Subject

Introduction to the Outcomes of MSC 101

ClassNK

Technical Information

No. TEC-1191
Date 2 October 2019

To whom it may concern

The 101st session of the Maritime Safety Committee (MSC 101) was held at the IMO in London, U.K. from 5 to 14 June 2019. Since the minutes, resolutions and circulars of the meeting were recently released from the IMO, a summary of the decisions taken at MSC 101 is provided as below for your information.

1. Adopted mandatory requirements
   Mandatory requirements were adopted at MSC 101 as follows:
   (1) Amendments to Forms C, E and P in the appendix to SOLAS certificates (See attachment 1)
   Amendments to item 8.1 "Details of navigational systems and equipment - Rudder, propeller, thrust, pitch and operational mode indicator" in the appendix to Safety Certificate for Cargo or Passenger Ships (Forms C, P) and in the appendix to Safety Equipment Certificate for Cargo Ships (Form E) were adopted, in order to uniform the indication in case the equipment is not on board.

   Applied: on or after 1 January 2024

   (2) Amendments to FSS Code (See attachment 2)
   Amendments to FSS Code Chapter 15, replacing the wording "forward of" with "downstream of" to avoid misunderstanding on design requirement of inert gas system, were adopted.

   Applied: on or after 1 January 2024

   (3) Amendments to IGF Code (See attachment 3)
   Amendments to regulations on fuel tank locations (paragraph 5.3.4.2 of IGF Code), loading limit for liquefied gas fuel tanks (paragraph 6.8.3), fuel piping (paragraph 9.5.3-9.5.6), internal combustion engines of piston type (paragraph 10.3.1.1.1) and fire protection for fuel storage hold space (paragraph 11.3.3, 11.3.3.1), were adopted.

   Applied: on or after 1 January 2024

(To be continued)

(4) Amendments to LSA Code (See attachment 4)
Two (2) amendments to the LSA Code were adopted as listed below.

i) Amendments to LSA Code 4.4.8.1 that the requirement of buoyant oars and related equipment is not applicable for lifeboats equipped with two independent propulsion systems.

ii) Amendments to LSA Code 6.1.1.3, in order to accept launch of a rescue boat with manual hoisting from the stowed position and turning out to the embarkation position by one person instead of stored mechanical power on cargo ships equipped with the rescue boat which is not one of the ship's survival craft, having a mass not more than 700 kg in fully equipped condition.

Applied: on or after 1 January 2024

(5) Amendments to IBC Code (See attachment 5)
Amendments to IBC Code Chapter 15 (Special requirements), Chapter 16 (Operational requirements), Chapter 17 (Summary of minimum requirements), Chapter 18 (List of chemicals to which the Code does not apply), Chapter 19 (Index of products carried in bulk), Chapter 21 (Criteria for assigning carriage requirements for products subject to the IBC Code), etc. were adopted following a comprehensive review of carriage requirements for products subject to the IBC Code. The detail of the amendments would be informed by issuing ClassNK Technical Information separately.

Applied: on or after 1 January 2021

(6) Amendments to 2011 ESP Code
Amendments to 2011 ESP Code were adopted to align with IACS unified requirements (UR) Z10 series and to modify expression of the mandatory requirements of the Code, etc.

Applied: on or after 1 January 2021

(7) Amendments to IMSBC Code
The 5th amendments to IMSBC Code including new cargos were adopted. The detail of the amendments would be informed by issuing ClassNK Technical Information separately.

Applied: on or after 1 January 2021 (Administrations may apply it on a voluntary basis as from 1 January 2020)

(To be continued)

2. Approved mandatory requirements
The following mandatory requirements were approved at this session, and are expected to be considered for adoption at MSC 102 in May 2020.

(1) Amendments to SOLAS regulation II-1/3-8 relevant to mooring equipment (See attachment 7)
New Guidelines on the design of mooring arrangements and the selection of appropriate mooring equipment and fittings for safe mooring and new Guidelines for inspection and maintenance of mooring equipment including lines were approved in principle as shown in below 3.2.(1). Accordingly, amendments to SOLAS regulation II-1/3-8 to refer to those Guidelines were also approved.

(2) Amendments to B-1 to B-4 of SOLAS chapter II-1 to ensure consistency with regard to watertight integrity (See attachment 7)
Amendments to B-1 to B-4 of SOLAS chapter II-1 were approved to ensure consistency with regard to watertight integrity.

