifeboat. <Activity on the ship> and <Activity in the lifeboat>	

**4.3 Stowage procedure**

 <b>Note</b>	Position <b>two persons</b> on davit platform to watch for proper stowage.
--	--

No.	Operation Guide	Schematic Diagram
1	Hoist the davit arm manually. <Activity on the ship>	
2	Confirm that the davit arm is in contact with the stop on platform. <Activity on the ship>	

 <b>Caution</b>	<ul style="list-style-type: none"> <li>• Each person on the platform should signal to the winch operator just when the davit arm reaches the stop on the frame.</li> <li>• Confirm that the davit arm and the stops are in contact fore and aft.</li> </ul>
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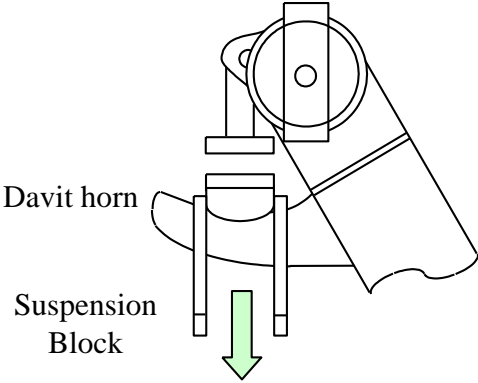



**Warning**


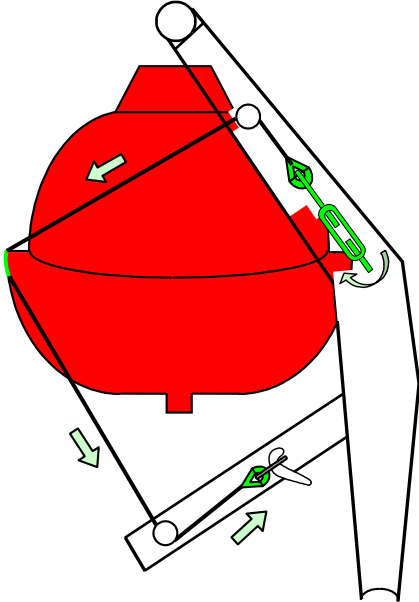
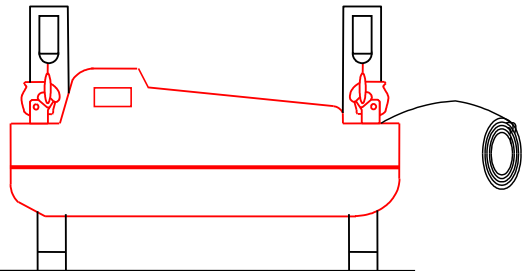
- Stop the hoisting operation immediately when the signal from the watchman is received.
- Over hoisting by manual operation may have serious consequences due to damage of the boat fall and the davit.

No.	Operation Guide	Schematic Diagram
3	<p>Detach the manual hoisting handle.</p> <p>&lt;Activity on the ship&gt;</p>	
4	<p>Set the davit arm stop immediately.</p> <p>&lt;Activity on the ship&gt;</p>	
5	<p>Insert the safety pin to the davit arm stop handle.</p> <p>&lt;Activity on the ship&gt;</p> <p>Note: Safety pins are generally intended only for use during maintenance or in port.</p>	



No.	Operation Guide	Schematic Diagram
6	<p>Lower the suspension block on the davit horn by releasing the handbrake of the winch.</p> <p>&lt;Activity on the ship&gt;</p>	 <p>Davit horn</p> <p>Suspension Block</p>

	<ul style="list-style-type: none"> <li>If the suspension blocks are not on the davit horn, the boat falls remain in tension during sea going and the load may cause damage to the boat falls.</li> </ul>
<p><b>Warning</b></p>	

No.	Operation Guide	Schematic Diagram
7	<p>Install and tighten the auto release gripe, if fitted.</p> <p> Tighten the auto release gripe rope with the turnbuckle.</p> <p>&lt;Activity on the ship&gt;</p>	
8	<p>Connect the painter to the painter release hook on the bow of lifeboat.</p> <p>&lt;Activity on the ship&gt;</p>	

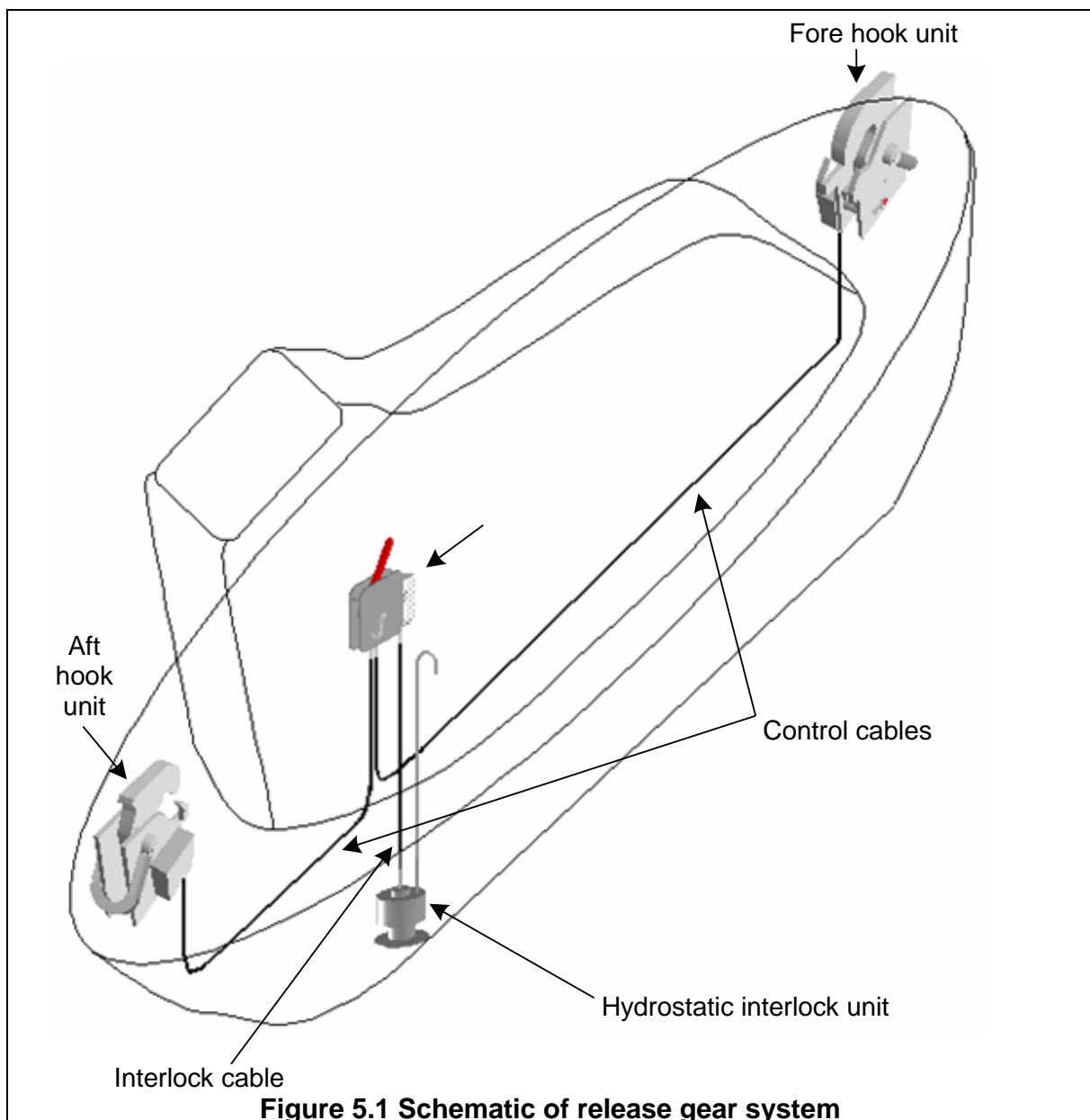
## 5 On-load/off-load release gear system

### 5.1 General

This section describes the details of the release gear system. Read this section carefully for safe operation. This release gear system consists of fore and aft hooks, a release handle near the steering console, a hydrostatic unit and the associated cables (see figure 5.1).

The releasing operation of the hooks is conducted at the release handle near the steering console through the control cables terminating at the fore and aft hooks. The interlock system including the hydrostatic interlock unit is provided to prevent the release of the hooks when the boat is not waterborne.

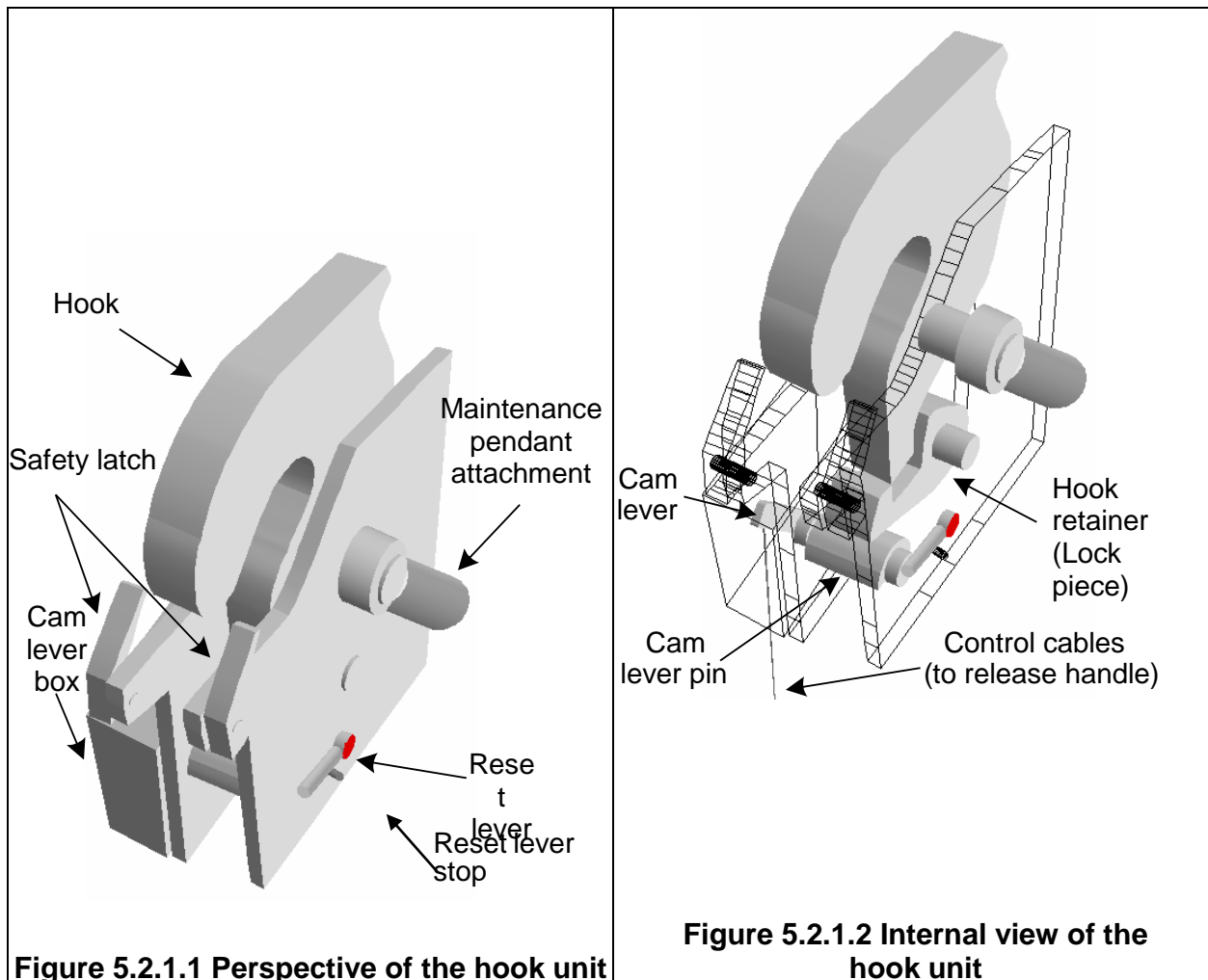
The system also has an on-load release function which makes it possible to over-ride the interlock by the hydrostatic unit. Incorrect on-load release operation may cause fatalities and due precautions should be taken for this operation.



## 5.2 Fore and aft hook units

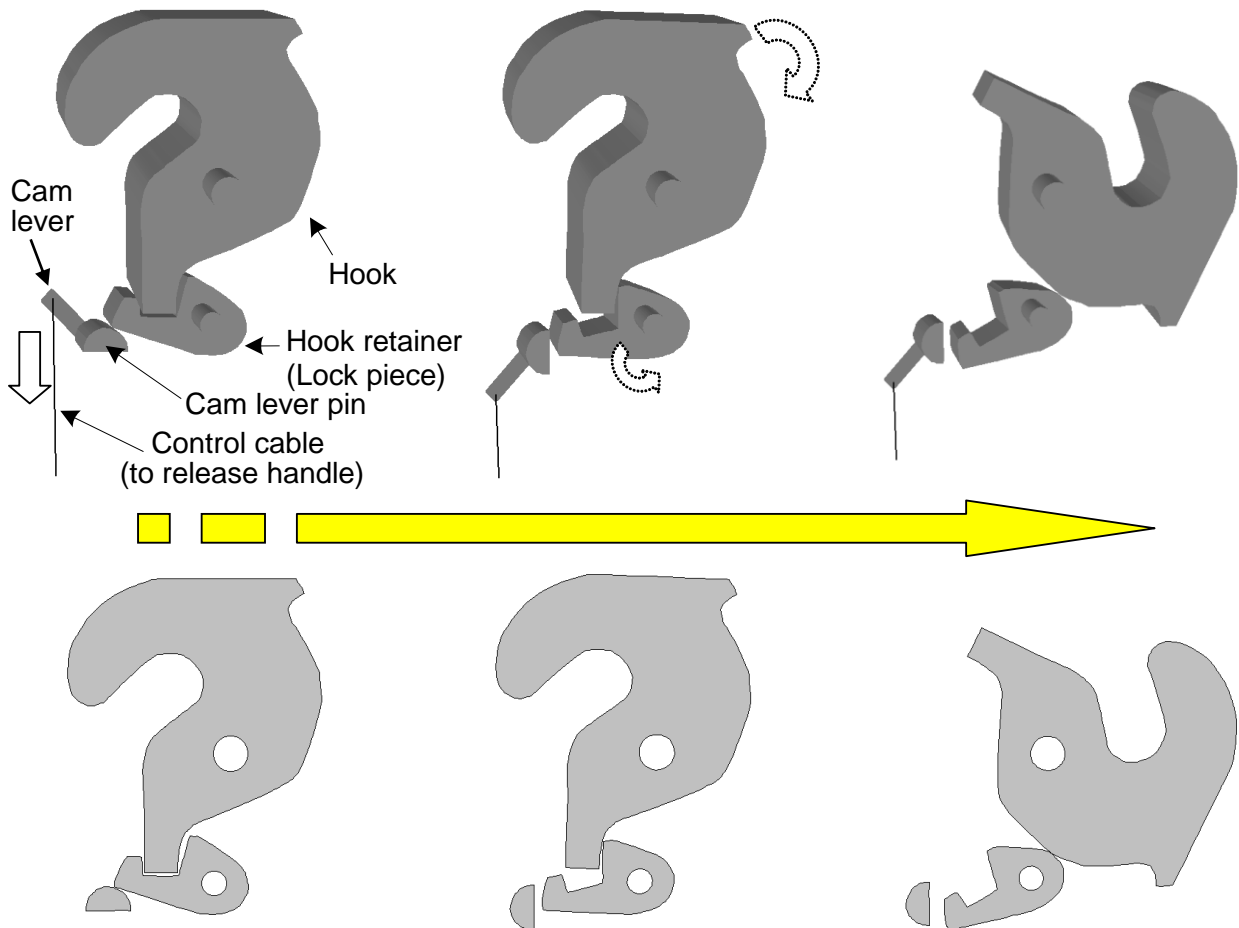
### 5.2.1 Structure and parts names

The structure and parts names of the fore and aft hooks are shown in figures 5.2.1.1 and 5.2.1.2. The fore and aft hooks are generally identical except for the direction of installation.



### 5.2.2 Releasing

When the release handle near the steering console is pulled, the cam lever pin is turned by the control cable and the lock piece is then made free. Finally, the hook is turned and released (see figure 5.2.2).



**Figure 5.2.2 Release principle of the hook unit**

### 5.2.3 Resetting

After the resetting of hooks, the posture of each hook is held by the lock piece and the lock piece is locked by the cam lever with the reset lever. To ensure the proper resetting of the fore and aft hooks, the procedures described in paragraph 4.1 should be followed. The fore and aft reset levers must be operated simultaneously. After simultaneous resetting of the hooks, the release handle near the steering console also returns to the closed position (see figure 5.2.3).

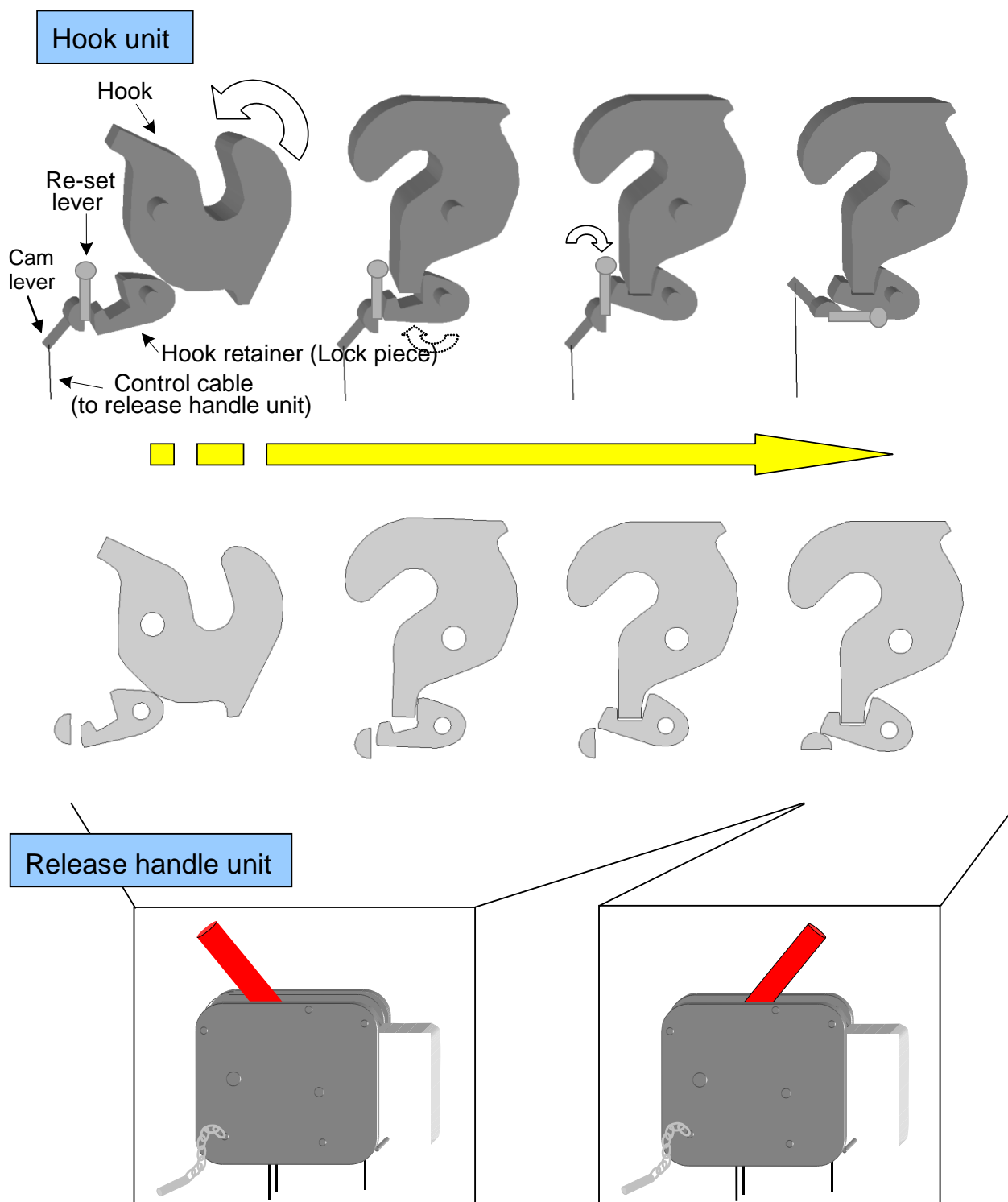
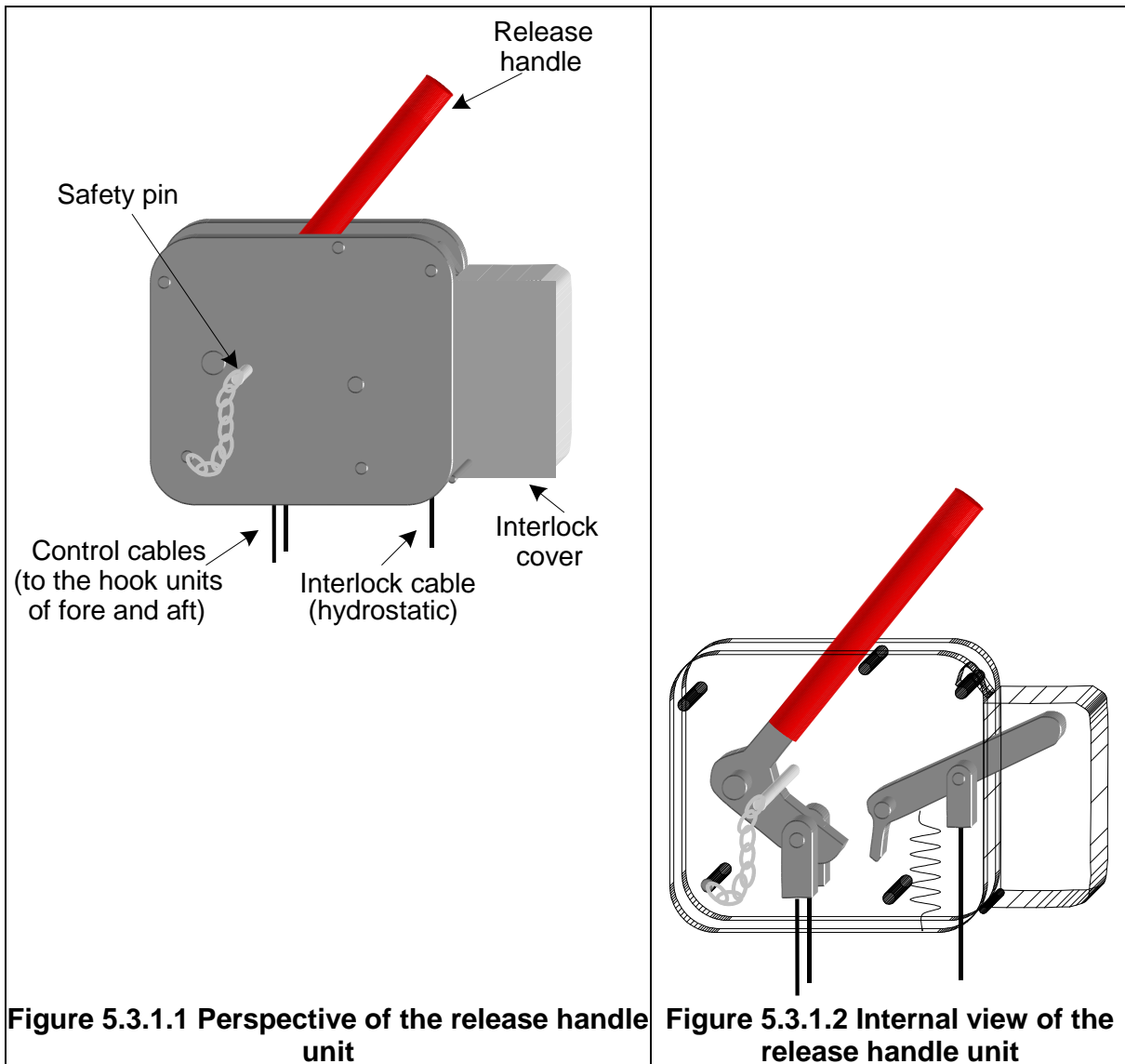


Figure 5.2.3 Reset principle of the hook unit

### 5.3 Release handle unit

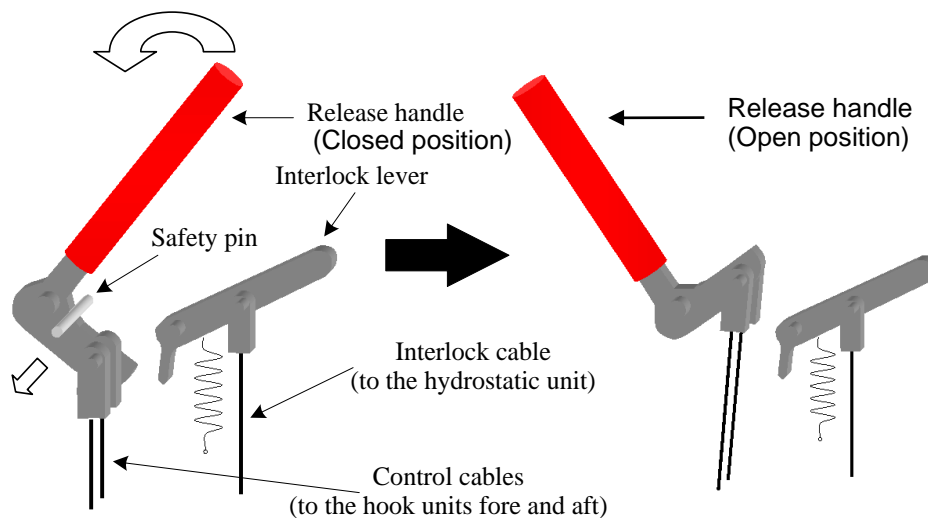
#### 5.3.1 Structure and parts names

The structure and parts names of the release handle are shown in figures 5.3.1.1 and 5.3.1.2.



#### 5.3.2 Operation

When the lifeboat is fully waterborne, the lifeboat can be released by removing the safety pin and then pulling the release handle fully and quickly to the open position (off-load release). The lifeboat can also be released by the same operation of the release handle even though the lifeboat is not fully waterborne, by opening the interlock cover and lifting up the interlock lever. This over-rides the interlock function of the hydrostatic interlock unit (on-load release).

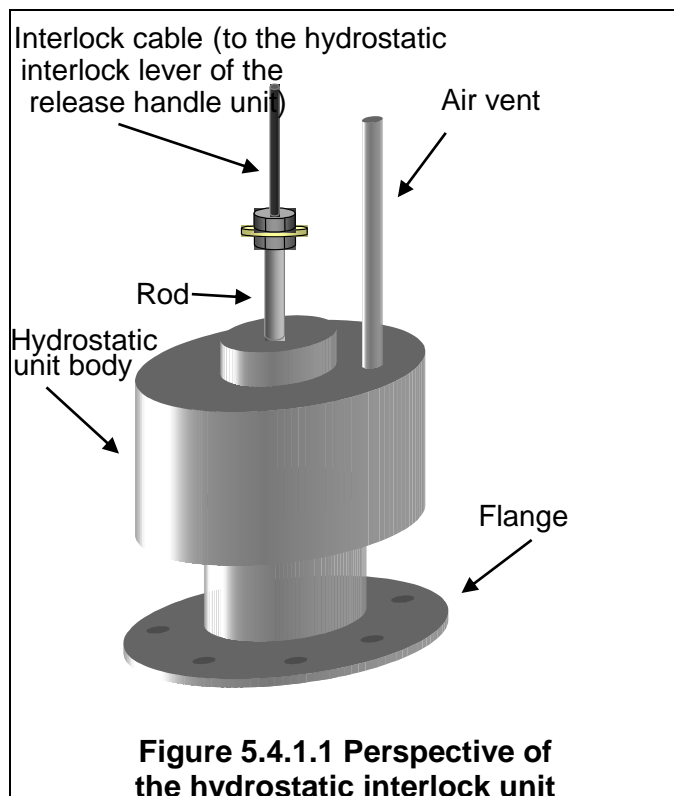


**Figure 5.3.2 Operation procedure of the release handle**

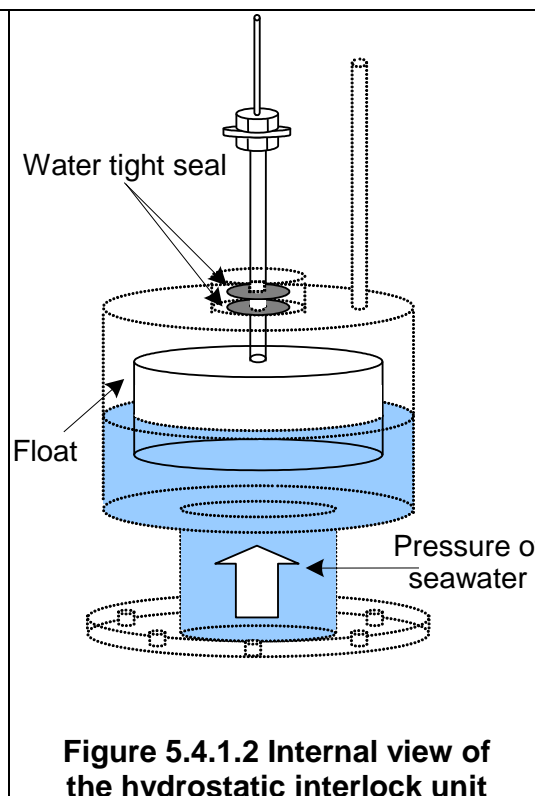
**5.4 Hydrostatic interlock unit**

**5.4.1 Structure and parts name**

Structure and parts names of the hydrostatic interlock unit are shown in figures 5.4.1.1 and 5.4.1.2.



**Figure 5.4.1.1 Perspective of the hydrostatic interlock unit**



**Figure 5.4.1.2 Internal view of the hydrostatic interlock unit**

## 5.4.2 Operation

When the lifeboat is fully waterborne, the hydrostatic interlock unit pushes up the interlock lever through the interlock cable by the water lifting the float and thus allowing the release handle to be operated. Contrary to this, operation of the release handle is not allowed by the hydrostatic interlock unit when the lifeboat is not fully waterborne.

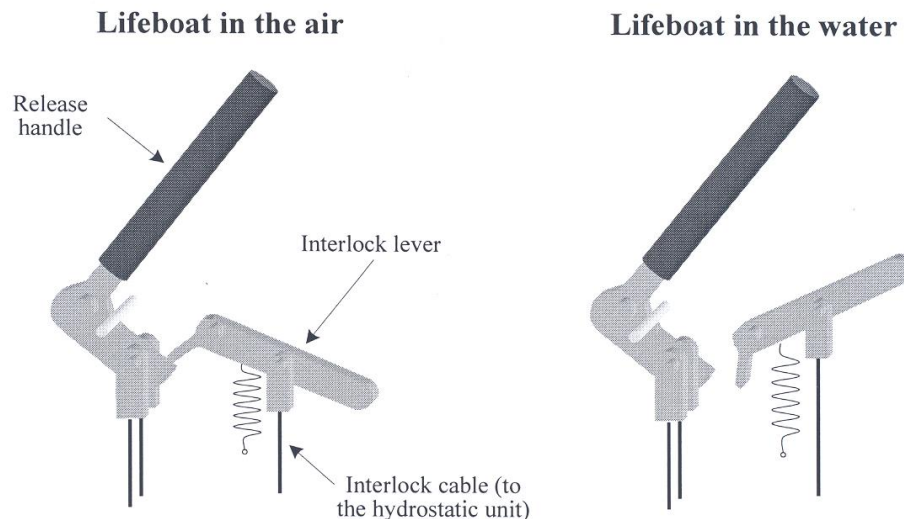


Fig. 5.4.2 Schematic diagram of the interlock

## 6 Inspection and maintenance

### 6.1 General precautions

6.1.1 SOLAS regulation III/20 requires that all life-saving appliances shall be in working order and ready for immediate use before the ship leaves port and at all times during the voyage. Lifeboats, launching appliances and release gear are required by SOLAS regulation III/20 to be inspected weekly and monthly according to the instructions for on-board maintenance complying with the requirements of SOLAS regulation III/36. Also, MSC.1/Circ.1206/Rev.1 describes more detailed procedures for periodic servicing and maintenance of lifeboats, launching appliances and release gear.

6.1.2 This manual includes only the weekly and monthly inspection and maintenance, which are conducted on board under the direct supervision of a senior ship's officer.

### 6.2 Inspection and maintenance of lifeboat and release gear system

#### 6.2.1 Inspection and maintenance plan

Lifeboats should be inspected and maintained weekly and monthly in accordance with the following tables. The tables list the items to be checked, the method of inspection, the procedures to be followed, and the frequency at which the items are to be attended to.



Table 6.2.1.1 covers the basic lifeboat (including release gear).

Table 6.2.1.2 covers the lifeboat engine.

Table 6.2.1.3 covers the electric parts.

Table 6.2.1.4 covers the lifeboat equipment.

**Table 6.2.1.1 – Inspection procedure and maintenance plan for boat**

Items		Method	Inspection procedure	Maintenance plan	
				Weekly	Monthly
Outside hull		Visual	Inspect for deformation or other defects. Inspect for peeling or any damage of retro-reflective material.	X	X
Outside canopy		Visual	Inspect for deformation or other defects.	X	X
Buoyant lifeline		Visual	Inspect for any damage.	X	X
Foldable canopy <sup>*1</sup>		Visual	Inspect for any damage to canopy.	X	X
Inside boat	GRP	Visual	Inspect for deformation or other defects.	X	X
	Wood	Visual	Inspect for crack or rot.	X	X
	Metal	Visual	Inspect for corrosion.	X	X
Drain valve		Visual	Inspect for any damage.	X	X
Release gear		Visual	Check resetting condition. Remove any dirt on moving parts.	X	X
Painter release device		Visual	Check resetting condition. Remove any dirt on moving parts.	X	X
All hatches		Visual Operation	Inspect for easy operation and good condition of gasket.	X	X
Window		Visual	Inspect for any crack on glass. Clean both sides of glass.		X
Steering gear		Visual	Inspect for any damage of rudder, tiller and emergency tiller.	X	X
		Operation	Inspect for good operation of main steering and connecting emergency tiller.	X	X
Stern tube		Visual	Inspect gasket and check for leakage of seawater.	*2	*2
Propeller and guard		Visual	Inspect for any damage.	X	X
Breather valve		Operation	Inspect operation of valve.		X
Water spray system	Clutch V-belt	Visual	Inspect for proper tension of V-belt. Inspect for any damage of belt.		X
		Operation	Inspect for proper operation.		X
	Spray pipe	Visual	Inspect for corrosion or any damage.		X
	Spray nozzle	Visual	Remove any deposit.		X
Air support system	High pressure pipe	Visual	Inspect for any damage.		X
	Regulator	Visual	Inspect for any damage.		X
	Air cylinder	Visual	Inspect for corrosion or any damage.		X

Note: 1      Applicable only to partially enclosed lifeboats.  
2      When waterborne.

**Table 6.2.1.2 – Inspection procedure and maintenance plan for engine**

Items	Method	Inspection procedure	Maintenance plan	
			Weekly	Monthly
Engine	Visual	Check in good condition.		X
	Operation	Start and operate the engine. Check operation of throttle. Check operation of clutch.	X	X
Lubricating oil	Visual	Check an amount of oil.		X
	Visual	Check viscosity of oil with finger and ensure it's not dirty.		X
Fuel oil tank	Visual	Check securing condition of the tank (corrosion or leakage and connecting parts). Check an amount of fuel oil.		X
Fuel oil pipe	Visual	Check any leakage on connecting parts.		X
Water cooler	Visual	Check an amount of fresh water.		X
Cooling water pipe	Visual	Check any leakage on pipe.		X
Starter switch	Operation	Check operating properly.	X	X
Glow lamp	Operation	Check light on when pre-heating.	X	X
Tachometer	Operation	Check proper indication of revolution.	X	X
Oil pressure warning lamp, Charge lamp	Operation	Check proper light on or light off condition.	X	X
Stop wire	Operation	Stop the engine.	X	X

**Table 6.2.1.3 - Inspection procedure and maintenance plan for electric parts**

Items	Method	Inspection procedure	Maintenance plan	
			Weekly	Monthly
Battery	Visual	Check lead wire.		X
	Measure	Measure voltage of battery. When voltage is low, charge battery.		X
Inside lamp	Operation	Check light on.		X
Canopy lamp	Operation	Check light on.		X
Search light	Operation	Check light on.		X
Electric wiring	Visual	Check any defects on wiring.		X

**Table 6.2.1.4 – Inspection procedure and maintenance plan for lifeboat equipment**

Check for condition, quantity and expiry date where applicable

No.	Items	Maintenance plan	
		Weekly	Monthly
1	Oars		X
2	Thole pins or crutches		X
3	Boat hooks		X
4	Buoyant bailer		X
5	Buckets		X
6	Survival manual	X	X
7	Compass		X
8	Sea-anchor		X
9	Painters		X
10	Hatchets		X
11	Watertight receptacle and fresh water		X
12	Dipper with lanyard		X
13	Graduated drinking vessel		X
14	Food ration in watertight container		X
15	Rocket parachute flare		X
16	Hand flare		X
17	Buoyant smoke signal		X
18	Waterproof electric torch		X
19	One daylight signalling mirror		X
20	One copy of life-saving signals	X	X
21	One whistle		X
22	A first-aid kit		X
23	Anti-seasickness medicine		X
24	One seasickness bag for each person		X
25	A jack knife		X
26	Three tin openers		X
27	Two buoyant rescue quoits		X
28	A manual pump	X	X
29	One set of fishing tackle		X
30	Portable fire-extinguishing equipment		X
31	A radar reflector		X
32	Thermal protective aids		X
33	Compartments for storage		X
34	A means for collecting rainwater		X
35	A boarding ladder		X
36	Seat belts		X
37	Instructions of immediate action	X	X
38	Water resistant instructions	X	X

## 6.2.2 On board maintenance procedures

### 6.2.2.1 General

As a result of inspection, any defective parts should be repaired in accordance with following procedures. Any shortage of quantity should be supplemented to the correct number. Defective parts other than the following should be recorded along with their details and ordered for maintenance and repair by the manufacturers.

#### 6.2.2.2 *Boat*

##### 6.2.2.2.1 *Rust on metal parts*

Give anti-rusting treatment according to degree of damage, or replace if significantly wasted.

##### 6.2.2.2.2 *Damage of fabric*

Repair fabric products by same material according to degree of damage.

##### 6.2.2.2.3 *Gasket*

Repair with adhesive sealant according to degree of damage.

##### 6.2.2.2.4 *Drain valve*

Remove any dirt and check correct operation.

##### 6.2.2.2.5 *Water spray system*

Remove any deposit from spray nozzles. Tighten up pipe connecting parts when any leakage was noted. Adjust to proper tension on V-belt.

#### 6.2.2.3 *Engine*

##### 6.2.2.3.1 *Oil coating and filling*

When any rust exists, remove rust and coat with machine oil. Rotating parts should be filled with lubricating oil.

##### 6.2.2.3.2 *Operating test*

An operational test of the engine should be carried out on board the ship and in the afloat condition after launching at an appropriate opportunity to check the running condition. After the operational test, ensure that the valves for the cooling water line are opened and flushed with fresh water and drained completely.

#### 6.2.2.4 *Electric parts*

##### 6.2.2.4.1 *Battery*

Fill up battery with electrolyte if level is below the designated position. Tighten up electric terminal if it is loose.

### **6.3 *Inspection and maintenance of launching appliances (davits and winches)***

#### **6.3.1 *Inspection and maintenance plan***

Launching appliances should be inspected and maintained weekly and monthly in accordance with the following tables. The tables list the items to be checked, the method of inspection, the procedure to be followed, and the frequency at which the items are to be attended to.

Table 6.3.1.1 covers the davit.

Table 6.3.1.2 covers the winch.

Table 6.3.1.3 covers the electric parts.