(3) Amendments to IGF Code (See attachment 8)
Three (3) amendments to the IGF Code were approved as listed below.
i) In paragraph 6.7.1.1, to remove tank cofferdams from the scope of requirement of pressure relief system.
ii) To add new paragraph 11.8, in order to require fixed fire-extinguishing system for fuel preparation rooms.
iii) To modify paragraph 16.3.3.5.1 concerning tensile tests for materials such as aluminium alloys.

(4) Amendments to IGC Code (See attachment 9)
As well as the amendments to the IGF Code as mentioned in above 2.(3)3, amendments to paragraph 6.5.3.5.1 of the IGC Code concerning tensile tests for materials such as aluminium alloys were approved.

3. The following unified interpretations (UIs), guidelines and guidance etc. were approved during MSC 101.

3.1 Unified interpretations (UIs)
(1) Amendments to unified interpretations to include provisions on openings to ventilation systems for closed ro-ro and vehicle spaces (See attachment 15, 16, 17)
Amendments to the interpretations (MSC.1/Circ.1535, MSC.1/Circ.1537, MSC.1/Circ.1539) were approved in order to include provisions to consider openings to ventilation systems for closed ro-ro and vehicle spaces in respective stability calculation required within LL, 2008 IS Code and SOLAS.

(To be continued)

(2) Unified interpretation on 2008 IS Code (See attachment 16)
The interpretation for Part B 3.4.2.3 of 2008 IS Code was approved to clarify assumed loading conditions to calculate the intact stability for tankers assigned with a tropical load line.

(3) Unified interpretation relevant to liquid level monitoring systems of passenger ships (See attachment 17)
The interpretation was approved for the sake of clarification that liquid level monitoring systems serving tanks containing liquids, which are used as, or replace flooding detection systems of passenger ships, should also meet the safe return to port (SRtP) requirements in SOLAS regulation II-2/21.4.13.

(4) Unified interpretation on SOLAS Chapter II-2 (See attachment 25)
Three (3) unified interpretations on SOLAS Chapter II-2 were approved as listed below.
i) The interpretation for regulation 9.2 to clarify the required fire integrity of a separated space, in which urea or sodium hydroxide solution tanks for EGCS etc. were installed.
ii) The interpretation for regulation 9.7.5 clarifying requirements in case where fixed gas fire-extinguishing systems are installed for galley exhaust ducts.
iii) The interpretation for regulation 10.10.4 to provide details on explosion proof and intrinsically safe of two-way portable radiotelephone apparatus for fire-fighter's communication.

(5) Unified interpretation on SOLAS Chapter III (See attachment 27)
Two (2) unified interpretations on SOLAS Chapter III were approved as listed below.
i) The interpretation of regulation 20.11 in order to clarify that overhauls and operational tests of lifeboats, rescue boats and their launching appliances and release gear carried out at intervals of at least once every five years should be done in the presence of the surveyor. (related to IACS UI SC144)
ii) The interpretation to clarify that a lifebuoy fitted with both a light and a lifeline for compliance with SOLAS regulation II-1/3-9 should not be taken into account when considering the minimum number and distribution of lifebuoys under regulation III/22.1.1 and III/32.1.1.

(To be continued)

(6) Unified interpretation on IGC Code (See attachment 20, 26)
Two (2) unified interpretations on IGC Code developed by SSE Sub-Committee were approved as listed below.

i) The interpretation, on the application of the design temperature for piping, fittings and related components of the water-spray system within cargo area as required by paragraph 11.3.6, to clarify the scope of the "cargo area".
ii) The interpretation to clarify the onboard discharge test of a dry chemical powder fire-extinguishing system as required by paragraph 11.4.8.

Four (4) unified interpretations on IGC Code developed by CCC Sub-Committee were approved as listed below.

i) The interpretation of paragraph 4.19.1.6 to clarify that duplication of heating system components is required in essential, as redundancy requirement for heating system to protect ship structure. (related to IACS UI GC23)
ii) The interpretation of paragraph 5.13.1.1.4 to clarify that an emergency shutdown valve in which components made of materials do not contribute to the shell or seat tightness of the valve, should not be included in the requirement of melting temperatures. (related to IACS UI GC24)
iii) The interpretation of paragraph 11.3.1 clarifying that remote survival crafts facing the cargo area should be protected by a water-spray system. (related to IACS UI GC22)
iv) The interpretation of paragraph 11.3.3 providing clarification on "two complete athwartship tank groupings" those which an appropriate protection is necessary in consideration of the capacity of the water spray pumps. (related to IACS UI GC22)