**Table 6.3.1.1 – Inspection procedure and maintenance plan for davit**

Items	Method	Inspection procedure	Maintenance plan	
			Weekly	Monthly
Frame	Visual	Check corrosion, deformation and depression.	X	X
Davit arms	Visual	Check corrosion, deformation and depression.	X	X
	Operation	Moving out from stowed position.	X	
	Operation	Turning out from stowed position.		X
Sheave, suspension block	Visual	Check wear and corrosion.		X
	Operation	Check moving condition.	X	X
	Lubricate	Lubricate/grease.		X
Hinge pin, sheave pin	Lubricate	Lubricate/grease.		X
Davit arm stopper and trigger hook	Visual	Check wear and corrosion.	X	X
	Operation	Check moving condition.	X	X
	Lubricate	Lubricate/grease.		X
Boat fall, Turn buckle	Visual	Check wear, breakage of wire and corrosion.		X
	Lubricate	Lubricate/grease.		X
	Turn ends	Turn ends of boat fall (2.5 years).		
	Replacing	Replacing boat fall (5 years).		
Lashing wire rope	Visual	Check wear, corrosion and looseness.	X	X
Deck operation device	Operation	Check moving condition.		X
	Lubricate	Lubricate/grease.		X
Remote control wire	Visual	Check wear and corrosion.	X	X
	Operation	Check moving condition.		X
	Lubricate	Lubricate/grease.		X
Boat chock	Visual	Check wear and corrosion.	X	X

**Table 6.3.1.2 – Inspection procedure and maintenance plan for winch**

Items	Method	Inspection procedure	Maintenance plan	
			Weekly	Monthly
Gear box, gear, bearing, oil seal	Visual	Check level and deterioration of lubricating oil.		X
	Operation	Check unusual noise.		X
Brake system, Centrifugal brake	Visual	Check corrosion or any defects.	X	X
Wire end cotter	Visual	Check looseness.		X
Brake lever	Visual	Check corrosion or any defects.	X	X
	Operation	Check operating condition.	X	X
Speed change lever	Lubricate	Lubricate/grease.	X	X

**Table 6.3.1.3 – Inspection procedure and maintenance plan for electric parts**

Items	Method	Inspection procedure	Maintenance plan	
			Weekly	Monthly
Electric motor	Visual	Check wiring.	X	X
	Operation	Check normal operation.		X
Limit switch	Visual	Check wiring.	X	X
	Operation	Check normal operation.		X
	Lubricate	Lubricate/grease.		X
Push-button switch box and cable	Visual	Check wiring and other defects.	X	X
	Operation	Check normal operation.		X
Start panel	Visual	Check wiring and other defects.	X	X
	Operation	Check normal operation.		X

### 6.3.2 On-board maintenance procedure

#### 6.3.2.1 General

As a result of inspection, any defective parts should be repaired in accordance with following procedures. Any shortage of quantity should be supplemented to correct number. Defective parts other than the following should be recorded along with their details and ordered for maintenance and repair by the manufacturers.

#### 6.3.2.2 Wire rope

6.3.2.2.1 Wire ropes should be changed in the following cases:

- .1 break of elemental wire was observed;
- .2 7% reduction of nominal diameter was observed;
- .3 kink or looseness of ply was observed; or
- .4 erosion/corrosion was observed.

6.3.2.2.2 Check fixing condition of wire ropes.

6.3.2.2.3 Change the boat falls within an appropriate period.

6.3.2.2.4 Adjust the length of boat falls as necessary so that the clearances between the davit arm and davit arm stopper at fore and aft are almost the same.

6.3.2.2.5 Ensure that material and diameter of suspension links are as specified by the release gear manufacturer.

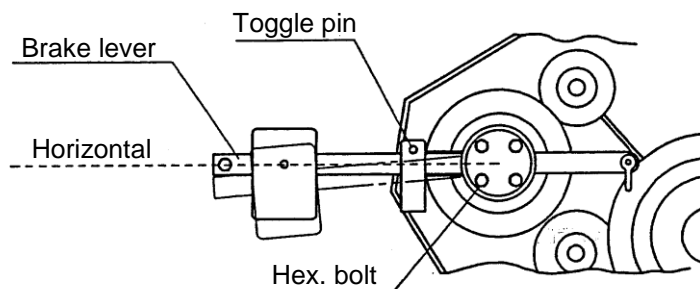
#### 6.3.2.3 Boat winch

6.3.2.3.1 Prior to commencement of the maintenance work for the winch, the boat should be secured to prevent movement.

6.3.2.3.2 Oil should be checked and changed if discoloured. In case that oil level is low, oil should be added until the its surface comes to the designated level in the oil gauge.

6.3.2.3.3 Surfaces of each gear inside the gear box should be checked. In case that a defect is found on a surface of gear, the gear box should be replaced or repaired.

6.3.2.3.4 In case that the angle of brake lever has dropped due to abrasion of the brake lining, the angle of the brake lever should be adjusted by loosening the bolts, adjusting the angle and tightening the bolts again.



#### 6.3.2.4 Greasing

6.3.2.4.1 Lubrication is essential for the function of the davit and winch and regular checking is necessary. Greasing also should be regularly conducted. For appropriate greasing, the detailed structure of the davit and winch and the functions of their parts should be understood.

6.3.2.4.2 All grease nipples of the davit should be greased at least once a month.

6.3.2.4.3 Gear oil inside the boat winch should regularly be checked regarding amount, change of colour and mixture of moisture.

6.3.2.4.4 Wire rope oil/grease should be regularly checked to prevent loss of oil/grease. Wire rope should be oiled or greased every two months in general.

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**REVISED GUIDELINES ON ALTERNATIVE DESIGN AND ARRANGEMENTS FOR  
SOLAS CHAPTERS II-1 AND III**

1 The Maritime Safety Committee, at its eighty-second session (29 November to 8 December 2006), approved *Guidelines on alternative design and arrangements for SOLAS chapters II-1 and III*, developed to provide further guidance on SOLAS regulations II-1/55 and III/38, which were adopted by resolution MSC.216(82) and entered into force on 1 January 2009.

2 The Guidelines serve to outline the methodology for the engineering analysis required by SOLAS regulations II-1/55 and III/38 on Alternative design and arrangements, applying to a specific engineering or life-saving system, design or arrangements for which the approval of an alternative design deviating from the prescriptive requirements of SOLAS chapters II-1 and III is sought.

3 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), approved amendments to the *Guidelines on alternative design and arrangements for SOLAS chapters II-1 and III* (MSC.1/Circ.1212), prepared by the Sub-Committee on Ship Systems and Equipment, at its sixth session.

4 Member Governments are invited to bring the revised Guidelines set out in the annex to the attention of shipowners, shipbuilders and designers for the facilitation of design within the framework of SOLAS regulations II-1/55 and III/38.

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## ANNEX

### REVISED GUIDELINES ON ALTERNATIVE DESIGN AND ARRANGEMENTS FOR SOLAS CHAPTERS II-1 AND III

#### 1 Application

1.1 These Guidelines are intended for application of safe engineering design to provide technical justification for alternative design and arrangements to SOLAS chapters II-1 (parts C, D and E) and III. The Guidelines serve to outline the methodology for the engineering analysis required by part F (Alternative design and arrangements) of SOLAS chapter II-1 and part C (Alternative design and arrangements) of SOLAS chapter III, applying to a specific safety system, design or arrangements for which the approval of an alternative design deviating from the prescriptive requirements of SOLAS chapters II-1 and III is sought.

1.2 These Guidelines are not intended to be applied to the type approval of individual materials, components or portable equipment.

1.3 These Guidelines are not intended to serve as a stand-alone document, but should be used in conjunction with the appropriate engineering design guides and other literature.

1.4 For the application of these Guidelines to be successful, all interested parties, including the Administration or its designated representative, owners, operators, designers and classification societies, should be in continuous communication from the onset of a specific proposal to utilize these Guidelines. This approach usually requires significantly more time in calculation and documentation than a typical regulatory prescribed design because of increased engineering rigor. The potential benefits include more options, cost effective designs for unique applications and an improved knowledge of loss potential.

#### 2 Definitions

For the purpose of these Guidelines, the following definitions apply:

2.1 *Alternative design and arrangements* means measures which deviate from the prescriptive requirement(s) of SOLAS chapters II-1 or III, but are suitable to satisfy the intent of that chapter. The term includes a wide range of measures, including alternative shipboard structures and systems based on novel or unique designs, as well as traditional shipboard structures and systems that are installed in alternative arrangements or configurations.

2.2 *Design casualty* means an engineering description of the development and severity of a casualty for use in a design scenario.

2.3 *Design casualty scenario* means a set of conditions that defines the development and severity of a casualty within and through ship space(s) or systems and describes specific factors relevant to a casualty of concern.

2.4 *Functional requirements* explain, in general terms, what function the system under consideration should provide to meet the safety objectives of SOLAS.

2.5 *Performance criteria* are measurable quantities to be used to evaluate the adequacy of trial designs.

2.6 *Prescriptive based design or prescriptive design* means a design of safety measures which comply with the regulatory requirements set out in parts C, D and E of SOLAS chapter II-1 and/or chapter III, as applicable.

2.7 *Safety margin* means adjustments made to compensate for uncertainties in the methods and assumptions used to evaluate the alternative design, e.g. in the determination of performance criteria or in the engineering models used to assess the consequences of a casualty.

2.8 *Sensitivity analysis* means an analysis to determine the effect of changes in individual input parameters on the results of a given model or calculation method.

2.9 SOLAS means the International Convention for the Safety of Life at Sea, 1974, as amended.

### **3 Engineering analysis**

3.1 The engineering analysis used to show that the alternative design and arrangements provide the equivalent level of safety to the prescriptive requirements of SOLAS chapters II-1 and III should follow an established approach to safety design. This approach should be based on sound science and engineering practice incorporating widely accepted methods, empirical data, calculations, correlations and computer models as contained in engineering textbooks and technical literature.

3.2 Other safety engineering approaches recognized by the Administration may be used.

### **4 Design team**

4.1 A design team acceptable to the Administration should be established by the owner, builder or designer and may include, as the alternative design and arrangements demand, a representative of the owner, builder or designer, and expert(s) having the necessary knowledge and experience in safety, design and/or operation as necessary for the specific evaluation at hand. Other members may include marine surveyors, ship operators, safety engineers, equipment manufacturers, human factors experts, naval architects and marine engineers.

4.2 The level of expertise that individuals should have to participate in the team may vary depending on the complexity of the alternative design and arrangements for which approval is sought. Since the evaluation, regardless of complexity, will have some effect on a particular field of safety, at least one expert with knowledge and experience in that appropriate safety field should be included as a member of the team.

4.3 The design team should:

- .1 appoint a coordinator serving as the primary contact;
- .2 communicate with the Administration for advice on the acceptability of the engineering analysis of the alternative design and arrangements throughout the entire process;
- .3 determine the safety margin at the outset of the design process and review and adjust it as necessary during the analysis;

- .4 conduct a preliminary analysis to develop the conceptual design in qualitative terms. This includes a clear definition of the scope of the alternative design and arrangements and the regulations which affect the design; a clear understanding of the intent requirements of the relevant regulations; the development of appropriate casualty scenarios, if necessary, and trial alternative designs. This portion of the process is documented in the form of a report that is reviewed and agreed by all interested parties and submitted to the Administration before the quantitative portion of the analysis is started;
- .5 conduct a quantitative analysis to evaluate possible trial alternative designs using quantitative engineering analysis. This consists of the specification of design thresholds, development of performance criteria based upon the performance of an acceptable prescriptive design and evaluation of the trial alternative designs against the agreed performance criteria. From this step the final alternative design and arrangements are selected and the entire quantitative analysis is documented in a report; and
- .6 prepare documentation, specifications and a life-cycle maintenance programme. The alternative design and arrangements should be clearly documented and approved by the Administration and a comprehensive report describing the alternative design and arrangements and required maintenance programme should be kept on board the ship. An operations and maintenance manual should be developed for this purpose. The manual should include an outline of the design conditions that should be maintained over the life of the ship to ensure compliance with the approved design.

## **5 Preliminary analysis in qualitative terms**

### **5.1 Definitions of scope**

5.1.1 The ship, ship system(s), component(s), space(s) and/or equipment subject to the analysis should be thoroughly defined. This includes the ship or system(s) representing both the alternative design and arrangements and the regulatory prescribed design. Depending on the extent of the desired deviation from prescriptive requirements, some of the information that may be required includes: detailed ship plans, drawings, equipment information and drawings, test data and analysis results, ship operating characteristics and conditions of operation, operating and maintenance procedures, material properties, etc.

5.1.2 The regulations affecting the proposed alternative design and arrangements, along with their functional requirements, should be clearly understood and documented in the preliminary analysis report (see paragraph 5.5). This should form the basis for the evaluation referred to in paragraph 6.4.

### **5.2 Development of casualty or operational scenarios**

Casualty or operational scenarios should provide the basis for analysis and trial alternative design evaluation and, therefore, are the backbone of the alternative design process. Proper casualty or operational scenario development is essential and, depending on the extent of deviation from the prescribed design, may require a significant amount of time and resources. This phase should outline why an alternative design may be beneficial. For life-saving arrangements, this may focus on casualty scenarios where an alternative design or arrangement will provide an equivalent (or greater) level of safety. Mechanical or electrical arrangements may focus on an operational scenario that will provide an equivalent level of safety, but may increase efficiencies or reduce cost to the operator.

### **5.3 Casualty scenario development**

#### **5.3.1 General**

Casualty scenario development can be broken down into four areas:

- .1 identification of hazards;
- .2 enumeration of hazards;
- .3 selection of hazards; and
- .4 specification of design casualty scenarios.

#### **5.3.2 Identification of hazards**

This step is crucial in the casualty scenario development process as well as in the entire alternative design methodology. If a particular hazard or incident is omitted, then it will not be considered in the analysis and the resulting final design may be inadequate. Hazards may be identified using historical and statistical data, expert opinion and experience and hazard evaluation procedures. There are many hazard evaluation procedures available to help identify the hazards including Hazard and Operability Study (HAZOP), Process Hazard Analysis (PHA), Failure Mode and Effects Analysis (FMEA), "what-if", etc. As a minimum, the following conditions and characteristics should be identified and considered:

- .1 pre-casualty situation: ship, platform, compartment, available potential and kinetic energy, environmental conditions;
- .2 potential initiating events, causes;
- .3 detailed technical information and properties of potential hazards;
- .4 secondary hazards that might be subject to effects of initial hazard;
- .5 extension potential: beyond compartment, structure, area (if in open);
- .6 target locations: note target items or areas associated with the performance parameters;
- .7 critical factors relevant to the hazard: ventilation, environment, operational, time of day, etc.; and
- .8 relevant statistical data: past casualty history, probability of failure, frequency and severity rates, etc.

#### **5.3.3 Enumeration of hazards**

All of the hazards identified above should be grouped into one of three incident classes: localized, major or catastrophic. A localized incident consists of a casualty with a localized effect zone, limited to a specific area. A major incident consists of a casualty with a medium effect zone, limited to the boundaries of the ship. A catastrophic incident consists of a casualty with a large affect zone, beyond the ship and affecting surrounding ships or communities. In the majority of cases, only localized and/or major incidents need to be considered. Examples

where the catastrophic incident class may be considered would include transport and/or offshore production of petroleum products or other hazardous materials where the incident effect zone is very likely to be beyond the ship vicinity. The hazards should be tabulated for future selection of a certain number of each of the incident classes.

#### 5.3.4 *Selection of hazards*

The number and type of hazards that should be selected for the quantitative analysis is dependent on the complexity of the trial alternative design and arrangements. All of the hazards identified should be reviewed for selection of a range of incidents. In determining the selection, frequency of occurrence does not need to be fully quantified, but it can be utilized in a qualitative sense. The selection process should identify a range of incidents which cover the largest and most probable range of enumerated hazards. Because the engineering evaluation relies on a comparison of the proposed alternative design and arrangements with prescriptive designs, demonstration of equivalent performance during the major incidents should adequately demonstrate the design's equivalence for all lesser incidents and provide the commensurate level of safety. In selecting the hazards it is possible to lose perspective and to begin selecting highly unlikely or inconsequential hazards. Care should be taken to select the most appropriate incidents for inclusion in the selected range of incidents.

#### 5.3.5 *Specification of design casualty scenarios*

Based on the hazards selected, the casualty scenarios to be used in the quantitative analysis should be clearly documented. The specification should include a qualitative description of the design casualty (e.g. initiating and subsequent chain of events, location, etc.), description of the vessel, compartment or system of origin, safeguard systems installed, number of occupants, physical and mental status of occupants and available means of escape. The casualty scenarios should consider possible future changes to the hazards (increased or decreased) in the affected areas. The design casualty or casualties will be characterized in more detail during the quantitative analysis for each trial alternative design. Operational scenario development for a mechanical or electrical alternative design or arrangement should include the operating scenarios under which the alternative will be utilized.

### **5.4 *Development of trial alternative designs***

At this point in the analysis, one or more trial alternative designs should be developed so that they can be compared against the developed performance criteria. The trial alternative design should also take into consideration the importance of human factors, operations and management. It should be recognized that well defined operations and management procedures may play a big part in increasing the overall level of safety.

### **5.5 *Preliminary analysis report***

5.5.1 A report of the preliminary analysis should include clear documentation of all steps taken to this point, including identification of the design team, their qualifications, the scope of the alternative design analysis, the functional requirements to be met, the description of the casualty scenarios and trial alternative designs selected for the quantitative analysis.

5.5.2 The preliminary analysis report should be submitted to the Administration for formal review and agreement prior to beginning the quantitative analysis. The report may also be submitted to the port State for informational purposes, if the intended calling ports are known during the design stage. The key results of the preliminary analysis should include:

- .1 a secured agreement from all parties to the design objectives and engineering evaluation;
- .2 specified design casualty scenario(s) acceptable to all parties; and
- .3 trial alternative design(s) acceptable to all parties.

## **6 Quantitative analysis**

### **6.1 General**

6.1.1 The quantitative analysis is the most labour intensive from an engineering standpoint. It consists of quantifying the design casualty scenarios, developing the performance criteria, verifying the acceptability of the selected safety margins and evaluating the performance of trial alternative designs against the prescriptive performance criteria.

6.1.2 The quantification of the design casualty scenarios may include calculating the effects of casualty detection systems, alarm and mitigation methods, generating timelines from initiation of the casualty until control of the casualty or evacuation, and estimating consequences in terms of damage to the vessel, and the risk of harm to passengers and crew. This information should then be utilized to evaluate the trial alternative designs selected during the preliminary analysis.

6.1.3 Risk assessment may play an important role in this process. It should be recognized that risk cannot ever be completely eliminated. Throughout the entire performance based design process, this fact should be kept in mind. The purpose of performance design is not to build a fail-safe design, but to specify a design with reasonable confidence that it will perform its intended function(s) when necessary and in a manner equivalent to or better than the prescriptive requirements of SOLAS chapters II-1 and III.

### **6.2 Quantification of design casualty scenarios**

6.2.1 After choosing an appropriate range of incidents, quantification of the casualties should be carried out for each of the incidents. Quantification will require specification of all factors that may affect the type and extent of the hazard. The casualty scenarios should consider possible future changes to the affected systems and areas. This may include calculation of specific casualty parameters, ship damage, passenger exposure to harm, time-lines, etc. It should be noted that, when using any specific tools, the limitations and assumptions of these models should be well understood and documented. This becomes very important when deciding on and applying safety margins. Documentation of the alternative design should explicitly identify the models used in the analysis and their applicability. Reference to the literature alone should not be considered as adequate documentation. The general procedure for specifying design casualties includes casualty scenario development completed during the preliminary analysis, timeline analysis and consequence estimation which is detailed below.

6.2.2 For each of the identified hazards, a range of casualty scenarios should be developed. Because the alternative design approach is based on a comparison against the regulatory prescribed design, the quantification can often be simplified. In many cases, it may only be necessary to analyse one or two scenarios if this provides enough information to evaluate the level of safety of the alternative design and arrangements against the required prescriptive design.

6.2.3 A timeline should be developed for each of the casualty scenarios beginning with initiation. Timelines should include the entire chain of relevant events up to and including escape times (to assembly stations, evacuation stations and lifeboats, as appropriate). This timeline should include personnel response, activation of damage control systems or active damage control measures, untenable conditions, etc. The timeline should include a description of the extent of the casualty throughout the scenario, as determined by using the various correlations, models and data from the literature or actual tests.

6.2.4 Consequences of various casualty scenarios should be quantified in relevant engineering terms. This can be accomplished by using existing correlations and calculation procedures for determining the characteristics of a casualty. In certain cases, full scale testing and experimentation may be necessary to properly predict the casualty characteristics. Regardless of the calculation procedures utilized, a sensitivity analysis should be conducted to determine the effects of the uncertainties and limitations of the input parameters.

### **6.3 *Development performance criteria***

6.3.1 Performance criteria are quantitative expressions of the intent of the requirements of the relevant SOLAS regulations. The required performance of the trial alternative designs are specified numerically in the form of performance criteria. Performance criteria may include tenability limits or other criteria necessary to ensure successful alternative design and arrangements.

6.3.2 Compliance with the prescriptive regulations is one way to meet the stated functional requirements. The performance criteria for the alternative design and arrangements should be determined, taking into consideration the intent of the regulations.

6.3.3 If the performance criteria for the alternative design and arrangements cannot be determined directly from the prescriptive regulations because of novel or unique features, they may be developed from an evaluation of the intended performance of a commonly used acceptable prescriptive design, provided that an equivalent level of safety is maintained. In the case of life-saving appliances and arrangements according to SOLAS chapter III, the goals, functional requirements and expected performance criteria, as set out in appendix 5, should be taken into account.

6.3.4 Before evaluating the prescriptive design, the design team should agree on what specific performance criteria and safety margins should be established. Depending on the prescriptive requirements to which the approval of alternative design or arrangements is sought, these performance criteria could fall within one or more of the following areas:

- .1 Life safety criteria – These criteria address the survivability of passengers and crew and may represent the effects of flooding, fire, etc.

- .2 Criteria for damage to ship structure and related systems – These criteria address the impact that casualty might have on the ship structure, mechanical systems, electrical systems, fire protection systems, evacuation systems, propulsion and manoeuvrability, etc. These criteria may represent physical effects of the casualty.
- .3 Criteria for damage to the environment – These criteria address the impact of the casualty on the atmosphere and marine environment.

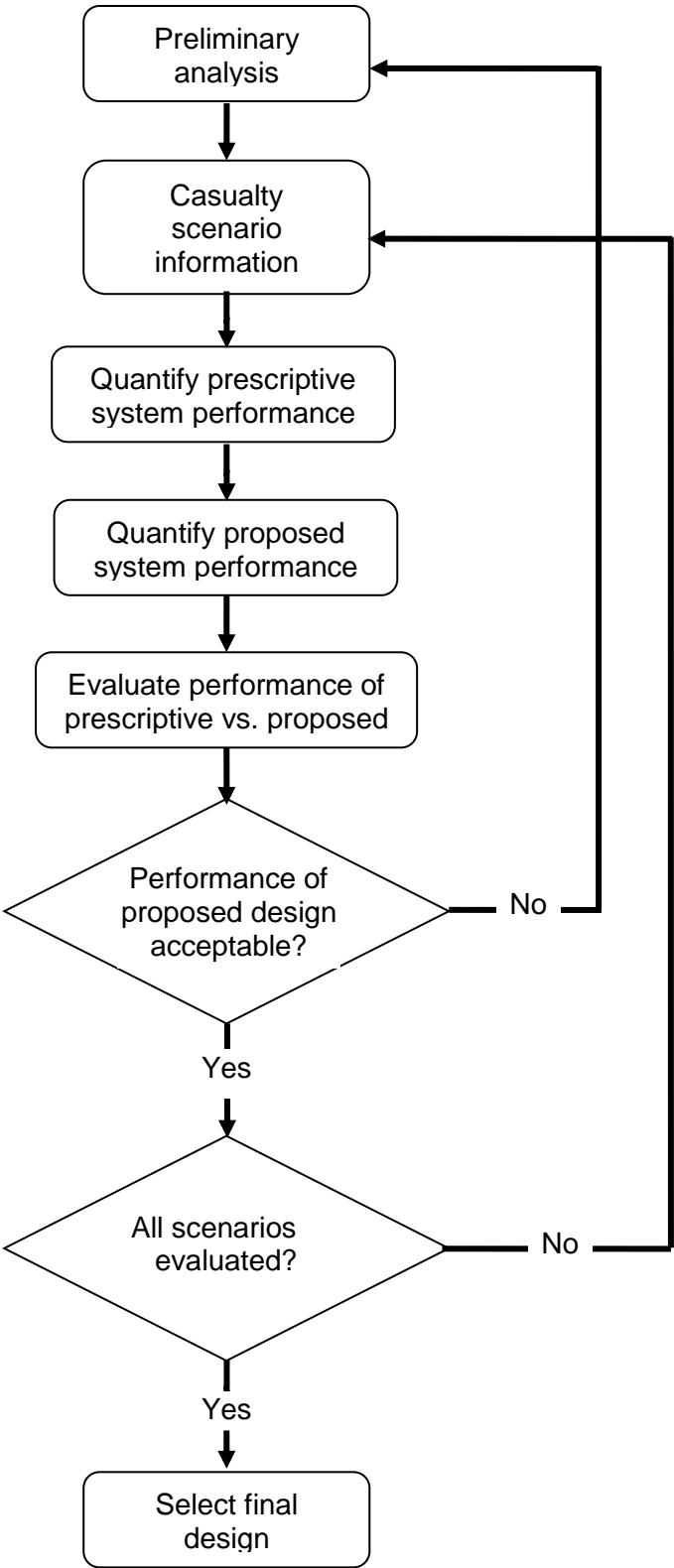
6.3.5 The design team should consider the impact that one particular performance criterion might have on other areas that might not be specifically part of the alternative design. For example, the failure of a particular safeguard may not only affect the life safety of passengers and crew in the adjacent space, but it may result in the failure of some system affecting the overall safety of the ship.

6.3.6 Once all of the performance criteria have been established, the design team can then proceed with the evaluation of the trial alternative designs (see section 6.4).

#### **6.4 Evaluation of trial alternative designs**

6.4.1 All of the data and information generated during the preliminary analysis and specification of design casualty should serve as input to the evaluation process. The evaluation process may differ depending on the level of evaluation necessary (based on the scope defined during the preliminary analysis), but should generally follow the process illustrated in figure 6.4.1.





**Figure 6.4.1** *Alternative design and arrangements process flowchart*

6.4.2 Each selected trial alternative design should be analysed against the selected design casualty scenarios to demonstrate that it meets the performance criteria with the agreed safety margin, which in turn demonstrates equivalence to the prescriptive design.

6.4.3 The level of engineering rigor required in any particular analysis will depend on the level of analysis required to demonstrate equivalency of the proposed alternative design and arrangements to the prescriptive requirements. Obviously, the more components, systems, operations and parts of the ship that are affected by a particular alternative design, the larger the scope of the analysis.

6.4.4 The final alternative design and arrangements should be selected from the trial alternative designs that meet the selected performance criteria and safety margins.

## **7 Documentation**

7.1 Because the alternative design process may involve substantial deviation from the regulatory prescribed requirements, the process should be thoroughly documented. This provides a record that will be required if future design changes to the ship are proposed or the ship transfers to the flag of another State and will also provide details and information that may be adapted for use in future designs. The following information should be provided for approval of the alternative design or arrangements:

- .1 scope of the analysis or design;
- .2 description of the alternative design(s) or arrangements(s), including drawings and specifications;
- .3 results of the preliminary analysis, to include:
  - .3.1 members of the design team (including qualifications);
  - .3.2 description of the trial alternative design and arrangements being evaluated;
  - .3.3 discussion of affected SOLAS regulations and their requirements;
  - .3.4 hazard identification;
  - .3.5 enumeration of hazards;
  - .3.6 selection of hazards; and
  - .3.7 description of design casualty scenarios;
- .4 results of quantitative analysis:
  - .4.1 design casualty scenarios:
    - .4.1.1 critical assumptions;
    - .4.1.2 initial conditions;

- .4.1.3 engineering judgements;
- .4.1.4 calculation procedures;
- .4.1.5 test data;
- .4.1.6 sensitivity analysis; and
- .4.1.7 timelines;
- .4.2 performance criteria;
- .4.3 evaluation of trial alternative designs against performance criteria;
- .4.4 description of final alternative design and arrangements;
- .4.5 test, inspection and maintenance requirements; and
- .4.6 references.

7.2 Documentation of approval by the Administration and the following information should be maintained onboard the ship at all times:

- .1 scope of the analysis or design, including the critical design assumptions and critical design features;
- .2 description of the alternative design and arrangements, including drawings and specifications;
- .3 listing of affected SOLAS regulations;
- .4 summary of the results of the engineering analysis and basis for approval; and
- .5 test, inspection and maintenance requirements.

### **7.3 Reporting and approval forms**

7.3.1 When the Administration approves alternative design and arrangements under these guidelines, pertinent technical information about the approval should be summarized on the reporting form given in appendixes 1 or 2, as appropriate, and should be submitted to the Organization for circulation to the Member Governments.

7.3.2 When the Administration approves alternative design and arrangements under these guidelines, documentation should be provided as indicated in appendixes 3 or 4, as appropriate. The documentation should be in the language or languages required by the Administration. If the language is neither English, French or Spanish, a translation into one of those languages should be included.

**APPENDIX 1**

**REPORT ON THE APPROVAL OF ALTERNATIVE DESIGN AND ARRANGEMENTS FOR MACHINERY AND ELECTRICAL INSTALLATIONS**

**The Government of ..... has approved on ..... an alternative design and arrangement in accordance with provisions of regulation II-1/55 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, as described below:**

Name of ship .....  
Port of registry .....  
Ship type .....  
IMO Number .....

- 1. Scope of the analysis or design, including the critical design assumptions and critical design features:
- 2. Description of the alternative design and arrangements:
- 3. Conditions of approval, if any:
- 4. Listing of affected SOLAS chapter II-1 regulations in parts C, D and E:
- 5. Summary of the result of the engineering analysis and basis for approval, including performance criteria and design casualty scenarios:
- 6. Test, inspection and maintenance requirements:

**APPENDIX 2**

**REPORT ON THE APPROVAL OF ALTERNATIVE DESIGN AND ARRANGEMENTS FOR  
LIFE-SAVING APPLIANCES AND ARRANGEMENTS**

**The Government of ..... has approved on ..... an alternative design and arrangement in accordance with provisions of regulation III/38 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, as described below:**

Name of ship .....  
Port of registry .....  
Ship type .....  
IMO Number .....

- 1. Scope of the analysis or design, including the critical design assumptions and critical design features:
- 2. Description of the alternative design and arrangements:
- 3. Conditions of approval, if any:
- 4. Listing of affected SOLAS chapter III regulations:
- 5. Summary of the result of the engineering analysis and basis for approval, including performance criteria and design casualty scenarios:
- 6. Test, inspection and maintenance requirements:

**APPENDIX 3**

**DOCUMENT OF APPROVAL OF ALTERNATIVE DESIGN AND ARRANGEMENTS FOR  
MACHINERY AND ELECTRICAL INSTALLATIONS**

**Issued in accordance with provisions of regulation II-1/55.4 of the International  
Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, under the authority  
of the Government of ..... by**

.....  
(Name of State)

(Person or organization authorized)

Name of ship .....

Port of registry .....

Ship type .....

IMO Number .....

THIS IS TO CERTIFY that the following alternative design and arrangements applied to the  
above ship have been approved under the provisions of SOLAS regulation II-1/55:

1. Scope of the analysis or design, including the critical design assumptions and critical design features:
2. Description of the alternative design and arrangements:
3. Conditions of approval, if any:
4. Listing of affected SOLAS chapter II-1 regulations:
5. Summary of the result of the engineering analysis and basis for approval, including performance criteria and design casualty scenarios:
6. Test, inspection and maintenance requirements:
7. Drawings and specifications of the alternative design and arrangement:

Issued at ..... on .....

.....  
(Signature of authorized official  
issuing the certificate)

(Seal or stamp of issuing authority, as appropriate)

**APPENDIX 4**

**DOCUMENT OF APPROVAL OF ALTERNATIVE DESIGN AND ARRANGEMENTS FOR  
LIFE-SAVING APPLIANCES AND ARRANGEMENTS**

Issued in accordance with provisions of regulation III/38.4 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, under the authority of the Government of ..... by .....  
(Name of State) (Person or organization authorized)

Name of ship .....  
Port of registry .....  
Ship type .....  
IMO Number .....

THIS IS TO CERTIFY that the following alternative design and arrangements applied to the above ship have been approved under the provisions of SOLAS regulation III/38.

- 1. Scope of the analysis or design, including the critical design assumptions and critical design features:
- 2. Description of the alternative design and arrangements:
- 3. Conditions of approval, if any:
- 4. Listing of affected SOLAS chapter III regulations:
- 5. Summary of the result of the engineering analysis and basis for approval, including performance criteria and design casualty scenarios:
- 6. Test, inspection and maintenance requirements:
- 7. Drawings and specifications of the alternative design and arrangement:

Issued at ..... on .....

.....  
(Signature of authorized official  
issuing the certificate)

(Seal or stamp of issuing authority, as appropriate)

## APPENDIX 5

### GOALS, FUNCTIONAL REQUIREMENTS AND EXPECTED PERFORMANCE CRITERIA FOR SOLAS CHAPTER III

Goal: To save and maintain human life during and after an emergency situation

FR 1: All life-saving appliances should be in a state of readiness for immediate use. This will be accomplished by ensuring:

- EP 1: All life-saving appliances should be easily accessible (e.g. not obstructed and not locked).
- EP 2: All life-saving appliances should be stowed securely in a sheltered position and protected from damage by fire and explosion.
- EP 3: All life-saving appliances should be maintainable to ensure reliability for the specified service cycle.
- EP 4: All life-saving appliances should be designed considering uncertainty in material properties, loads, deterioration and consequences of failure in operating environment.
- EP 5: Descriptions and instructions for operation, inspection, maintenance and functional testing should be provided for all life-saving appliances.
- EP 6: All life-saving appliances should be able to withstand environmental exposure of the ship including sunlight, ozone, seawater (wash, heavy seas), icing, wind, humidity, oil, air temperature (-30°C to +65°C), water temperature (at least -1°C to +30°C if it is likely to be immersed in seawater), fungus and marine atmosphere.
- EP 7: All life-saving appliances should be usable and operational under adverse vessel conditions, i.e. list and trim.
- EP 8: Deployment of life-saving appliances should be possible without depending upon any means other than gravity or stored power which is independent of the ship's power supplies to launch the survival craft.
- EP 9: The number of crew members on board should be sufficient for operating the life-saving appliance and launching arrangements required for abandonment by the total number of persons on board. This should include substitutes for key persons and crew members on board operating survival craft and launching arrangements are assigned and trained appropriately.

FR 2: Training and drills should be sufficient to ensure that all passengers and crew are familiar with their responsibilities in an emergency. This will be accomplished by ensuring:

- EP 1: All life-saving appliances and arrangements should be designed and installed to facilitate training and drills.



- EP 2: Training and drills should be routinely conducted to ensure crew are in a state of readiness and are competent with the operation of life-saving appliances and their assigned emergency duties.
- EP 3: Every crew member should participate in drills. These should be conducted, as far as practicable, as if there were an actual emergency.
- EP 4: Drills should be planned and conducted in a safe manner.
- EP 5: Drills should be planned in such a way that due consideration is given to regular practice in the various emergencies that may occur depending on the type of ship and cargo.

FR 3: Before proceeding to sea, all crew and passengers should be provided with information and instructions of the actions to be taken in an emergency. This will be accomplished by ensuring:

- EP 1: Safety information and instructions should be presented in a manner that is easily understood by passengers, in language, illustration and/or demonstration.
- EP 2: Information should be distributed and displayed in appropriate conspicuous places accessible under all conditions, e.g. emergency lighting.
- EP 3: All ships should clearly indicate and highlight the stowage location of all life-saving appliances, display directions to places designated for assembling all persons in the event of an emergency, display assignment to life-saving appliances and display how to operate life-saving appliances.
- EP 4: The number and type of life-saving appliances should be marked at each stowage location.

FR 4: All ships should have an effective emergency management system. A copy of the emergency management system should be readily available to crew. This will be accomplished by ensuring:

- EP 1: The emergency management system should clearly identify roles and responsibilities during an emergency.
- EP 2: Assembly locations, muster stations and escape routes should be identified on all ships.
- EP 3: All passenger ships should establish a decision support system.
- EP 4: The emergency management system should include the consideration of physical characteristics and capabilities of embarked persons.
- EP 5: All ships should have the means to account for all persons on board.
- EP 6: The emergency management system should have a uniform structure, be easy to use and be provided on board in an appropriate conspicuous location.

FR 5: All ships should be provided with means of external communications with shore, ships and aircraft. This will be accomplished by ensuring:

- EP 1: All ships should have the means to indicate their position visually in an emergency, which makes it possible to detect and locate the ship from an altitude of at least 3,000 m at a range of at least 10 miles under clear daytime and night-time conditions for a period of at least 40 s.
- EP 2: All ships should be provided with means for two-way on-scene communication between survival craft, between survival craft and ship, and between survival craft and rescue craft.
- EP 3: All ships should carry search and rescue locating devices that are designed to automatically activate and operate continuously and can be rapidly placed into any survival craft from their place of storage on the ship.

FR 6: All ships should be able to internally communicate emergency messages and instructions to all crew and passengers. This will be accomplished by ensuring:

- EP 1: Emergency alerts, messages and instructions to all crew and passengers should be received regardless of an individual's location on the ship.
- EP 2: Emergency alerts, messages and instructions should be communicated in appropriate languages expected to be understood by all those on board.
- EP 3: Two-way communications should be possible between emergency control stations, places designated for assembling and/or embarkation to survival craft and strategic positions on board.

FR 7: All ships should provide means for a safe abandonment for all persons. This will be accomplished by ensuring:

- EP 1: Means should be available to embark survival craft from both the embarkation deck and the waterline in the lightest seagoing condition and under adverse conditions of list and trim.
- EP 2: Means of evacuation should be distributed on the ship considering access of persons and areas where persons may become isolated.
- EP 3: Each davit-launched, self-propelled survival craft boarded from the embarkation deck should be capable of being launched from two positions by one crew member: from a position in the survival craft and from a position on deck.
- EP 4: All survival and rescue craft should be stowed as near the water surface as is safe and practicable.
- EP 5: All ships should provide for safe unobstructed launching of each survival craft, for example, by avoiding interference with fixed structures, fixtures, fittings, equipment and other life-saving appliances.
- EP 6: Embarkation platforms should provide for protection from the seaway and the effects of hazardous cargo, if carried.

- EP 7: Relative movement and gaps between the survival craft and ship during embarkation should be minimized.
- EP 8: All life-saving appliances should enable safe abandonment of all persons on board regardless of their physical condition, age and mobility, including those needing evacuation by stretcher or other means.
- EP 9: All ships should provide for safe launching of survival craft both in a seaway and when the ship is adrift.
- EP 10: Passenger ships should provide float free survival craft capacity for at least 25% of the total number of persons on board and cargo ships should provide 100% float free survival craft capacity for the total number of persons on board.
- EP 11: All ships should provide adequate space to muster and provide instructions for all persons on board.
- EP 12: Abandonment of all persons on board should take no more than 30 minutes after mustering on passenger ships, and 10 minutes on cargo ships.
- EP 13: Each survival craft should be prepared for boarding and launching by no more than two crew members in less than 5 minutes.
- EP 14 Life-saving appliances and the craft they launch should operate as a system.
- FR 8: All ships should provide means for the safety and survivability of all persons after abandonment for the time until expected rescue. This will be accomplished by ensuring:
- EP 1: Survival craft should provide a habitable environment for all persons on board.
- EP 2: Survival craft should provide adequate ventilation and protection for its complement against wind, rain and spray at all ambient temperatures between -15 and 30 degrees C.
- EP 3: Each survival craft shall have sufficient buoyancy when loaded with its full complement of persons and when punctured in any one location.
- EP 4: All passenger ships must have sufficient self-propelled craft capable of marshalling all non-self-propelled survival craft sufficient for the total number of persons on board.
- EP 5: Self-propelled survival and rescue craft should be capable of proceeding ahead in calm water at least at 2 knots when towing the largest passive survival craft carried on the ship loaded with its full complement of persons and equipment.
- EP 6: Survival craft should be able to reach a safe distance from the ship in a timely manner, either by its own propulsion or by assistance from other survival craft or rescue craft.

- EP 7: Each survival craft should have sufficient first aid supplies, anti-seasickness medication, and supply of food and water for the number of persons on board.
- EP 8: Survival craft should be approved for the maximum number of persons it is permitted to accommodate, as decided by practical seating tests afloat and based upon the number of adult persons wearing individual buoyancy equipment who can be seated without, in any way, interfering with the normal operation of its equipment or means of propulsion.
- EP 9: All life-saving appliances and arrangements should be designed to reflect the expected capabilities and characteristics of persons on board.
- EP 10: All survival craft should provide means for persons in the water to cling to the survival craft, and permit persons to board the survival craft from the water when wearing individual buoyancy equipment.
- FR 9: Each person should be provided with means to facilitate survival in the water until rescued into a survival craft or rescue unit. This will be accomplished by ensuring:
- EP 1: Each person on a cargo ship and each crew member assigned to operate the life-saving appliances on any ship should be provided with individual garments for protection against hypothermia.
- EP 2: Each person on board should have ready access to a physically suitable personal life-saving appliance, regardless of their location on the vessel.
- EP 3: All ships must ensure individual wearable buoyancy equipment are available for persons on watch and at remote locations on the ship so that they are readily accessible in an emergency.
- EP 4: All ships shall ensure that each adult on board has a suitable individual wearable buoyancy equipment considering their weight and girth.
- EP 5: Passenger ships shall ensure that each infant and child on board has a suitable individual wearable buoyancy equipment, as appropriate, for the duration of the voyage and the type of service.
- EP 6: Throwable personal flotation devices are distributed so that they are readily available on both sides of the ship and as far as practicable on all open decks extending to the ship's side or to the stern.
- EP 7: Throwable personal flotation devices are stowed so as to be capable of being rapidly cast loose and not permanently secured in any way.
- EP 8: Personal life-saving appliances should be provided with adequate spare capacity.
- FR 10: Each survival craft should provide active and passive means of detection by other survival and rescue craft. This will be accomplished by ensuring:
- EP 1: Survival craft should have active and passive means of detection which makes it possible to visually locate or detect the survival craft in a seaway from a ship or an aircraft.