(7) Unified interpretation on SOLAS regulations II-1/28, II-1/29 and II-1/30 (See attachment 14)
The interpretation for regulations II-1/28, II-1/29 and II-1/30 on propulsion and steering considering modern combined propulsion/steering systems such as azimuth thrusters, etc. was approved. (related to IACS UI SC242)

(8) Unified interpretation on IGF Code (See attachment 19)
Four (4) unified interpretations on IGF Code were approved as listed below.

i) The interpretation of paragraph 6.3.10 providing clarification as to whether or not drip trays are required to protect the deck from leakages from tank connections of liquefied gas fuel storage tanks. (related to IACS UI GF2)
ii) The interpretation of paragraph 12.4 and 12.5 which introduces that categorization of gas admission valves at dual fuel engines and gas engines is equivalently applicable to the examples for hazardous area zones as laid out in paragraph 12.5, provided with an appropriate risk assessment.
iii) The interpretation of paragraph 12.5.2.1 to clarify the hazardous area classification of fuel storage hold spaces. (related to IACS UI GF14)
iv) The interpretation of paragraph 15.10.1 to provide clarification on requirements of audible and visual alarm for ventilation system. (related to IACS UI GF15)

(To be continued)

3.2 Guidelines, guidance and other circulars

(1) Two (2) sets of new guidelines and one (1) revised guidance on mooring equipment
Guidelines and guidance relevant to mooring equipment were approved in principle as listed below. These are expected to be finally approved in conjunction with the adoption of the draft amendments to SOLAS regulation II-1/3-8 referred to in above 2.(1) and would take effect on 1 January 2024.
   i) New *Guidelines on the design of mooring arrangements and the selection of appropriate mooring equipment and fittings for safe mooring*
   ii) New *Guidelines for inspection and maintenance of mooring equipment including lines*
   iii) Amendments to *the Guidance on shipboard towing and mooring equipment* (MSC.1/Circ.1175)

(2) Amendments to *the Guidelines on alternative design and arrangements for SOLAS chapters II-1 and III* (See attachment 12)
The Guidelines on alternative design and arrangements for SOLAS chapters II-1 and III (MSC.1/Circ.1212) were amended to presents goal, functional requirements and expected performance criteria for SOLAS Chapter III.

(3) Amendments to *the Guidelines for developing operation and maintenance manuals for lifeboat systems* (See attachment 11)
The Guidelines for developing operation and maintenance manuals for lifeboat systems (MSC.1/Circ.1205) were amended in order to make reference to Assembly resolution A.1116(30) on escape route signs and equipment location markings resolution.

(4) Amendments to Assembly resolution A.658(16) (See attachment 10)
Draft amendments to Assembly resolution A.658(16), which is referred to in 1.2.2.7 of LSA Code, in order to accept weatherometer other than carbon arc type on accelerated weathering test for retro-reflective material, were approved. The draft amendments are expected to be adopted at 31st Assembly Committee (A31) in November 2019.

(5) MSC circular on carriage of Chapter 19 products, amended IGC Code (See attachment 21)
The circular which provides example of an addendum to IGC Certificate to enable for ships constructed on or after 1 July 1986 and before 1 July 2016 to carry the additional products listed in Chapter 19 of the amended IGC Code (resolution MSC.370(93)) was approved.

(6) Update of lists of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted (See attachment 13)
In relation to the amendments to IMSBC Code as indicated in above 1.(6), MSC.1/Circ.1395/Rev.3 was amended to update a list of solid bulk cargoes, for which a fixed gas fire-extinguishing system may be exempted.

(To be continued)

(7) *Guidance for navigation and communication equipment intended for use on ships operating in polar waters* (See attachment 22)
Guidance for navigation and communication equipment intended for use on ships operating in polar waters, which is consist of Module A (General part related to equipment under environmental conditions of the Polar waters) and Module B (Specific part on selected equipment), was approved.

(8) *Interim guidelines on life-saving appliances and arrangements for ships operating in polar waters* (See attachment 23)
Interim guidelines on life-saving appliances and arrangements for ships operating in polar waters, including the requirement of personal life-saving appliances and survival crafts etc., were approved.