EP 2: Visual means of detection for survival craft should make it possible for an aircraft at an altitude of up to 3,000 meters to detect the survival craft at a range of at least 10 miles; and for a ship to detect the survival craft in a seaway in clear conditions at a range of at least 2 miles.

FR 11: All ships should provide active and passive means for detection of persons in the water by survival units and by rescue craft.

EP 1: Visual means of detection for persons in the water should make it possible for a ship to detect the person in a seaway in clear daytime conditions at a range of at least 0.2 miles; and in clear night-time conditions at a range of at least 0.5 miles for a duration of at least 8 hours.

EP 2: Individual wearable buoyancy equipment should have a manually controlled active means of detection which makes it possible to detect a person in a seaway audibly at a range of at least 0.2 miles in calm weather.

EP 3: Buoyancy equipment intended to support and enable the detection of persons in the water should be provided on board. The buoyancy equipment should have passive means of detection, which makes it possible to detect the buoyancy equipment in a seaway visually and, have active means of detection attached which is automatically activated when the buoyancy equipment is deployed.

FR 12: All ships should provide for the search, rescue and retrieval of persons in the water. This will be accomplished by ensuring:

EP 1: Rescue craft should be stowed in such a way that they are kept in a state of continuous readiness and can be launched within 5 minutes and neither the rescue craft nor its stowage arrangements interfere with the operation of any survival craft at any other launching station.

EP 2: Launching arrangements for rescue craft should provide safe launching from the ship in a seaway with the ship making way at speeds of up to 5 knots.

EP 3: Rescue craft should be capable of maintaining a speed of at least 6 knots for at least 4 hours in a seaway.

EP 4: Rescue craft should be capable of being towed at speeds of up to 5 knots and be capable of towing other survival craft.

EP 5: Rescue craft should have sufficient mobility and manoeuvrability in a seaway to enable retrieval of persons from the water. Ro-ro passenger ships should be equipped with effective means for rapidly recovering survivors from the water and transferring survivors from rescue or survival craft to the ship.

EP 6: The full complement of occupants for which the rescue craft is approved to carry must be recovered to a position where they can disembark to the deck of the ship.

EP 7: Rescue craft should be capable of carrying at least five persons seated and at least one person lying down.

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MSC.1/Circ.1395/Rev.4  
13 June 2019

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

- 1 The Maritime Safety Committee, at its sixty-fourth session (5 to 9 December 1994), agreed that there was a need to provide Administrations with guidelines regarding the provisions of SOLAS regulation II-2/10 concerning exemptions from the requirements for fire-extinguishing systems.
- 2 Consequently, the Committee approved MSC/Circ.671 whereby it agreed to:
  - .1 a list of solid bulk cargoes, for which a fixed gas fire-extinguishing system may be exempted (table 1) and recommended Member States to take into account the information contained in table 1 when granting exemptions under the provisions of SOLAS regulation II-2/10.7.1.4; and
  - .2 a list of solid bulk cargoes for which a fixed gas fire-extinguishing system is ineffective (table 2), and recommended that cargo spaces in a ship engaged in the carriage of cargoes listed in table 2 be provided with a fire-extinguishing system which provides equivalent protection. The Committee also agreed that Administrations should take account of the provisions of SOLAS regulation II-2/19.3.1 when determining suitable requirements for an equivalent fire-extinguishing system.
- 3 The Maritime Safety Committee, at its seventy-ninth session (1 to 10 December 2004), reviewed the above-mentioned tables and approved MSC/Circ.1146. The Committee decided that the annexed tables should be periodically reviewed and invited Member States to provide the Organization, when granting exemptions to ships for the carriage of cargoes not included in table 1, with data on the non-combustibility or fire risk properties of such cargoes. Member States were also requested to provide the Organization, when equivalent fire-extinguishing systems are required for the agreed carriage of cargoes not included in table 2, with data on the inefficiency of fixed gas fire-extinguishing systems for such cargoes.
- 4 The Maritime Safety Committee, at its eighty-ninth session (11 to 20 May 2011), noting the mandatory status of the IMSBC Code, reviewed the aforementioned lists of solid bulk cargoes to align certain names in the lists with those in the recent version of the IMDG Code and approved MSC.1/Circ.1395 on *Lists of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted or for which a fixed gas fire-extinguishing*

*system is ineffective*, superseding MSC/Circ.1146. The Maritime Safety Committee, at its ninety-second session (12 to 21 June 2013), approved a revision of MSC.1/Circ.1395 (MSC.1/Circ.1395/Rev.1).

5 The Maritime Safety Committee, at its ninety-fifth session (3 to 12 June 2015), considering a proposal by the Sub-Committee on Carriage of Cargoes and Containers, at its first session, approved a revision of tables 1 and 2 of MSC.1/Circ.1395/Rev.1 (MSC.1/Circ.1395/Rev.2).

6 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), considering a proposal by the Sub-Committee on Carriage of Cargoes and Containers, at its third session, approved a revision of tables 1 and 2 of MSC.1/Circ.1395/Rev.2 (MSC.1/Circ.1395/Rev.3).

7 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), considering a proposal by the Sub-Committee on Carriage of Cargoes and Containers, at its third session, approved a revision of tables 1 and 2 of MSC.1/Circ.1395/Rev.3, as set out in the annex.

8 The purpose of this circular is to provide guidance to Administrations. However, Administrations are not prevented from granting exemptions for cargoes not included in table 1 or imposing any conditions when granting such exemptions under the provisions of SOLAS regulation II-2/10.7.1.4.

9 This circular supersedes MSC.1/Circ.1395/Rev.3.

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**ANNEX**

**TABLE 1**

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

- 1 Cargoes including, but not limited to, those listed in SOLAS regulation II-2/10:
- Ore
  - Coal (COAL and BROWN COAL BRIQUETTES)
  - Grain
  - Unseasoned timber
- 2 Cargoes listed in the International Maritime Solid Bulk Cargoes (IMSBC) Code, which are not combustible or constitute a low fire risk, as follows:
- .1 all cargoes not categorized into Group B in the IMSBC Code;
  - .2 the following cargoes categorized into Group B in the IMSBC Code:
    - ALUMINA HYDRATE
    - ALUMINIUM SMELTING BY-PRODUCTS UN 3170  
(Both the names ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIUM REMELTING BY-PRODUCTS are in use as proper shipping name)
    - ALUMINIUM FERROSILICON POWDER UN 1395
    - ALUMINIUM SILICON POWDER, UNCOATED UN 1398
    - AMORPHOUS SODIUM SILICATE LUMPS
    - BORIC ACID
    - CLINKER ASH
    - COAL TAR PITCH
    - DIRECT REDUCED IRON (A) Briquettes, hot-moulded
    - FERROPHOSPHORUS (including briquettes)
    - FERROSILICON UN 1408, with 30% or more but less than 90% silicon (including briquettes)
    - FERROSILICON, with at least 25% but less than 30% silicon, or 90% or more silicon
    - FLUE DUST, CONTAINING LEAD AND ZINC
    - FLUORSPAR
    - GRANULATED NICKEL MATTE (less than 2% moisture content)
    - LIME (UNSLAKED)
    - LOGS
    - MAGNESIA (UNSLAKED)
    - MATTE CONTAINING COPPER AND LEAD
    - MONOCALCIUMPHOSPHATE (MCP)
    - MONOAMMONIUM PHOSPHATE (M.A.P.), MINERAL ENRICHED COATING
    - PEAT MOSS
    - PETROLEUM COKE (calcined or uncalcined)\*
    - PITCH PRILL
    - PULP WOOD
    - PYRITES, CALCINED (calcined pyrites)
    - RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non-fissile or fissile-excepted UN 2912

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



RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I), non-fissile or fissile-excepted UN 2913  
ROUNDWOOD  
SAND, MINERAL CONCENTRATE, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I) UN 2912  
SAW LOGS  
SILICOMANGANESE (low carbon)  
SULPHUR, UN 1350 (crushed lump and coarse grained)  
TIMBER  
VANADIUM ORE  
WOODCHIPS, with moisture content of 15% or more  
WOOD PELLETS NOT CONTAINING ANY ADDITIVES AND/OR BINDERS  
ZINC ASHES UN 1435  
ZINC OXIDE ENRICHED FLUE DUST

- .3 cargoes assigned to the following generic Group B shipping schedules when they do not exhibit any self-heating, flammability or water-reactive flammability hazards in accordance with the MHB tests and classification criteria contained in the Code:

METAL SULPHIDE CONCENTRATES  
METAL SULPHIDE CONCENTRATES, CORROSIVE UN 1759

- 3 Solid bulk cargoes which are not listed in the IMSBC Code, provided that:

- .1 they are assessed in accordance with section 1.3 of the Code;  
.2 they do not present hazards of Group B as defined in the Code; and  
.3 a certificate has been provided by the competent authority of the port of loading to the master in accordance with 1.3.2 of the Code.

## TABLE 2

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

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

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



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MSC.1/Circ.1416/Rev.1  
26 June 2019

## **UNIFIED INTERPRETATIONS OF SOLAS REGULATIONS II-1/28, II-1/29 AND II-1/30**

1 The Maritime Safety Committee, at its ninetieth session (16 to 25 May 2012), with a view to ensuring a uniform approach towards the application of the provisions of SOLAS regulations II-1/28 and II-1/29, and following a recommendation made by the Sub-Committee on Ship Design and Equipment at its fifty-fifth session, approved unified interpretations concerning the arrangements for steering capability and function on ships fitted with propulsion and steering systems other than traditional arrangements for a ship's directional control, as contained in *Unified interpretation of SOLAS regulations II-1/28 and II-1/29* (MSC.1/Circ.1416).

2 Noting that the 1974 SOLAS Convention adequately addresses steering gear arrangements having a traditional propulsion system and a rudder-type steering system, whereas it does not adequately provide for modern combined propulsion/steering systems such as azimuth thrusters, podded propulsors, waterjets, cycloidal propellers\*, etc. and that there is a need to clarify that the requirements of SOLAS regulation II-1/30.2 apply to each steering system in ships fitted with multiple steering systems, the Maritime Safety Committee, at its 101st session (5 to 14 June 2019), approved the *Unified interpretation of SOLAS regulations II-1/28, II-1/29 and II-1/30*, prepared by the Sub-Committee on Ship Systems and Equipment, at its sixth session, as set out in the annex.

3 Member Governments are invited to use the annexed interpretations from 1 January 2020 when applying the relevant provisions of SOLAS regulations II-1/28, II-1/29 and II-1/30, and to bring them to the attention of all parties concerned.

4 This circular supersedes MSC.1/Circ.1416.

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\* This should not be considered as an exhaustive list.

## ANNEX

### UNIFIED INTERPRETATIONS CONCERNING THE ARRANGEMENTS FOR STEERING CAPABILITY AND FUNCTION ON SHIPS FITTED WITH PROPULSION AND STEERING SYSTEMS OTHER THAN TRADITIONAL ARRANGEMENTS FOR A SHIP'S DIRECTIONAL CONTROL

#### Introduction

The SOLAS requirements for steering gears have been established for ships having a traditional propulsion system and one rudder. For ships fitted with alternative propulsion and steering arrangements, such as but not limited to, azimuthing propulsors or water jet propulsion systems, SOLAS regulations II-1/28.2, 28.3, 29.1, 29.2.1, 29.3, 29.4, 29.6.1, 29.14 and 30.2 should be interpreted as follows, except 29.14, which is limited to the steering systems having a certain steering capability due to ship speed also in case propulsion power has failed.

#### Regulation 28 – Means of going astern

##### *Paragraph 3*

The stopping times, ship headings and distances recorded on trials, together with the results of trials to determine the ability of ships having multiple propulsion/steering arrangements to navigate and manoeuvre with one or more of these devices inoperative, should be available on board for the use of the master or designated personnel.

#### Regulation 29 – Steering gear

##### *Paragraph 1*

For a ship fitted with multiple steering-propulsion units, such as, but not limited to, azimuthing propulsors or water jet propulsion systems, each of the steering-propulsion units should be provided with a main steering gear and an auxiliary steering gear or with two or more identical steering actuating systems in compliance with interpretation of SOLAS regulation II-1/29.6.1. The main steering gear and the auxiliary steering gear should be so arranged that the failure of one of them will not render the other one inoperative.

For a ship fitted with a single steering-propulsion unit, the requirement in SOLAS regulation II-1/29.1 is considered satisfied if the steering gear is provided with two or more steering actuating systems and is in compliance with interpretation of SOLAS regulation II-1/29.6.1. A detailed risk assessment should be submitted in order to demonstrate that in the case of any single failure in the steering gear, control system and power supply the ship steering is maintained.

##### *Paragraph 2.1*

All components used in steering arrangements for ship directional control should be of sound reliable construction to the satisfaction of the Administration or recognized organizations acting on its behalf. Special consideration should be given to the suitability of any essential component which is not duplicated. Any such essential component should, where appropriate, utilize anti-friction bearings such as ball bearings, roller bearings or sleeve bearings which should be permanently lubricated or provided with lubrication fittings.

**Paragraph 3**

The main steering arrangements for ship directional control should be:

- .1 of adequate strength and capable of steering the ship at maximum ahead service speed which should be demonstrated;
- .2 capable of changing direction of the steering-propulsion unit from one side to the other at declared steering angle limits at an average turning speed of not less than 2.3°/s with the ship running ahead at maximum ahead service speed;
- .3 for all ships, operated by power; and
- .4 so designed that they will not be damaged at maximum astern speed; this design requirement need not be proved by trials at maximum astern speed and declared steering angle limits.

Ship manoeuvrability tests, such as according to resolution MSC.137(76) on *Standards for ship manoeuvrability*, should be carried out with steering angles not exceeding the declared steering angle limits.

**Definition:** *Declared steering angle limits* are the operational limits in terms of maximum steering angle, or equivalent, according to manufacturers' guidelines for safe operation, also taking into account the ship's speed or propeller torque/speed or other limitation; the "declared steering angle limits" are to be declared by the directional control system manufacturer for each ship specific non-traditional steering mean; ship manoeuvrability tests, such as those in the *Standards for ship manoeuvrability* (resolution MSC.137(76)) should be carried out with steering angles not exceeding the declared steering angle limits.

**Paragraph 4**

The auxiliary steering arrangements for ship directional control should be:

- .1 of adequate strength and capable of steering the ship at navigable speed and of being brought speedily into action in an emergency;
- .2 capable of changing direction of the ship's directional control system from one side to the other at declared steering angle limits at an average turning speed, of not less than 0.5°/s; with the ship running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater; and
- .3 for all ships, operated by power where necessary to meet the requirements of SOLAS regulation II-1/29.4.2 and in any ship having power of more than 2,500 kW propulsion power per steering-propulsion unit.

Ship manoeuvrability tests, such as according to resolution MSC.137(76), should be carried out with steering angles not exceeding the declared steering angle limits.

The definition of "declared steering angle limits", set out in the interpretation of paragraph 3 above, applies.

### **Paragraph 6.1**

For a ship fitted with a single steering-propulsion unit where the main steering gear comprises two or more identical power units and two or more identical steering actuators, an auxiliary steering gear need not be fitted provided that the steering gear:

- .1 in a passenger ship, is capable of satisfying the requirements in interpretation to SOLAS regulation II-1/29.3 while any one of the power units is out of operation;
- .2 in a cargo ship, is capable of satisfying the requirements in interpretation to SOLAS regulation II-1/29.3 while operating with all power units; and
- .3 is arranged so that after a single failure in its piping system or in one of the power units, steering capability can be maintained or speedily regained.

For a ship fitted with multiple steering-propulsion units, where each main steering system comprises two or more identical steering actuating systems, an auxiliary steering gear need not be fitted provided that each steering gear:

- .1 in a passenger ship, is capable of satisfying the requirements in interpretation to SOLAS regulation II-1/29.3 while any one of the steering gear steering actuating systems is out of operation;
- .2 in a cargo ship, is capable of satisfying the requirements in interpretation to SOLAS regulation II-1/29.3 while operating with all steering gear steering actuating systems;
- .3 is arranged so that after a single failure in its piping or in one of the steering actuating systems, steering capability can be maintained or speedily regained; and
- .4 the above capacity requirements apply regardless whether the steering systems are arranged with common or dedicated power units.

**Definition:** *Steering gear power unit* – For the purposes of alternative steering arrangements, the steering gear power unit should be considered as defined in SOLAS regulation II-1/3. For electric steering gears, refer to SOLAS regulation II-1/3; electric steering motors should be considered as part of the power unit and actuator.

### **Paragraph 14**

This interpretation is valid to steering-propulsion units having a certain proven steering capability due to ship speed also in case propulsion power has failed.

Where the propulsion power exceeds 2,500 kW per thruster unit, an alternative power supply, sufficient at least to supply the steering arrangements which complies with the requirements of SOLAS regulation II-1/29.4.2 and also its associated control system and the steering gear response indicator, should be provided automatically, within 45 s, either from the emergency source of electrical power or from an independent source of power located in the steering gear compartment. This independent source of power should be used only for this purpose. In every ship of 10,000 gross tonnage and upwards, the alternative power supply should have a capacity for at least 30 min of continuous operation and in any other ship for at least 10 min.

**Regulation 30 – Additional requirements for electric and electrohydraulic steering gear**

***Paragraph 2***

For a ship fitted with multiple steering systems, the requirements in SOLAS regulation II-1/30.2 are to be applied to each of the steering systems.

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4 July 2019

**UNIFIED INTERPRETATIONS RELATING TO THE PROTOCOL OF 1988  
RELATING TO THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966**

1 The Maritime Safety Committee, at its ninety-sixth session (11 to 20 May 2016), in order to facilitate global and consistent implementation of requirements concerning sill and coaming heights for openings on top of deckhouses and companionways of the 1988 Load Lines Protocol, approved *Unified interpretations relating to the Protocol of 1988 relating to the International Convention on Load Lines, 1966* (MSC.1/Circ.1535), prepared by the Sub-Committee on Ship Design and Construction, at its third session.

2 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), approved amendments to MSC.1/Circ.1535 to include text to the unified interpretations of regulation 27(13)(e) of the 1988 Protocol to the International Convention on Load Lines, 1966, prepared by the Sub-Committee on Ship Design and Construction, at its sixth session. The amended text of the Unified Interpretations is set out in the annex.

3 Member States are invited to apply the annexed unified interpretations and to bring them to the attention of all parties concerned.

4 This circular supersedes MSC.1/Circ.1535.

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## ANNEX

### UNIFIED INTERPRETATIONS RELATING TO THE PROTOCOL OF 1988 RELATING TO THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966

#### Regulation 13 – Position of hatchways, doorways and ventilators

1 For the purpose of these regulations, two positions of hatchways, doorways and ventilators are defined as follows:

Position 1 – Upon freeboard decks and raised quarterdecks, or other exposed decks\* lower than one standard height of superstructure above the freeboard deck, and upon exposed decks\* situated forward of a point located a quarter of the ship's length from the forward perpendicular that are located lower than two standard heights of superstructure above the freeboard deck.

Position 2 – Upon exposed decks\* situated abaft a quarter of the ship's length from the forward perpendicular and located at least one standard height of superstructure above the freeboard deck and lower than two standard heights of superstructure above the freeboard deck.

Upon exposed decks\* situated forward of a point located a quarter of the ship's length from the forward perpendicular and located at least two standard heights of superstructure above the freeboard deck and lower than three standard heights of superstructure above the freeboard deck.