(9) *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* (See attachment 24)
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 were approved. The guidelines consist of following five (5) items.
i) PREVENTION/IGNITION
ii) DETECTION AND DECISION
iii) EXTINGUISHMENT
iv) CONTAINMENT
v) INTEGRITY OF LIFE-SAVING APPLIANCES AND EVACUATION

4. Others

(1) Consideration of requirements for Maritime Autonomous Surface Ships (MASS) (See attachment 18)
Taking into account recent investigation of automation surrounding a ship, it has been discussed at MSC on conventional requirements of safety and environmental protection relating to MASS.
At this session, in accordance with the framework and methodology for Regulatory Scoping Exercise (RSE) which have been agreed at previous MSC 100, the ongoing working progress of first step (identification of provisions in IMO instruments) of the RSE in each convention or chapter basis was reported. The final consideration on the working output of RSE might be given at MSC 102 held in May 2020.
Further, *interim guidelines for MASS trials* were approved. These Guidelines indicate principles and main objectives which should be used when conducting trials of MASS-related systems and infrastructure.

(To be continued)

(2) Consideration of measures to enhance the safety on use of fuel oil (See attachment 6)
Triggered by the global 0.5% sulphur limit, which will enter into force on 1 January 2020, safety measures on use of fuel oil have been discussed, in order to develop SOLAS requirements in addition to requirements of MARPOL.
In conclusion at MSC 101, MSC resolution on *Recommended interim measures to enhance the safety of ships relating to the use of oil fuel* was adopted, to recommend flag States to report the cases of deliveries of oil fuel having a flash point of less than 60℃ to IMO.
In addition, action plan for the development of measures to enhance the safety of ships relating to the use of oil fuel was endorsed, with a view to finalizing the measures at MSC 104 in 2021. In accordance with the action plan, development of the relevant mandatory requirements, such as amendments to SOLAS Chapter II-2, would be proceeded.

(To be continued)

For any questions about the above, please contact:

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Attachment:

1. RESOLUTION MSC.456(101)
2. RESOLUTION MSC.457(101)
3. RESOLUTION MSC.458(101)
4. RESOLUTION MSC.459(101)
5. RESOLUTION MSC.460(101)
6. RESOLUTION MSC.465(101)
7. DRAFT AMENDMENTS TO SOLAS CHAPTER II-1
8. DRAFT AMENDMENTS TO THE IGF CODE
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
14. MSC.1/Circ.1416/Rev.1
15. MSC.1/Circ.1535/Rev.1
16. MSC.1/Circ.1537/Rev.1
17. MSC.1/Circ.1539/Rev.1
18. MSC.1/Circ.1604
19. MSC.1/Circ.1605
20. MSC.1/Circ.1606
21. MSC.1/Circ.1607
22. MSC.1/Circ.1612
23. MSC.1/Circ.1614
24. MSC.1/Circ.1615
25. MSC.1/Circ.1616
26. MSC.1/Circ.1617
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:

"

	Item	Actual provision
8.1	Rudder, propeller, thrust, pitch and operational mode indicator[2] [3]	.....

"

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:

"

	Item	Actual provision
8.1	Rudder, propeller, thrust, pitch and operational mode indicator[2] [3]	.....

"

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:

"

	Item	Actual provision
8.1	Rudder, propeller, thrust, pitch and operational mode indicator[3] [4]	.....

"

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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 bowsing 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^2 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_2S) detection equipment for bulk liquids**

Hydrogen sulphide (H_2S) detection equipment shall be provided on board ships carrying bulk liquids prone to H_2S formation. It should be noted that scavengers and biocides, when used, may not be 100% effective in controlling the formation of H_2S. Toxic vapour detection instruments complying with the requirement in 13.2.1 of the Code for testing for H_2S 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 *(column a)*	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 *(column b)*	Deleted	
Pollution Category *(column c)*	The letter X, Y, Z means the Pollution Category assigned to each product under MARPOL Annex II.	
Hazards *(column d)*	"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 *(column e)*	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 *(column f)*	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 *(column g)*	Cont.:	controlled venting
	Open:	open venting
Tank environmental control *(column h)*	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 No: indicates no special requirements under this Code	
Fire protection *(column l)*	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'	i''	i'''	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

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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

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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	

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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

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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

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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+) alkanoic 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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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
Dioctyl 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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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 - alkoxypoly (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
Nitrilotriacetic 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
Pentaethylenehexamine	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 phosphorosulphide, 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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
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.

Product Name	**Pollution Category**
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

Product Name	Pollution Category
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-	(α-)
beta-	(β-)
gamma-	(γ-)
epsilon-	(ε-)
omega-	(ω-)

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.

Index Name	Product Name	Chapter
Abietic anhydride	**ROSIN**	17
acedimethylamide	**N,N-DIMETHYLACETAMIDE**	17
Acetaldehyde cyanohydrin solution (80% or less)	**LACTONITRILE SOLUTION (80% OR LESS)**	17
Acetaldehyde trimer	**PARALDEHYDE**	17
ACETIC ACID		17
Acetic acid anhydride	**ACETIC ANHYDRIDE**	17
Acetic acid, ethenyl ester	**VINYL ACETATE**	17
Acetic acid, methyl ester	**METHYL ACETATE**	17
Acetic acid, vinyl ester	**VINYL ACETATE**	17
ACETIC ANHYDRIDE		17
Acetic ester	**ETHYL ACETATE**	17
Acetic ether	**ETHYL ACETATE**	17
Acetic oxide	**ACETIC ANHYDRIDE**	17
Acetoacetic acid, methyl ester	**METHYL ACETOACETATE**	17
Acetoacetic ester	**ETHYL ACETOACETATE**	17
ACETOCHLOR		17
ACETONE		18
ACETONE CYANOHYDRIN		17
ACETONITRILE		17
ACETONITRILE (LOW PURITY GRADE)		17
Acetyl anhydride	**ACETIC ANHYDRIDE**	17
Acetylene tetrachloride	**TETRACHLOROETHANE**	17
Acetyl ether	**ACETIC ANHYDRIDE**	17
Acetyl oxide	**ACETIC ANHYDRIDE**	17
ACID OIL MIXTURE FROM SOYABEAN, CORN (MAIZE) AND SUNFLOWER OIL REFINING		17
Acroleic acid	**ACRYLIC ACID**	17
ACRYLAMIDE SOLUTION (50% OR LESS)		17
ACRYLIC ACID		17
ACRYLIC ACID/ETHENESULPHONIC ACID COPOLYMER WITH PHOSPHONATE GROUPS, SODIUM SALT SOLUTION		17
Acrylic acid, 2-hydroxyethyl ester	**2-HYDROXYETHYL ACRYLATE**	17
Acrylic amide solution, 50% or less	**ACRYLAMIDE SOLUTION (50% OR LESS)**	17
Acrylic resin monomer	**METHYL METHACRYLATE**	17
ACRYLONITRILE		17
ACRYLONITRILE-STYRENE COPOLYMER DISPERSION IN POLYETHER POLYOL		17
Adipic acid, bis(2-ethylhexyl) ester	**DI-(2-ETHYLHEXYL) ADIPATE**	17
ADIPONITRILE		17
ALACHLOR TECHNICAL (90% OR MORE)		17
Alcohol	**ETHYL ALCOHOL**	18
Alcohol, C10	**DECYL ALCOHOL (ALL ISOMERS)**	17
Alcohol, C11	**UNDECYL ALCOHOL**	17
Alcohol, C12	**DODECYL ALCOHOL**	17
Alcohol, C7 (a)	**HEPTANOL (ALL ISOMERS) (D)**	17
Alcohol, C8	**OCTANOL (ALL ISOMERS)**	17