#### Regulation 20 – Air pipes

2 Where air pipes to ballast and other tanks extend above:

- .1 the freeboard deck; or
- .2 other exposed decks\* lower than two standard heights of superstructure above the freeboard deck,

the exposed parts of the pipes should be of substantial construction, and the height from the deck to the point where water may have access below should be at least:

- .1 760 mm on the freeboard deck or other exposed decks\* lower than one standard height of superstructure above the freeboard deck; and
- .2 450 mm on other exposed decks\* lower than two standard heights of superstructure above freeboard deck.

**Note:** Flush bolted access covers, which are of substantial construction and are secured by gaskets and closely spaced bolts to maintain water tightness, are not subject to the minimum sill height requirements.

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\* "Exposed decks" include top decks of superstructures, deckhouses, companionways and other similar deck structures.



## **Regulation 27 – Types of ships**

### **Regulation 27(13)(e)**

3 Unprotected openings include ventilators (complying with regulation 19(4) of the International Convention on Load Lines, 1966) that for operational reasons have to remain open to supply air to the engine-room, emergency generator room or closed ro-ro and vehicle spaces (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship. Where it is not technically feasible to treat some closed ro-ro and vehicle space ventilators as unprotected openings, Administrations may allow an alternative arrangement that provides an equivalent level of safety.

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### **UNIFIED INTERPRETATIONS OF THE 2008 IS CODE**

1 The Maritime Safety Committee, at its ninety-sixth session (11 to 20 May 2016), in order to facilitate global and consistent implementation of requirements of the 2008 Intact Stability Code (2008 IS Code), approved unified interpretations of the 2008 IS Code (MSC.1/Circ.1537), prepared by the Sub-Committee on Ship Design and Construction, at its third session.

2 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), approved amendments to MSC.1/Circ.1537 to include revisions to the unified interpretations of section 2.3 (Severe wind and rolling criterion (weather criterion)), as well as to section 3.4.2 (Assumptions for calculating loading conditions), prepared by the Sub-Committee on Ship Design and Construction, at its sixth session. The amended text of the Unified Interpretations is set out in the annex.

3 Member States are invited to apply the annexed unified interpretations and to bring them to the attention of all parties concerned.

4 This circular supersedes MSC.1/Circ.1537.

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## ANNEX

### UNIFIED INTERPRETATIONS OF THE 2008 IS CODE

#### Introduction

#### **2.23 Definition of the term "lightship"**

1 The weight of mediums on board for the fixed fire-fighting systems (e.g. freshwater, CO<sub>2</sub>, dry chemical powder, foam concentrate, etc.) should be included in the lightweight and lightship condition.

#### **Part A – Mandatory criteria**

#### **2.3 Severe wind and rolling criterion (weather criterion)**

2 In applying  $\Phi_f$ , openings which cannot be or are incapable of being closed weathertight include ventilators (complying with regulation 19(4) of the International Convention on Load Lines, 1966) that for operational reasons have to remain open to supply air to the engine-room, emergency generator room or closed ro-ro and vehicle spaces (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship. Where it is not technically feasible to treat some closed ro-ro and vehicle space ventilators as unprotected openings, Administrations may allow an alternative arrangement that provides an equivalent level of safety.

#### **Part B – Recommendations for certain types of ships and additional guidelines**

#### **3.4.2 Assumptions for calculating loading conditions**

3 For tankers assigned with a tropical load line, the ship should be assumed to be loaded in accordance with the following:

- .1 a fully loaded departure condition at the tropical load line and the corresponding arrival loading condition are considered;
- .2 the cargo is homogeneously distributed throughout all cargo tanks; and
- .3 sea water density is 1.025 t/m<sup>3</sup>.

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MSC.1/Circ.1539/Rev.1  
4 July 2019

**UNIFIED INTERPRETATIONS OF SOLAS CHAPTERS II-1 AND  
SAFE RETURN TO PORT REQUIREMENTS FOR FLOODING DETECTION SYSTEMS**

1 The Maritime Safety Committee, at its ninety-sixth session (11 to 20 May 2016), in order to facilitate global and consistent implementation of the requirements of SOLAS chapter II-1, approved *Unified Interpretations of SOLAS chapter II-1* (MSC.1/Circ.1539), prepared by the Sub-Committee on Ship Design and Construction, at its third session.

2 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), approved amendments to MSC.1/Circ.1539 to include additional text in the unified interpretations of SOLAS regulation II-1/7-2 on the calculation of the factor  $s_i$ , as well as new interpretations of regulations II-1/22-1 and II-2/21.4.13 on the safe return to port requirement for flooding detection systems. The amended text of the unified interpretations is set out in the annex.

3 Member States are invited to bring the annexed unified interpretations to the attention of all parties concerned, noting that the unified interpretation of regulations II-1/22-1 and II-2/21.4.13 on the safe return to port requirement for flooding detection system should only be applied to ships contracted for construction on or after 1 July 2019.

4 This circular supersedes MSC.1/Circ.1539.

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## ANNEX

### UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-1

#### Regulation 2.21 – Definition of the term "Lightweight"

1 The weight of mediums on board for the fixed fire-fighting systems (e.g. freshwater, CO<sub>2</sub>, dry chemical powder, foam concentrate, etc.) should be included in the lightweight and lightship condition.

#### Regulation 3-2 – Protective coatings of dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers

2 The following tanks should not be considered to be dedicated seawater ballast tanks and should, therefore, be exempted from the application and requirements of the *Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers* (resolution MSC.215(82)), provided the coatings applied in the tanks described in sub-paragraphs .2 and .3 below are confirmed by the coating manufacturer to be resistant to the media stored in these tanks and provided such coatings are applied and maintained according to the coating manufacturer's procedures.

- .1 ballast tanks identified as "Spaces included in Net Tonnage" in the International Tonnage Certificate (1969);
- .2 seawater ballast tanks in passenger ships also designated for the carriage of grey water or black water; and
- .3 seawater ballast tanks in livestock carriers also designated for the carriage of livestock dung.

#### Regulation 7-2 – Calculation of the factor $s_i$

3 In applying  $\theta_v$ , openings which cannot be or are incapable of being closed weathertight include ventilators (complying with regulation 19(4) of the *International Convention on Load Lines, 1966*) that for operational reasons have to remain open to supply air to the engine-room, emergency generator room or closed ro-ro and vehicle spaces (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship. Where it is not technically feasible to treat some closed ro-ro and vehicle space ventilators as unprotected openings, Administrations may allow an alternative arrangement that provides an equivalent level of safety.

#### Regulation II-1/22-1 – Flooding detection systems for passenger ships carrying 36 or more persons constructed on or after 1 July 2010<sup>i</sup>

"A flooding detection system for watertight spaces below the bulkhead deck shall be provided based on the guidelines developed by the Organization.\*

\* Refer to *Guidelines for flooding detection systems on passenger ships* (MSC.1/Circ.1291)."

<sup>i</sup> SOLAS regulations II-1/22-1 and II-2/21.4.13 amendments were adopted by resolution MSC.216(82)

### **Regulation II-2/21.4 – Safe return to port\***

"When fire damage does not exceed the casualty threshold indicated in paragraph 3, the ship shall be capable of returning to port while providing a safe area as defined in regulation 3. To be deemed capable of returning to port, the following systems shall remain operational in the remaining part of the ship not affected by fire:

(...)

.13 flooding detection systems; and (...)

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\* *Refer to Interim Explanatory Notes for the assessment of passenger ship systems' capabilities after a fire or flooding casualty (MSC.1/Circ.1369 and Add.1)."*

### **Guidelines for flooding detection systems on passenger ships (MSC.1/Circ.1291)**

"7 Any watertight spaces that are separately equipped with a liquid level monitoring system (such as fresh water, ballast water, fuel, etc.), with an indicator panel or other means of monitoring at the navigation bridge (and the safety centre if located in a separate space from the navigation bridge), are excluded from these requirements."

### **Interpretation**

For passenger ships carrying 36 or more persons and subject to SOLAS regulation II-1/8-1, the Safe Return To Port (SRTP) requirements of SOLAS regulation II-2/21.4 apply to both:

- .1 the flooding detection systems in the spaces as defined in paragraph 6 of MSC.1/Circ.1291; and
- .2 the liquid level monitoring systems, which are used as, or replace, the flooding detection systems, as specified in paragraph 7 of MSC.1/Circ.1291.

Therefore, for systems noted in sub-paragraph .2 above, the phrase "excluded from these requirements" in paragraph 7 of MSC.1/Circ.1291 is not an exclusion from the general provision in SOLAS regulation II-2/21.4.13 (remain operational in the event of fire). This exclusion pertains only to the detailed provisions in MSC.1/Circ.1291.

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MSC.1/Circ.1604  
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### **INTERIM GUIDELINES FOR MASS TRIALS**

1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), with the aim of assisting relevant authorities and relevant stakeholders with ensuring that the trials of Maritime Autonomous Surface Ships (MASS) related systems and infrastructure are conducted safely, securely and with due regard for protection of the environment, approved Interim Guidelines for MASS trials, as set out in the annex.

2 The Committee agreed to keep the Interim Guidelines under review and to amend them in view of the experience gained with their application and/or as and when the circumstances so warrant.

3 Member States and international organizations are invited to use the annexed Interim Guidelines and bring them to the attention of all parties concerned.

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## ANNEX

### INTERIM GUIDELINES FOR MASS TRIALS

#### 1 INTRODUCTION

##### 1.1 Aim

These Guidelines have been developed to assist relevant authorities and relevant stakeholders with ensuring that the trials of Maritime Autonomous Surface Ships (MASS) related systems and infrastructure are conducted safely, securely and with due regard for protection of the environment.

##### 1.2 Scope and application

1.2.1 These Guidelines provide guidance to:

- .1 relevant authorities:
  - .1 coastal State;
  - .2 flag State; and
  - .3 port State; and
- .2 relevant stakeholders such as shipowners/authorized representatives, operators and other involved parties in the conduct of MASS trials.

1.2.2 These Guidelines should be used when conducting trials of MASS-related systems and infrastructure. The term "trial" means an experiment or series of experiments, conducted over a limited period, in order to evaluate alternative methods of performing specific functions or satisfying regulatory requirements prescribed by various IMO instruments, which would provide at least the same degree of safety, security and protection of the environment as provided by those instruments.

1.2.3 The obligations and responsibilities of the relevant authorities with respect to MASS trials are established by the individual instruments. It is the responsibility of the flag State Administration to authorize a ship to participate in a trial. Where necessary, authorization should also be obtained from the coastal State and/or port State Authority where the trial will be conducted.

#### 2 PRINCIPLES AND MAIN OBJECTIVES

Trials should be conducted in a manner that provides at least the same degree of safety, security and protection of the environment as provided by the relevant instruments. The following objectives are provided to guide relevant authorities and stakeholders when planning, authorizing and conducting trials of MASS-related systems and infrastructure.



## **2.1 Risk management**

2.1.1 Trials should address the risks to safety, security and protection of the environment. The risks associated with the trials should be appropriately identified and measures to reduce the risks to as low as reasonably practicable and acceptable should be put in place.

2.1.2 Appropriate and effective emergency plans and measures should be established based on the results of the risk assessment to reduce the impact of any foreseeable incidents or failure.

2.1.3 Trials safety should be continuously evaluated, and trials should be suspended or stopped where safety parameters are exceeded.

## **2.2 Compliance with mandatory instruments**

2.2.1 Compliance with the intent of mandatory instruments should be ensured.

2.2.2 The scope of application of mandatory instruments, including provisions for exemptions and equivalencies, to a ship involved in a MASS trial should be determined by the flag State Administration in accordance with those instruments. Such determination should take into account the objectives of the trial, the anticipated capabilities and limitations of the ship and related systems and infrastructure during the trial, and the risk control measures adopted for the trial.

## **2.3 Manning and qualifications of personnel involved in MASS trials**

2.3.1 Appropriate steps should be taken to ensure that the intent of minimum manning requirements is met.

2.3.2 Onboard or remote operators of MASS should be appropriately qualified for operating MASS subject to the trial.

2.3.3 Any personnel involved in MASS trials, whether remote or onboard, should be appropriately qualified and experienced to safely conduct MASS trials.

## **2.4 Human element (including monitoring infrastructure and human-system interface)**

For the safe, secure and environmentally sound conduct of MASS trials, the human element should be appropriately addressed.\* The trial should consider the human-system interface as harmonization between human centred design and automation is a key component of MASS.

## **2.5 Infrastructure for safe conduct of trials**

2.5.1 Proper infrastructure should be established to provide for the safe, secure and environmentally sound conduct of MASS trials. In this regard, appropriate strategies should be implemented to mitigate the effects of incident and/or failure of systems, technology and testing. These strategies should include the ability to respond to emergencies.

2.5.2 Information related to the ship's performance and the basis of judgement by automated systems should be available to any personnel involved in MASS trials, whether remote or onboard.

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\* Refer to the *Human element vision, principles and goals for the Organization* (resolution A.947(23)).

## **2.6 Trial awareness**

Reasonable steps should be taken to ensure that potentially impacted third parties are informed of the trial of MASS systems and infrastructure.

## **2.7 Communications and data exchange**

An appropriate means for communications and data exchange, including redundancy, should be provided for the safe conduct of the trial.

## **2.8 Reporting requirements and information sharing**

2.8.1 Details of trials should be reported to the relevant authorities, as appropriate, as early as practicable, so as to enable the dissemination of information on the trials to all impacted third parties in the specified area.

2.8.2 Reporting requirements as included in IMO instruments should be complied with.

2.8.3 Relevant authorities are encouraged to report the results and lessons learned from trials to the Organization through appropriate means.

2.8.4 All stakeholders involved in trials are encouraged to share relevant information, as appropriate.

## **2.9 Scope and objective for each individual trial**

Each individual MASS trial should have its scope and objective specified.

## **2.10 Cyber risk management**

Appropriate steps should be taken to ensure sufficient cyber risk management of the systems and infrastructure used when conducting MASS trials.

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MSC.1/Circ.1605  
2 July 2019

### **UNIFIED INTERPRETATIONS OF THE IGF CODE**

1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), with a view to providing more specific guidance for the application of the relevant requirements of the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels (IGF Code), approved unified interpretations of the Code prepared by the Sub-Committee on Carriage of Cargoes and Containers, at its fifth session, as set out in the annex.

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

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## ANNEX

### UNIFIED INTERPRETATIONS OF THE IGF CODE

#### **1 Ship steel protection against liquefied gas fuel (paragraph 6.3.10)**

Whether a drip tray is needed or not should be decided in accordance with the following:

- .1 when the tank is located on the open deck, drip trays should be provided to protect the deck from leakages from tank connections and other sources of leakage;
- .2 when the tank is located below the open deck but the tank connections are on the open deck, drip trays should be provided to protect the deck from leakages from tank connections and other sources of leakage; and
- .3 when the tank and the tank connections are located below the deck, all tank connections should be located in a tank connection space. Drip trays in this case need not be required.

#### **2 Functional requirements applied to gas admission valves at dual fuel engines and gas engines (sections 12.4 and 12.5)**

2.1 The risk assessment, in accordance with the relevant standards on area classification as set out in section 12.4 of part A-1 of the IGF Code, should be understood as a procedure equivalently applicable to the examples for hazardous area zones as laid out in section 12.5 of part A-1 of the Code for the categorization of gas admission valves at dual fuel engines and gas engines.

2.2 Section 12.4 should be interpreted as the guiding methodology for the categorization of gas admission valves at dual fuel engines and gas engines. If no additional safety measures and no corresponding risk assessment in accordance with section 12.4 are available, the examples in section 12.5 should apply.

#### **3 Hazardous area classification of fuel storage hold spaces (section 12.5.2.1 and footnote 23)**

3.1 For the purposes of hazardous area classification, fuel storage hold spaces containing type C tanks with all potential leakage sources in a tank connection space and having no access to any hazardous area, should be considered non-hazardous.

3.2 Where the fuel storage hold spaces include potential leakage sources, e.g. tank connections, they should be considered hazardous area zone 1.

3.3 Where the fuel storage hold spaces include bolted access to the tank connection space, they should be considered hazardous area zone 2.

#### **4 Alarms for loss of ventilation capacity (section 15.10.1)**

Acceptable means to confirm that the ventilation system has the "required ventilating capacity" in operation should be, but not be limited to:

- .1 monitoring of the ventilation electric motor or fan operation combined with underpressure indication; or
  - .2 monitoring of the ventilation electric motor or fan operation combined with ventilation flow indication; or
  - .3 monitoring of ventilation flow rate to indicate that the required air flow rate is established.
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**E**

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MSC.1/Circ.1606  
2 July 2019

**UNIFIED INTERPRETATION OF PARAGRAPH 13.3.5 OF THE IGC CODE  
(AS AMENDED BY RESOLUTION MSC.370(93))**

1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), with a view to providing more specific guidance for the application of the relevant requirements of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), as amended by resolution MSC.370(93), approved unified interpretations of the Code prepared by the Sub-Committee on Carriage of Cargoes and Containers, at its fifth session, as set out in the annex.

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

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## ANNEX

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

#### **1 Cargo tank structure heating arrangement power supply (paragraph 4.19.1.6)**

1.1 The heating system referred to in paragraph 4.19.1.6.1 should be such that, in case of a single failure of a mechanical or electrical component in any part of the system, heating can be maintained at not less than 100% of the theoretical heat requirement.

1.2 Where the above requirements are met by duplication of the system components, i.e. heaters, glycol circulation pumps, electrical control panel, auxiliary boilers, etc., all electrical components of at least one of the systems should be supplied from the emergency source of electrical power.

1.3 Where duplication of the primary source of heat, e.g. oil-fired boiler is not feasible, alternative proposals can be accepted such as an electric heater capable of providing 100% of the theoretical heat requirement provided and supplied by an individual circuit arranged separately on the emergency switchboard. Other solutions may be considered towards satisfying the requirements of paragraph 4.19.1.6.1, provided a suitable risk assessment is conducted to the satisfaction of the Administration. The requirement in paragraph 2 of this interpretation should continue to apply to all other electrical components in the system.

#### **2 Fire test for emergency shutdown valves (paragraph 5.13.1.1.4)**

"Emergency shutdown valves, with materials having melting temperatures lower than 925°C", should not include an emergency shutdown valve in which components made of materials having melting temperatures lower than 925°C do not contribute to the shell or seat tightness of the valve.

#### **3 Survival craft protection (paragraph 11.3.1)**

3.1 With reference to sub-paragraph .7 of IGC Code, paragraph 11.3.1, the survival craft on board, including remote survival craft (SOLAS regulation III/31.1.4) facing the cargo area, should be protected by a water-spray system, taking into consideration cargo area extension for fire-fighting purposes as stated in paragraph 11.1.4.

3.2 Remote liferafts located in areas covered by water-spray protection as required in sub-paragraph .6 may be considered as adequately protected.

#### **4 Tank groups in cargo area (paragraph 11.3.3)**

4.1 The expression "two complete athwartship tank groupings" in sub-paragraph .1 of IGC Code, paragraph 11.3.3 means any two groups of tanks where one group is defined as tanks located in transverse direction from ship side to ship side. Where there is only one cargo tank occupying a hold space from ship side to ship side, it should be considered as a "grouping" for the purpose of this interpretation.

4.2 "Any two complete athwartship tank groupings" should represent an area equal to the combined area of the two largest tank groupings, including any gas process units within these areas.



**E**

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MSC.1/Circ.1607  
2 July 2019

**CARRIAGE OF CHAPTER 19 PRODUCTS,  
AMENDED IGC CODE (RESOLUTION MSC.370(93)), ON SHIPS BUILT  
AFTER 1 JULY 1986 AND BEFORE 1 JULY 2016**

1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), with a view to providing guidance for ships constructed on or after 1 July 1986 and before 1 July 2016 wanting to carry the additional products listed in chapter 19 of the Amendments to the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (resolution MSC.370(93)) (hereafter referred to as "the amended IGC Code"), approved the example of an addendum to the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk for ships built before 1 July 2016, prepared by the Sub-Committee on Carriage of Cargoes and Containers, at its fifth session, as set out in the annex.

2 Unless expressly provided otherwise, ships constructed on or after 1 July 1986 and before 1 July 2016 wanting to carry the additional products listed in chapter 19 of the amended IGC Code may carry these additional products subject to them being listed in the addendum to the Certificate of Fitness and meeting the requirements of the applicable IGC Code.

3 Furthermore, the *Guidance on completing the certificate of fitness under the IBC, BCH, IGC, GC and EGC Codes* (MSC-MEPC.5/Circ.14) needs to be considered, in addition to paragraph 2, when issuing the Certificate of Fitness for ships built on or after 1 July 1986 and before 1 July 2016.

4 Member States are invited to use the annexed example when applying the relevant provision of the amended IGC Code and to bring it to the attention of all parties concerned.