Index Name	Product Name	Chapter
Alcohol, C9	**NONYL ALCOHOL (ALL ISOMERS)**	17
ALCOHOLIC BEVERAGES, N.O.S.		18
ALCOHOL (C9-C11) POLY(2.5-9)ETHOXYLATE		17
ALCOHOL (C10-C18) POLY (7) ETHOXYLATE		17
ALCOHOL (C6-C17) (SECONDARY) POLY(3-6)ETHOXYLATES		17
ALCOHOL (C6-C17) (SECONDARY) POLY(7-12)ETHOXYLATES		17
ALCOHOL (C12-C16) POLY(1-6) ETHOXYLATES		17
ALCOHOL (C12-C16) POLY(20+)ETHOXYLATES		17
ALCOHOL (C12-C16) POLY(7-19)ETHOXYLATES		17
ALCOHOLS (C13+)		17
Alcohols, C13 - C15	**ALCOHOLS (C13+)**	17
ALCOHOLS (C12+), PRIMARY, LINEAR		17
ALCOHOLS (C8-C11), PRIMARY, LINEAR AND ESSENTIALLY LINEAR		17
ALCOHOLS (C12-C13), PRIMARY, LINEAR AND ESSENTIALLY LINEAR		17
ALCOHOLS (C14-C18), PRIMARY, LINEAR AND ESSENTIALLY LINEAR		17
Aldehyde collidine	**2-METHYL-5-ETHYL PYRIDINE**	17
Aldehydine	**2-METHYL-5-ETHYL PYRIDINE**	17
ALKANES (C6-C9)		17
ISO- AND CYCLO-ALKANES (C10-C11)		17
ISO- AND CYCLO-ALKANES (C12+)		17
N-ALKANES (C9-C11)		17
N-ALKANES (C10-C20)		17
Alkane(C10-C18)sulfonic acid, phenyl ester (a)	**ALKYL SULPHONIC ACID ESTER OF PHENOL**	17
ALKARYL POLYETHERS (C9-C20)		17
ALKENOIC ACID, POLYHYDROXY ESTER BORATED		17
ALKENYL (C11+) AMIDE		17
ALKENYL (C16-C20) SUCCINIC ANHYDRIDE		17
ALKYL ACRYLATE/VINYLPYRIDINE COPOLYMER IN TOLUENE		17
ALKYL/CYCLO (C4-C5) ALCOHOLS		17
ALKYLARYL PHOSPHATE MIXTURES (MORE THAN 40% DIPHENYL TOLYL PHOSPHATE, LESS THAN 0.02% ORTHO-ISOMERS)		17
ALKYLATED (C4-C9) HINDERED PHENOLS		17
ALKYLBENZENE, ALKYLINDANE, ALKYLINDENE MIXTURE (EACH C12-C17)		17
ALKYLBENZENE DISTILLATION BOTTOMS		17
ALKYLBENZENE MIXTURES (CONTAINING AT LEAST 50% OF TOLUENE)		17
ALKYL (C3-C4) BENZENES		17
ALKYL (C5-C8) BENZENES		17
ALKYL(C9+)BENZENES		17

Index Name	Product Name	Chapter
ALKYLBENZENES MIXTURES (CONTAINING NAPHTHALENE)		17
ALKYL (C11-C17) BENZENE SULPHONIC ACID		17
ALKYLBENZENE SULPHONIC ACID, SODIUM SALT SOLUTION		17
ALKYL (C12+) DIMETHYLAMINE		17
ALKYL DITHIOCARBAMATE (C19-C35)		17
ALKYL DITHIOTHIADIAZOLE (C6-C24)		17
ALKYL ESTER COPOLYMER (C4-C20)		17
ALKYL (C8-C10)/(C12-C14):(40% OR LESS/60% OR MORE) POLYGLUCOSIDE SOLUTION (55% OR LESS)		17
ALKYL (C8-C10)/(C12-C14):(60% OR MORE/40% OR LESS) POLYGLUCOSIDE SOLUTION(55% OR LESS)		17
ALKYL (C7-C9) NITRATES		17
2,2'- [3-(Alkyl(C16-C18)oxy)propylimino]diethanol (a)	**ETHOXYLATED LONG CHAIN (C16+) ALKYLOXYALKYLAMINE**	17
Alkylphenol, long-chain (C14-C18)	**LONG-CHAIN ALKYLPHENOL (C14-C18)**	17
Alkylphenol, long-chain (C18-C30)	**LONG-CHAIN ALKYLPHENOL (C18-C30)**	17
ALKYL(C7-C11)PHENOL POLY(4-12) ETHOXYLATE		17
ALKYL (C8-C40) PHENOL SULPHIDE		17
ALKYL (C8-C9) PHENYLAMINE IN AROMATIC SOLVENTS		17
ALKYL (C9-C15) PHENYL PROPOXYLATE		17
ALKYL (C8-C10) POLYGLUCOSIDE SOLUTION (65% OR LESS)		17
ALKYL (C8-C10)/(C12-C14):(50%/50%) POLYGLUCOSIDE SOLUTION (55% OR LESS)		17
ALKYL (C12-C14) POLYGLUCOSIDE SOLUTION (55% OR LESS)		17
ALKYL(C12-C16) PROPOXYAMINE ETHOXYLATE		17
ALKYL (C10-C15, C12 RICH) PHENOL POLY(4-12)ETHOXYLATE		17
ALKYL (C10-C20, SATURATED AND UNSATURATED) PHOSPHITE		17
ALKYL SULPHONIC ACID ESTER OF PHENOL		17
ALKYL (C18+) TOLUENES		17
Alkyltoluenesulfonic acid, calcium salts, high overbase (up to 70% in mineral oil)	**ALKYL (C18-C28) TOLUENESULPHONIC ACID, CALCIUM SALTS, HIGH OVERBASE**	17
Alkyl(C18-C28)toluenesulfonic acid,calcium salts, low overbase (up to 60% in mineral oil)	**ALKYL (C18-C28) TOLUENESULPHONIC ACID, CALCIUM SALTS, LOW OVERBASE**	17
ALKYL(C18-C28)TOLUENESULPHONIC ACID		17
ALKYL(C18-C28)TOLUENESULPHONIC ACID, CALCIUM SALTS, BORATED		17
ALKYL (C18-C28) TOLUENESULPHONIC ACID, CALCIUM SALTS, HIGH OVERBASE		17
ALKYL (C18-C28) TOLUENESULPHONIC ACID, CALCIUM SALTS, LOW OVERBASE		17
3-Alky(C16-C18)oxy-N,N'-bis(2-hydroxyethyl)propan-1-amine (a)	**ETHOXYLATED LONG CHAIN (C16+) ALKYLOXYALKYLAMINE**	17
ALLYL ALCOHOL		17
ALLYL CHLORIDE		17
ALUMINIUM CHLORIDE/HYDROGEN CHLORIDE SOLUTION		17

Index Name	Product Name	Chapter
ALUMINIUM HYDROXIDE, SODIUM HYDROXIDE, SODIUM CARBONATE SOLUTION (40% OR LESS)		17
Aluminium silicate hydroxide	**KAOLIN SLURRY**	18
ALUMINIUM SULPHATE SOLUTION		17
Aminoacetic acid, sodium salt solution	**GLYCINE, SODIUM SALT SOLUTION**	17
1-Amino-3-aminomethyl-3,5,5-trimethylcyclohexane	**ISOPHORONEDIAMINE**	17
Aminobenzene	**ANILINE**	17
1-Aminobutane (a)	**BUTYLAMINE (ALL ISOMERS)**	17
2-Aminobutane	**BUTYLAMINE (ALL ISOMERS)**	17
Aminocyclohexane	**CYCLOHEXYLAMINE**	17
Aminoethane	**ETHYLAMINE**	17
Aminoethane solutions, 72% or less	**ETHYLAMINE SOLUTIONS (72% OR LESS)**	17
2-Aminoethanol	**ETHANOLAMINE**	17
2-(2-AMINOETHOXY) ETHANOL		17
2-(2-Aminoethylamino)ethanol	**AMINOETHYL ETHANOLAMINE**	17
AMINOETHYLDIETHANOLAMINE/AMINOETHYLETHANOLAMINE SOLUTION		17
AMINOETHYL ETHANOLAMINE		17
N-(2-aminoethyl)ethylenediamine	**DIETHYLENETRIAMINE**	17
1-(2-Aminoethyl)piperazine	**N-AMINOETHYLPIPERAZINE**	17
N-AMINOETHYLPIPERAZINE		17
2-Aminoisobutane (a)	**BUTYLAMINE (ALL ISOMERS)**	17
Aminomethane solutions, 42% or less	**METHYLAMINE SOLUTIONS (42% OR LESS)**	17
1-Amino-2-methylbenzene	**O-TOLUIDINE**	17
2-Amino-1-methylbenzene	**O-TOLUIDINE**	17
2-AMINO-2-METHYL-1-PROPANOL		17
3-Aminomethyl-3,5,5-trimethylcyclohexylamine	**ISOPHORONEDIAMINE**	17
Aminophen	**ANILINE**	17
1-Aminopropane	**N-PROPYLAMINE**	17
2-Aminopropane	**ISOPROPYLAMINE**	17
2-Aminopropane (70% or less) solution	**ISOPROPYLAMINE (70% OR LESS) SOLUTION**	17
1-Amino-2-propanol	**ISOPROPANOLAMINE**	17
1-Aminopropan-2-ol	**ISOPROPANOLAMINE**	17
3-Aminopropan-1-ol	**N-PROPANOLAMINE**	17
2-Aminotoluene	**O-TOLUIDINE**	17
o-Aminotoluene	**O-TOLUIDINE**	17
5-Amino-1,3,3-trimethylcyclohexylmethylamine	**ISOPHORONEDIAMINE**	17
AMMONIA AQUEOUS (28% OR LESS)		17
Ammonia water, 28% or less	**AMMONIA AQUEOUS (28% OR LESS)**	17
AMMONIUM CHLORIDE SOLUTION (LESS THAN 25%) (*)		17
AMMONIUM HYDROGEN PHOSPHATE SOLUTION		17
Ammonium hydroxide, 28% or less	**AMMONIA AQUEOUS (28% OR LESS)**	17
AMMONIUM LIGNOSULPHONATE SOLUTIONS		17
AMMONIUM NITRATE SOLUTION (93% OR LESS) (*)		17
AMMONIUM POLYPHOSPHATE SOLUTION		17