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**ANNEX**

**EXAMPLE OF AN ADDENDUM TO THE INTERNATIONAL CERTIFICATE OF FITNESS  
FOR THE CARRIAGE OF LIQUEFIED GASES IN BULK FOR SHIPS BUILT  
BEFORE 1 JULY 2016**

Addendum to Certificate No.:		Issued at: dd/mm/yyyy			
Issued in pursuance of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, as amended, for ships constructed on or after 1 July 1986 and before 1 July 2016, under the authority of the Government of:  .....					
Name of ship	Distinctive number or letters	IMO number	Port of registry	Cargo capacity (m <sup>3</sup> )	Ship type

**THIS IS TO CERTIFY:**

That the ship, in addition to carrying the products listed on the above Certificate of Fitness, is also suitable for the carriage in bulk of the following additional product(s) listed in chapter 19 of the Amendments to the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (MSC.370(93)), provided that all operational provisions of the applicable Code are observed:

Product*	Conditions of carriage (tank numbers, etc.)	Minimum temperature	MARVS

Place and date of issue: (dd/mm/yyyy).....

Signed: .....  
(signature of authorized official)

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\* Any cargo offered for bulk shipment shall be indicated in the shipping documents by the product name under which it is listed in chapter 19 of the amended IGC Code (MSC.370(93)).

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MSC.1/Circ.1612  
14 June 2019

**GUIDANCE FOR NAVIGATION AND COMMUNICATION EQUIPMENT  
INTENDED FOR USE ON SHIPS OPERATING IN POLAR WATERS**

1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), approved the *Guidance for navigation and communication equipment intended for use on ships operating in polar waters*, as set out in the annex, prepared by the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR), at its sixth session (16 to 25 January 2019).

2 The Maritime Safety Committee, at its ninety-seventh session (21 to 25 November 2016) had instructed the NCSR Sub-Committee to consider the current navigation and communication requirements in the SOLAS Convention and the need for any amendments, taking into account the extended duration requirements in the International Code for Ships Operating in Polar Waters (Polar Code).

3 The aim of this Guidance is to enhance the safety and efficiency of navigation and communication equipment intended for use on ships operating in polar waters by giving recommendations on general requirements and specific performance standards for navigation and communication equipment.

4 Member States and international organizations are invited to bring the Guidance to the attention of all parties concerned.

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## ANNEX

### GUIDANCE FOR NAVIGATION AND COMMUNICATION EQUIPMENT INTENDED FOR USE ON SHIPS OPERATING IN POLAR WATERS

#### Purpose

1 The purpose of this Guidance is to enhance the safety and efficiency of navigation and communication equipment intended for use on ships operating in polar waters:

- .1 It gives recommendations on general requirements and specific performance standards for navigation and communication equipment intended for use on ships operating in polar waters.
- .2 It covers:
  - .1 generally, all navigation and communication equipment where equipment or parts of it are exposed to the specific environmental conditions of the polar waters; and
  - .2 specific requirements for equipment which may be influenced by regional effects.
- .3 It aims to establish requirements to facilitate different approaches (e.g. built-in protection, handling requirements, etc.).

#### Scope

2 This Guidance provides recommendations on:

- .1 requirements for navigation and communication equipment intended for use on ships operating in polar waters, where technical provisions could reduce the listed effects;
- .2 rules to operate navigation and communication equipment intended for use on ships operating in polar waters, if technical provisions could not protect the equipment from the listed effects; and
- .3 additional requirements for navigation and communication equipment intended for use on ships operating in polar waters, if the equipment is influenced by incorrect data of impaired equipment only.

#### Structure

3 This Guidance has a modular structure:

- .1 It starts with a general part (Module A) which should be applied to equipment or parts of it exposed to the environmental conditions of polar waters.
- .2 The second module (Module B) is addressing equipment specific topics.
- .3 The third module (Module C) is addressing the handling of incorrect data of impaired equipment.

- .4 The appendix provides information on survival craft and rescue boat communications capabilities.

### Application

4 This Guidance is applicable to navigation and communication equipment intended for use on ships operating in polar waters.

### Abbreviations

AIS	- Automatic Identification System
DSC	- Digital Selective Calling
ECDIS	- Electronic Chart Display and Information System
EGC	- Enhanced Group Call
ENC	- Electronic Navigational Chart
GNSS	- Global Navigation Satellite System
HF	- High Frequency
LRIT	- Long Range Identification and Tracking
MF	- Medium Frequency
PST	- Polar Service Temperature (defined by Polar Code, part I-A, paragraph 1.2.11)
PWOM	- Polar Water Operational Manual
SART	- Search and Rescue Radar Transponder
SOLAS	- International Convention for the Safety of Life at Sea
THD	- Transmitting Heading Device
VDR	- Voyage Data Recorder
VHF	- Very High Frequency

## MODULE A – GENERAL PART RELATED TO EQUIPMENT EXPOSED TO THE SPECIFIC ENVIRONMENTAL CONDITIONS OF POLAR WATERS

Generally, limitations due to environmental conditions should be documented in the Polar Water Operational Manual (PWOM).

### A.1 Temperature

A.1.1 If equipment or parts thereof are exposed to the environmental conditions of polar waters, the navigation and communication equipment should keep its specific performance requirements as far as possible.

A.1.2 Exposed portable equipment should be subject to testing in accordance with a recognized procedure,\* except that the temperature of the chamber should be reduced to, and maintained at, the specified PST.

A.1.3 In addition, test condition provisions in paragraphs not related to exposure temperature should follow the *General requirements for shipborne radio equipment forming part of the Global Maritime Distress and Safety System (GMDSS) and for electronic navigational aids* (resolution A.694(17)).

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\* Refer to low temperature test procedure in paragraph 8.4 of IEC 60945.

## **A.2 Ice accretion**

A.2.1 If equipment or parts thereof are exposed to ice accretion, dependent on the polar water and season, the navigation and communication equipment should keep its specific performance requirements, as far as possible.

A.2.2 According to the Polar Code, part I-A, paragraph 4.3.1.1.1, the icing allowance as stability criterion is 30 kg/m<sup>2</sup> (around 30 mm) on horizontal parts or 7.5 kg/m<sup>2</sup> (around 7.5 mm) on vertical parts and should be used as maximum criterion for icing for the ship and related navigation and communication equipment exposed to icing with respect to its design and placement on board.

A.2.3 The performance could be ensured by:

- .1 physical protection (e.g. heating);
- .2 operational protection (e.g. removing); or
- .3 design (e.g. location can be easily accessed for removing of ice or the design reduces possible covering of ice).

A.2.4 Where facilities to de-ice equipment are provided, these should result in the performance criteria being met within two hours from power on.

A.2.5 According to the Polar Code, the physical and operational measures should be part of the PWOM.

## **A.3 Handling of equipment dependent on batteries**

A.3.1 According to the Polar Code, part I-A, paragraph 1.2.7, the maximum expected time of rescue means the time adopted for the design of equipment and system that provide survival support. It should never be less than five days (120 h). This requirement may be difficult to meet by some specific equipment requirements, design requirements or handling requirements.

A.3.2 Based on the interpretation provided in the appendix, the performance of equipment and systems that provide survival support may be maintained throughout the maximum expected time of rescue using design requirements, operational requirements and any other means documented in the PWOM or a combination of these.

A.3.3 Any procedures or measures taken to address ice accretion or the handling of equipment dependent on batteries, as outlined in sections A.2 and A.3 respectively, should be included in the PWOM.

## **MODULE B – REQUIREMENTS FOR SPECIFIC EQUIPMENT**

### **B.1 Magnetic compass**

B.1.1 If the magnetic compass is intended for use in polar waters, the performance in latitudes beyond 70 should be additionally validated with the requirements of resolution A.382(X) on *Magnetic Compasses – Carriage and performance standards*.

B.1.2 The magnetic compass fitted on deck without tarpaulin should be protected against ice accretion as described in section A.2, if it is intended for use in specified latitudes during the relevant trip within polar waters.

**B.2 Pelorus, compass bearing device or heading repeater (gyro, magnetic or GNSS-THD compass)**

If the related compass device is intended for use in polar waters and exposed to the weather, the pelorus or compass bearing device including their means of correction should be protected against ice accretion as described in section A.2.

**B.3 ECDIS**

The ECDIS should be capable of displaying ENCs in a projection suitable for higher latitudes, as applicable, for the intended route. Input data of critical input sensors should be handled as described in module C.

**B.4 GNSS-receiver**

The GNSS-antenna should be protected against ice accretion as described in section A.2.

**B.5 Radar reflector**

The radar reflector should be protected against ice accretion as described in section A.2.

**B.6 Sound reception system**

The outdoor microphones of the sound reception system should be protected against ice accretion as described in section A.2.

**B.7 Daylight signalling lamp (if fitted on deck)**

The daylight signalling lamp (if fitted on deck) should be protected against ice accretion as described in section A.2.

**B.8 Radar**

The radar antenna should be protected against ice accretion as described in section A.2. Input data of critical input sensors should be handled as described in module C.

**B.9 Speed and distance measuring equipment**

If underwater sensors are used for measuring speed through water, the performance in very clean water conditions with a significant reduced number of particles in the water, as expected in polar waters, should be validated to be within the requirements of the *Performance standards for devices to indicate speed and distance* (resolution A.824(19)).

**B.10 GNSS-THD**

The GNSS-THD antenna should be protected against ice accretion as described in section A.2. The performance in latitudes beyond 70° should be additionally validated to be within the requirements of the *Performance standards for marine transmitting heading devices (THDs)* (resolution MSC.116(73)).

#### **B.11 AIS**

The AIS antennas should be protected against ice accretion as described in section A.2. Input data of critical input sensors should be handled as described in module C.

#### **B.12 Gyro compass**

If the gyro compass is intended for use in polar waters, the performance in latitudes beyond 70° should be additionally validated to be within the requirements of the *Performance standards for gyro compasses* (resolution A.424(XI)).

#### **B.13 Heading or track control system**

Input data of critical input sensors should be handled as described in module C.

#### **B.14 LRIT**

The function may be limited depending on latitude and selected system (Inmarsat C is limited whereas Iridium may offer a full coverage). The LRIT antennas should be protected against ice accretion as described in section A.2.

#### **B.15 VDR (if fitted on deck)**

The float-free release mechanism of the VDR fitted on deck should be protected against ice accretion as described in section A.2.

#### **B.16 Navigation bridge visibility**

The navigation bridge windows should be protected against ice accretion as described in section A.2.

#### **B.17 Pilot ladder**

The pilot ladder should be protected against ice accretion as described in section A.2.

#### **B.18 Antennas for all radiocommunication equipment**

The antennas for radiocommunication equipment should be protected against ice accretion as described in section A.2.

#### **B.19 EGC receiver**

The function may be limited, in the case of Inmarsat EGC, depending on latitude. The EGC receiver antennas should be protected against ice accretion as described in section A.2.

#### **B.20 EPIRB**

The EPIRB should be protected against ice accretion as described in section A.2.

#### **B.21 Two-way VHF radiophones for use in survival crafts**

Two-way VHF radiophones for use in survival crafts should be included in the PWOM.

#### **B.22 Navigation lights/360° Search light**

The navigation and search lights should be protected against ice accretion as described in section A.2.

#### **B.23 Sound signalling equipment**

The sound signalling equipment should be protected against ice accretion as described in section A.2.

#### **B.24 Search and rescue locating device (SART/AIS-SART)**

The SART / AIS-SART should be protected against ice accretion as described in section A.2.

### **MODULE C – HANDLING OF INCORRECT DATA**

Depending on the region (latitude) some sensors (e.g. heading, speed) may not work with the accuracy defined in the relevant standards. There should be an automatic warning or a clear indication that the bridge crew is able to decide to use the information for display or for use in any other calculation of connected equipment.



## APPENDIX

### SURVIVAL CRAFT AND RESCUE BOAT COMMUNICATIONS CAPABILITIES

1 All rescue boats, all lifeboats and all other survival craft carried by the ship, notwithstanding the redundancy in aggregate capacity of survival craft required by SOLAS regulations III/21 and III/31, and taking into account the different possible distress scenarios, are considered able to be released for evacuation simultaneously and should be provided with mandatory communication equipment accordingly.

2 The expressions "shall maintain capability for", "shall be capable of operation during the maximum expected time of rescue" and "are available for operation during the maximum expected time of rescue" used in paragraphs 10.2.2.1, 10.2.2.2, 10.2.2.3 and 10.3.2.3 of part I-A of the Polar Code mean the ability of mandatory communication equipment for use in survival craft, including liferafts, and rescue boats to maintain the ready for operation state within the maximum expected time of rescue at the Polar Service Temperature (PST) assigned to the ship, and, after that, to be capable to perform its functions at the PST assigned to the ship for the operating time not less than that specified in respective existing performance standards.\*

**Note:** For example, it is not required that an EPIRB used for distress alerting continues distress messaging for the maximum expected time of rescue and the two-way VHF radiotelephone apparatus being used for transmitting and receiving on-scene communications does not need to be technically in operation at its highest rated power with a duty cycle of 1:9 for maximum expected time of rescue.

3 Procedures referred to in paragraph 10.3.2.3 of part I-A of the Polar Code can include both operational requirements and any other means, including technical solutions, i.e. thermal insulation, chemical heat sources, additional batteries, rechargeable batteries with respective chargers, etc., and should be documented in the PWOM.

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\* Refer to the following performance standards: EPIRB - resolutions A.810(19) and MSC.471(101); Radar transponder - resolution A.802(19); AIS-SART - resolution MSC.246(83); Two-way VHF radiotelephone apparatus - resolution MSC.149(77).

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MSC.1/Circ.1614  
26 June 2019

**INTERIM GUIDELINES ON LIFE-SAVING APPLIANCES AND ARRANGEMENTS FOR  
SHIPS OPERATING IN POLAR WATERS**

1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), having considered a proposal by the Sub-Committee on Ship Systems and Equipment, at its sixth session, and recognizing the importance of life-saving appliances and arrangements for ships operating in polar waters, with a view to providing interim guidance outlining possible means of mitigating hazards in order to comply with section 8.3 of part I-A of the International Code for Ships Operating in Polar Waters (Polar Code), approved the *Interim guidelines on life-saving appliances and arrangements for ships operating in polar waters*, as set out in the annex.

2 Member States are invited to bring the annexed Interim guidelines to the attention of ship designers, shipyards, shipowners, ship managers, ship operators and other organizations or persons responsible for life-saving appliances and arrangements for ships operating in polar waters.

3 Member States are also invited to bring the annexed Interim guidelines to the attention of shipmasters, ships' officers and crew and all other parties concerned.

4 The Committee agreed to keep the Interim guidelines under review, taking into account operational experience gained with their application.

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## ANNEX

### INTERIM GUIDELINES ON LIFE-SAVING APPLIANCES AND ARRANGEMENTS FOR SHIPS OPERATING IN POLAR WATERS

#### 1 GENERAL

1.1 These Interim guidelines outline possible means of mitigating hazards in order to comply with section 8.3 of part I-A of the International Code for Ships Operating in Polar Waters (Polar Code) and are intended to assist ship designers and shipowners/operators, as well as Administrations in the uniform implementation of the Polar Code.

1.2 Compliance with these Interim guidelines does not necessarily mean that the ship complies with the Polar Code. There may be other hazards, conditions and mitigating means to be considered in the operational assessment required in section 1.5 of part I-A of the Code. The complexity of a prolonged survival time in a harsh environment should not be underestimated.

1.3 Survival after abandonment will rely on several factors, such as the types and combination of equipment, crew training and good leadership of each survival craft. The expected time of rescue is a defining factor for life-saving appliances and arrangements. Conditions that are not otherwise considered critical may become critical over time.

1.4 While equipment enhancement greatly improves survivability, the human element is a significant factor. The crew should have relevant knowledge of human behaviour in extended survival situations, medical first aid and the management of the resources available.

1.5 Key physical parameters for human survival and human behaviour in a crisis should be taken into account when considering life-saving appliances and arrangements for ships operating in polar waters.

1.6 All references to the LSA Code in these Interim guidelines mean the International Life-saving Appliance (LSA) Code, adopted by the Maritime Safety Committee of the Organization by resolution MSC.48(66), as amended.

1.7 Due to the variability of risk levels in polar waters, some of the mitigation means within these Interim guidelines may not apply to all operations. Any risk mitigation measures applied should be based on the results of the assessment, as required by the Polar Code and the operational limitations identified on the Polar Ship Certificate.

#### 2 CONDITIONS TO CONSIDER

2.1 The Polar Code considers hazards that may lead to elevated levels of risks due to an increased probability of occurrence and/or more severe consequences. The sources of hazards listed in section 3 of the introduction of the Code should be considered for both normal operation and emergency situations.

2.2 These Interim guidelines are based on the following specific operational assessment criteria:

- .1 maximum expected time of rescue;

- .2 operation in low air temperatures (ships with an assigned Polar Service Temperature (PST));
- .3 operation in ice;
- .4 icing of life-saving appliances and arrangements;
- .5 the effect of operation in high latitudes;
- .6 operation in extended periods of darkness; and
- .7 abandonment onto ice or land.

2.3 In the following provisions, the mitigating means are organized based on their relevance in relation to the specific conditions. Some means may be relevant to more than one of the conditions. The final relevance for each individual ship is dependent on the results of the operational assessment required by section 1.5 of part I-A of the Polar Code.

### **3 MAXIMUM EXPECTED TIME OF RESCUE**

3.1 This section provides guidance for the type and amount of survival equipment related to the maximum expected time of rescue.

#### **Personal and group survival equipment**

3.2 The following equipment should be available for all persons after abandonment and for the maximum expected time of rescue, which can be stored in survival craft or be a part of the personal survival equipment or group survival equipment and the Polar Water Operational Manual (PWOM) should consider the location, stowage and transfer of life-saving equipment:

- .1 insulated immersion suit or thermal protective aid provided with gloves should be provided with separate gloves, which shall be permanently attached to the suit/protective aid;
- .2 food rations providing a minimum of 5,000 kJ (1,195 kcal) per person per day which should be increased as necessary taking into account the operational assessment;
- .3 at least 2 litres of fresh water per person per day: de-salting apparatus or means to melt ice or snow may supply the amount exceeding the requirements of paragraphs 4.1.5.1.19 and 4.4.8.9 of the LSA Code and there should be a tank or a container of adequate size to collect water from the de-salting apparatus and rainwater collectors;
- .4 anti-seasickness medicine;
- .5 protective clothing of a material with thermal properties taking into account performance of the material when wet and type of survival craft, including head protection, neck and face protection, gloves/mittens, socks, boots, long underpants and sweaters;
- .6 sunglasses or ski goggles appropriate for the expected conditions to protect persons from snow blindness, UV rays, snow ingress and/or cold;

- .7 drinking vessel, preferably with a screw cap;
- .8 polar survival guidance;
- .9 a seasickness bag in addition to the one required by the LSA Code;
- .10 anti-bacterial gel or hand wipes;
- .11 blanket of a material with thermal properties suitable for use on the planned route, for each person on board; and
- .12 other equipment in accordance with section 9.1 of part I-B of the Polar Code, as deemed necessary.

3.3 Personal survival equipment should be packed in a waterproof floatable carrier bag. The personal survival equipment may be stored at the assembly or embarkation stations and should be clearly marked with the size of the person they are intended for (if applicable). The content should include, as a minimum, all equipment needed during the abandonment and the initial part of the survival phase. The carrier bag should also function as each person's personal storage area for equipment handed out during the survival phase in order to keep the survival craft or shelter tidy and habitable.

#### **Capacity of survival craft**

3.4 The capacity of each survival craft should comply with the following:

- .1 The seating capacity of each survival craft should be adjusted taking into account polar clothing, additional equipment including all persons carrying their intended personal survival equipment and space for occupants to stand and move in turns.
- .2 Where additional personal and group survival equipment is carried in accordance with paragraphs 8.3.3.3.2 and 8.3.3.3.3 of chapter 8 of part 1-A of the Polar Code, adequate space for the stowage of the equipment should be provided. The total combined weight including additional equipment may not exceed the weight determined for the type approval of the survival craft.

#### **Equipment in survival craft**

3.5 The following equipment should be available in the survival craft:

- .1 Effective means of communicating important messages from the person in charge of the survival craft, unless the Administration considers the survival craft small enough to ensure that all important messages can be heard by all persons on board, taking into account the noise level caused by the lifeboat engine, harsh weather, etc.
- .2 In addition to the tools required in paragraph 4.4.8.27 of the LSA Code, the lifeboat should be provided with tools and critical spare parts for minor adjustments of the equipment and components to ensure operability during the survival phase.

3.6 Notwithstanding the requirement in paragraph 4.4.8 of the LSA Code that all lifeboat equipment should be as small and of as little mass as possible, it is important that all items are robust to retain their functionality for the maximum expected time of rescue.

3.7 Survival craft should be of a type complying with the following:

- .1 Survival craft should be fitted with handholds or handhold lines to safeguard persons who are standing upright or moving inside the craft in a seaway.
- .2 Survival craft should provide a habitable environment for all persons on board that prevent exposure to a long-term CO<sub>2</sub> concentration of more than 5,000 ppm for the maximum expected time of rescue. The ventilation should be considered in context with heating requirements to achieve a habitable temperature in the survival craft.
- .3 Each seat in a lifeboat should be provided with a backrest.

#### **4 SHIPS OPERATING IN LOW AIR TEMPERATURE**

4.1 This section applies to ships intended to operate in low air temperatures, as defined in the Polar Code, part I-A, regulation 1.2.12.

4.2 All life-saving appliances and arrangements should remain operational and ready for immediate use at the polar service temperature (PST) or at the temperatures specified by the LSA Code, whichever is the lowest. The manufacturer should provide information of additional tests including temperature ranges which the equipment is intended for. This information should be a part of the operating and maintenance manual.

4.3 In the survival craft, the combination of personal survival equipment, ventilation, insulation and heating means, if provided, should be capable of maintaining a habitable inside air temperature when the outside air temperature is equal to the PST. All cold surfaces should be insulated, in particular the surfaces in direct contact with the persons, e.g. seats.

4.4 Installed heating systems, if provided, and their power sources should be capable of operation during the maximum expected time of rescue.

4.5 Means should be provided to avoid icing or dew on the windows of the lifeboat steering position, in order to maintain a proper lookout.

4.6 In order to avoid exposure to cold air, toilet equipment should be provided inside the survival craft.

4.7 Liferafts should be provided with inflatable floors or equivalent and all persons should be wearing insulated immersion suits instead of thermal protective aids.

4.8 Survival craft and containers for group survival equipment in their stowed position should have means to mitigate the freezing of drinking water supplies.

4.9 Lifeboats should be provided with suitable low temperature grade fuel and lubrication oil for the engine and suitable low temperature grade oil for the steering gear, as necessary, or be fitted with a heating system to maintain fuel and lubrication oil at the appropriate viscosity for operation.

## **5 SHIPS OPERATING IN ICE**

5.1 This section applies to Category A and B ships and ice strengthened Category C ships.

5.2 All survival craft should be arranged for launching in such a way that they will not be damaged or cause sufficient impact to injure persons on board.

5.3 Survival and rescue craft and their fittings should be so constructed as to prevent damage from contact with ice when loaded with its full complement of persons and equipment.

5.4 A survival craft should withstand a controlled deployment into the ice conditions expected for the operational area and its propeller, rudder or other external fittings should be capable of operating in such conditions.

## **6 SHIPS OPERATING IN CONDITIONS WITH RISK OF ICING OF LIFE-SAVING APPLIANCES AND ARRANGEMENTS**

6.1 This section applies to ships operating in conditions where ice accretion is likely to occur on life-saving appliances and arrangements.

6.2 Means should be provided to ensure the function of launching appliances, release mechanisms, hydrostatic release units and marine evacuation systems in the expected conditions of icing.

6.3 Lifeboats and rescue boats should maintain positive metacentric height (GM) when loaded as required by paragraph 4.4.5.1 of the LSA Code and with an additional ice load of 30 kg/m<sup>2</sup> on exposed horizontal surfaces and 7.5 kg/m<sup>2</sup> for the projected lateral area of each side of the lifeboat.

6.4 Means for removing ice should be provided for all survival craft likely to accumulate ice.

6.5 Entrances, hatches and means of ventilation should be designed and equipped in a way that they can be operated during icing condition to allow mitigation of ice accretion and remove the accumulated ice.

## **7 SHIPS OPERATING IN HIGH LATITUDES**

7.1 This section applies to ships operating in areas of high latitudes.

7.2 Lifeboats and rescue boats on ships proceeding to latitudes over 80°N should be fitted with a non-magnetic means for determining heading. It should be possible to supply the means with power from two independent batteries.

## **8 SHIPS OPERATING IN EXTENDED PERIODS OF DARKNESS**

8.1 This section applies to all ships operating in polar waters during extended periods of darkness.

8.2 Survival craft exterior and interior lights should be capable of being in operation for the extended periods of darkness during the maximum expected time of rescue. Lifeboat searchlights should be capable of being in continuous operation for the maximum expected time of rescue.

## **9 ABANDONMENT TO ICE OR LAND**

9.1 This section applies to ships where the assessment required by paragraph 1.5 of part I-A of the Polar Code identifies a potential of abandonment onto ice or land.

9.2 Special consideration should be given when operating in areas with dangerous wildlife. Additional flares and/or a flare gun should be provided.

### **Shelter**

9.3 The combination of a chosen type of shelter, type of personal thermal protection and other mitigating means should provide a habitable environment on ice or land, while adequately protecting against cold, wind and sun.

9.4 When determining the capacity of the shelters, the expected environmental condition in the operating area should be considered. For ships operating in low air temperature, the calculation should take into account that it might be unsafe for persons to stay outside the shelter, even for short periods. Hence, the same considerations as for survival craft should be taken into account.

9.5 Shelters should have insulated floor or other means to minimize heat transfer to the surface.

### **Group survival equipment**

9.6 The container for group survival equipment when fully loaded should have a size, shape and mass that enables it to be towed through icy water, and also allows two crew members to pull it out the water and tow it on ice or on land.

9.7 Unless the group survival equipment is carried in the survival craft, means should be provided to launch the containers to water, ice or land without damage to the container or its contents. Means to launch such containers should be independent of the ship power system.

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**INTERIM GUIDELINES FOR MINIMIZING THE INCIDENCE AND CONSEQUENCES OF FIRES IN RO-RO SPACES AND SPECIAL CATEGORY SPACES OF NEW AND EXISTING RO-RO PASSENGER SHIPS**

- 1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), approved *Interim guidelines for minimizing the incidence and consequences of fires in ro-ro spaces and special category spaces of new and existing ro-ro passenger ships*, prepared by the Sub-Committee on Ship Systems and Equipment, at its sixth session, as set out in the annex.
- 2 The Committee agreed to keep the Interim guidelines under review, taking into account operational experience gained with their application.
- 3 Member States are invited to bring the Interim guidelines to the attention of all parties concerned and to recount their experience gained through the use of these Interim guidelines to the Organization.

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## ANNEX

### **INTERIM GUIDELINES FOR MINIMIZING THE INCIDENCE AND CONSEQUENCES OF FIRES IN RO-RO SPACES AND SPECIAL CATEGORY SPACES OF NEW AND EXISTING RO-RO PASSENGER SHIPS**

For the purpose of these guidelines, section 1 applies to new and existing ro-ro passenger ships and sections 2 to 5, except 3.2, apply only to new ships unless specified otherwise.

#### **1 PREVENTION/IGNITION**

##### **1.1 Inspection of ship's power supply equipment and cables**

1.1.1 Electrical cables, sockets, and their associated equipment in ro-ro and special category spaces intended for power supply to vehicles or cargo units should be inspected, in principle prior to their use, by trained crew or other trained personnel according to an established procedure.

1.1.2 Non-ship cables provided and connected by drivers present an increased risk of overheating or short circuit; therefore, only ship power supply equipment and cables should be used.

##### **1.2 Maintenance plan for electrical cables and their sockets in ro-ro and special category spaces intended for power supply to vehicles or cargo units**

A maintenance plan should be developed for electrical cables, sockets, and their associate equipment in ro-ro and special category spaces intended for power supply to vehicles or cargo units.

##### **1.3 Electrical cables**

1.3.1 In addition to SOLAS regulation II-1/45.5.1 to .6, electrical cables intended for power supply to vehicles or cargo units that may be damaged by vehicles or cargo units during loading and unloading operations should be suitably protected, even when armoured, unless the ship's structure provides adequate protection. The arrangement should be sufficiently protected against corrosion and effectively earthed.

1.3.2 When not in use, electric cables intended for power supply to vehicles or cargo units should be stored in a way that they cannot be damaged by loading/unloading operations.

##### **1.4 Shock/waterproof rating of electrical connections**

1.4.1 In addition to SOLAS regulation II-2/20.3.2, sockets should be provided with a degree of protection of at least IP56 in accordance with standard IEC 60529.

1.4.2 The socket should be provided with means to maintain the same degree of protection after the plug is removed from the socket. Where a loose cover is used for this purpose, it should be anchored to its socket, for example by means of a chain.

## **1.5 Circuit breakers**

The electrical system should detect potentially detrimental loads or earth faults, so that the affected socket will be isolated.

## **1.6 Electrical connections and disconnections of cargo units and electrical vehicles**

Only trained personnel or other persons under the supervision of ship's crew should perform the electrical connection and disconnection of cargo units and electrical vehicles.

## **1.7 Check points at patrols**

1.7.1 During patrols by crew in ro-ro spaces and special category spaces, the following should be checked, for example, but not limited to:

- .1 leakages from the vehicles;
- .2 conditions of electrical connections and ship's power supply cables to vehicles; and
- .3 common cargo fire hazards.

1.7.2 It is recommended that portable thermal imaging devices be used for screening during fire rounds and upon suspicion to detect hot areas and overheated electrical equipment.

## **1.8 Strengthening of the requirement for elimination of sources of ignition**

1.8.1 The company should establish a fire-fighting plan that, in particular, identifies any risks specific to alternatively powered vehicles, including battery powered vehicles, and outlines the most appropriate fire-fighting techniques for such vehicles. The company should ensure adequate training and good access to any specialized fire-fighting equipment for alternatively powered vehicles.

1.8.2 During voyages when vehicles powered by compressed natural gases or hydrogen are carried, the hazards associated with accumulation of flammable gases and gases lighter than air under ceilings need to be addressed.

1.8.3 Pipes with combustible hydraulic oil should be protected from damage. Hydraulic oil from a damaged pipeline in contact with a source of ignition, for example, a refrigerating unit of a truck working during the voyage, can cause a fire.

## **2 DETECTION AND DECISION**

### **2.1 Addressable fixed fire detection and alarm systems**

2.1.1 For ships built before July 2010, it is recommended that a fixed fire detection and alarm system with individually addressable detectors be considered to replace existing systems in ro-ro spaces and special category spaces.

2.1.2 If a fixed water-based deluge system is used for ro-ro spaces and special category spaces then a fire detection and alarm system addressable to the same sections of the deluge systems should be arranged.

2.1.3 In the design of the fire detection alarm system, it should be designed with a system interface which provides logical and unambiguous presentation of the information, to allow a quick and correct understanding and decision-making. In particular, the alarm system section numbering should coincide with the sections of other systems, such as fixed water-based fire-extinguishing system or television surveillance system, if available.

## **2.2 Video monitoring**

2.2.1 Television surveillance systems can be effective for rapid confirmation of a fire after activation of fire alarms, as well as rapid execution of related actions after the confirmation of fire. This supports the activation of the correct deluge section, as well as manual fire-fighting.

2.2.2 Effective television surveillance systems should be provided in ro-ro and special category spaces for continuous video monitoring of these spaces and be provided with immediate playback capability to allow for quick identification of fire location, as far as practicable. Continuous monitoring of the video image by the crew needs not be ensured.

## **2.3 Fire detection in open ro-ro spaces**

In open ro-ro spaces on all ro-ro passenger ships, if smoke detectors are installed they should be supplemented with other effective means of detection e.g. flame detectors, heat detectors.

## **2.4 Fire detection on weather decks**

A fixed fire detection and fire alarm system should be provided for weather decks intended for the carriage of vehicles. The fixed fire detection system should be capable of rapidly detecting the onset of fire on the weather deck. The type of detectors, spacing, and location should be to the satisfaction of the Administration, taking into account the effects of weather, cargo obstruction and other relevant factors. Different settings may be used for specific operation sequences, such as during loading or unloading and during voyage, in order to reduce the false alarms.

## **2.5 Alarm system design and integration**

Alarm notifications should follow a consistent alarm presentation scheme (wording, vocabulary, colour, and position) and that alarms are immediately recognizable on the bridge and not compromised by noise or poor placing. The interface should provide alarm addressability to allow the crew to identify the alarm history, the most recent alarm, and the means to suppress alarms while ensuring the alarms with ongoing trigger conditions are still clearly visible.

## **2.6 Signage and markings for effective identification and localization**

For closed vehicle, ro-ro spaces, and special category spaces where fixed pressure water-spraying systems are fitted, they should be provided with suitable signage and marking on deck and vertical boundaries to easily identify the sections of the fixed fire-extinguishing system. Signage and markings should be adapted to typical patterns of crew movement and should not be obstructed by fixed installations. Section number signs should be of photoluminescent material complying with ISO 15370. The section numbering indicated inside the space should be the same as the section valve identification and section identification at the safety centre or continuously manned control station.

### **3 EXTINGUISHMENT**

#### **3.1 Additional fire-fighting equipment for ro-ro passenger ships**

A claw bar should be available for prompt fire-fighting in all ro-ro spaces and special category spaces.

#### **3.2 Appropriate training and drills**

3.2.1 Relevant crew members should be trained on fire-fighting strategies and risks associated with alternatively powered vehicles such as battery or gas driven vehicles.

3.2.2 Relevant crew members should receive adequate training and participate in drills in order to be familiar with the specific arrangements of the ship, as well as the location, operation, and limitations of the fire-fighting systems and appliances that they may be called upon for use in ro-ro spaces and special category spaces.

#### **3.3 Positioning of sprinklers and nozzles**

MSC.1/Circ.1430/Rev.1 on *Revised guidelines for the design and approval of fixed water-based fire-fighting systems for ro-ro spaces and special category spaces* should be referred to with regard to functional requirements for positioning of sprinklers and nozzles to provide satisfactory performance with respect to both activation time and water distribution.

#### **3.4 Fixed fire-extinguishing measures on weather decks**

Additional fire-extinguishing measures such as fire monitors and drainage systems may be considered on weather decks. Remotely controlled fire monitors may allow for safe operation of the monitors, but where suitable, manually operated fire monitors may also be used.

### **4 CONTAINMENT**

#### **4.1 Fire integrity of ro-ro decks and decks in special category spaces**

The fire integrity of ro-ro decks separating ro-ro spaces should be at least A-30.

#### **4.2 Types of ro-ro spaces**

Vehicles spaces and ro-ro spaces should be either closed ro-ro spaces or weather decks.

### **5 INTEGRITY OF LIFE-SAVING APPLIANCES AND EVACUATION**

5.1 For new and existing ships, the following safety distances (measured horizontally) are recommended to avoid jeopardizing life-saving appliances and embarkation stations in case of fire in ro-ro and special category spaces:

- .1 survival craft and marine evacuation systems stowed and in a position to be deployed:
  - .1 more than 6 m from a cargo space side opening; and
  - .2 more than 8 m from cargo on weather deck; and

- .2 survival craft embarkation stations and muster stations located:
  - .1 more than 6 m away from a cargo space side opening; and
  - .2 more than 13 m from cargo on weather deck.

5.2 Equivalent arrangements to the satisfaction of the Administration, providing at least the same level of protection, could be considered.

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## **UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-2**

1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), with a view to providing more specific guidance on SOLAS regulations II-2/9 and II-2/10, approved unified interpretations of SOLAS chapter II-2, prepared by the Sub-Committee on Ship Systems and Equipment, at its sixth session, as set out in the annex.

2 Member States are invited to use the annexed unified interpretations as guidance when applying SOLAS regulations II-2/9 and II-2/10, and to bring them to the attention of all parties concerned.

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## ANNEX

### UNIFIED INTERPRETATIONS OF SOLAS CHAPTER II-2

#### CHAPTER II-2

#### Construction – Fire protection, fire detection and fire extinction

##### Regulation 9.2 – Containment of fire, thermal and structural boundaries

In cases where urea or sodium hydroxide solution tanks for selective catalytic reduction (SCR) systems, exhaust gas recirculation (EGR) systems or exhaust gas cleaning systems (EGCS) are installed in a space separated from the engine-room, in determining fire integrity of divisions, the solution tank space should be considered as "similar spaces" in the definition of "machinery spaces" in regulation 3.30 and should be categorized as:

"(10) Tanks, voids and auxiliary machinery spaces having little or no fire risk" in regulation 9.2.2.3.2.2, for ships carrying more than 36 passengers; or

"(7) Other machinery spaces" in regulations 9.2.2.4.2.2, 9.2.3.3.2.2 or 9.2.4.2.2.2, for ships carrying not more than 36 passengers and cargo ships.

The division between the engine-room and the solution tank space should have a fire integrity of at least "A-0" class.

##### Regulation 9.7.5 – Containment of fire, Ventilation systems, Exhaust ducts from galley ranges

The reference to ISO 15371:2009 in the footnote to both regulations 9.7.5.1.1.3 and 9.7.5.2.4 is given as an example of a suitable performance standard for pre-engineered galley duct fixed fire-extinguishing systems.

CO<sub>2</sub> fire-extinguishing systems, which are not pre-engineered fixed fire-extinguishing systems, should be designed according to the requirements set out in regulation 10.6.3.1.1 (spaces containing flammable liquids) or another suitable standard acceptable to the Administration.

##### Regulation 10.10.4 – Fire-fighting, Fire-fighter's outfits, Fire-fighter's communication

Two-way portable radiotelephone apparatus for fire-fighter's communication required by regulation 10.10.4 should be of certified safe type suitable for use in zone 1 hazardous areas, as defined in IEC Publication 60079.

The minimum requirements in respect to the apparatus group and temperature class are to be consistent with the most restrictive requirements for the hazardous area zone on board which is accessible to fire party.





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### **UNIFIED INTERPRETATIONS OF THE IGC CODE**

1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), with a view to providing more specific guidance on paragraphs 11.3.6 and 11.4.8 of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), approved unified interpretations of the Code, prepared by the Sub-Committee on Ship Systems and Equipment, at its sixth session, as set out in the annex.

2 Member States are invited to use the annexed unified interpretations as guidance when applying paragraphs 11.3.6 and 11.4.8 of the IGC Code, and to bring them to the attention of all parties concerned.

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## ANNEX

### UNIFIED INTERPRETATIONS OF THE IGC CODE

#### **Paragraph 11.3.6 – Fire protection and extinction, Water-spray system**

Where "F.O. tanks" are installed at the after end of the aftermost hold space or at the forward end of the forwardmost hold space instead of cofferdams as allowed for in paragraphs 3.1.2 and 3.1.3 of the IGC Code, the weather deck area above these tanks should be regarded as a "cargo area" for the purpose of applying paragraph 11.3.6.

#### **Paragraph 11.4.8 – Fire protection and extinction, Dry chemical powder fire-extinguishing systems**

Testing arrangements should involve the discharge using dry chemical powder from all monitors and hand hose lines on board but it is not required that there is a full discharge of the installed quantity of dry powder. This testing can also be used to satisfy the requirement that the piping is free of obstructions, in lieu of blowing through with dry air all the distribution piping. However, after the completion of this testing, the system, including all monitors and hand hose lines, should be blown through with dry air but only for the purpose of the system subsequently being clear from any residues of dry chemical powder.

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### **UNIFIED INTERPRETATIONS OF SOLAS CHAPTER III**

1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), with a view to providing more specific guidance on SOLAS regulations III/20.11, III/22.1.1 and III/32.1.1, approved unified interpretations of SOLAS chapter III, prepared by the Sub-Committee on Ship Systems and Equipment, at its sixth session, as set out in the annex.

2 Member States are invited to use the annexed unified interpretations as guidance when applying SOLAS regulations III/20.11, III/22.1.1 and III/32.1.1, and to bring them to the attention of all parties concerned.

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## ANNEX

### UNIFIED INTERPRETATIONS OF SOLAS CHAPTER III

**Regulation 20.11 – Operational readiness, maintenance and inspections, maintenance, thorough examination, operational testing, overhaul and repair of lifeboats, rescue boats and fast rescue boats, launching appliances and release gear**

The thorough examinations, overhauls and operational tests, carried out at intervals of at least once every five years, should be done in the presence of a surveyor.

**Regulation 22.1.1 – Personal life saving appliances, lifebuoys**

**Regulation 32.1.1 – Personal life saving appliances, lifebuoys**

When considering the minimum number and distribution of lifebuoys as required by regulations 22.1.1 or 32.1.1, as applicable, a lifebuoy, fitted with both a light and a lifeline as per MSC.1/Circular.1331 for compliance with SOLAS regulation II-1/3-9.2, should not be taken into account.

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