Index Name	Product Name	Chapter
AMMONIUM SULPHATE SOLUTION		17
AMMONIUM SULPHIDE SOLUTION (45% OR LESS) (*)		17
AMMONIUM THIOSULPHATE SOLUTION (60% OR LESS)		17
AMYL ACETATE (ALL ISOMERS)		17
Amyl acetate, commercial (a)	**AMYL ACETATE (ALL ISOMERS)**	17
n-Amyl acetate (a)	**AMYL ACETATE (ALL ISOMERS)**	17
sec-Amyl acetate (a)	**AMYL ACETATE (ALL ISOMERS)**	17
Amylacetic ester (a)	**AMYL ACETATE (ALL ISOMERS)**	17
Amyl alcohol	**N-AMYL ALCOHOL**	17
N-AMYL ALCOHOL		17
AMYL ALCOHOL, PRIMARY		17
SEC-AMYL ALCOHOL		17
TERT-AMYL ALCOHOL		17
Amyl aldehyde	**VALERALDEHYDE (ALL ISOMERS)**	17
Amylcarbinol	**HEXANOL**	17
Amylene hydrate	**TERT-AMYL ALCOHOL**	17
TERT-AMYL ETHYL ETHER		17
Amyl ethyl ketone	**ETHYL AMYL KETONE**	17
TERT-AMYL METHYL ETHER		17
n-Amyl methyl ketone	**METHYL AMYL KETONE**	17
n-Amyl propionate	**N-PENTYL PROPIONATE**	17
Anaesthetic ether	**DIETHYL ETHER (*)**	17
ANILINE		17
Aniline oil	**ANILINE**	17
Anilinobenzene	**DIPHENYLAMINE (MOLTEN)**	17
Anthracene oil (coal tar fraction) (a)	**COAL TAR**	17
Ant oil, artificial	**FURFURAL**	17
APPLE JUICE		18
Aqua fortis	**NITRIC ACID (70% AND OVER)**	17
Argilla	**KAOLIN SLURRY**	18
ARYL POLYOLEFINS (C11-C50)		17
AVIATION ALKYLATES (C8 PARAFFINS AND ISO-PARAFFINS BPT 95 - 120°C)		17
Azacycloheptane	**HEXAMETHYLENEIMINE**	17
3-Azapentane-1,5-diamine	**DIETHYLENETRIAMINE**	17
Azepane	**HEXAMETHYLENEIMINE**	17
Azotic acid	**NITRIC ACID (70% AND OVER)**	17
BARIUM LONG CHAIN (C11-C50) ALKARYL SULPHONATE		17
Basic calcium alkyl salicylate in approximately 30% mineral oil (b)	**CALCIUM LONG-CHAIN ALKYL SALICYLATE (C13+)**	17
Battery acid	**SULPHURIC ACID**	17
Behenyl alcohol (a)	**ALCOHOLS (C13+)**	17
Benzenamine	**ANILINE**	17
1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	**BIS(2-ETHYLHEXYL) TEREPHTHALATE**	17
1,4-Benzenedicarboxylic acid, butyl ester	**DIBUTYL TEREPHTHALATE**	17
1,2-Benzenedicarboxylic acid, diethyl ester	**DIETHYL PHTHALATE**	17

Index Name	Product Name	Chapter
1,2-Benzenedicarboxylic acid, diundecyl ester	**DIUNDECYL PHTHALATE**	17
BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)		17
BENZENE SULPHONYL CHLORIDE		17
BENZENESULPHONYL CHLORIDE	**BENZENE SULPHONYL CHLORIDE**	17
BENZENETRICARBOXYLIC ACID, TRIOCTYL ESTER		17
Benzenol	**PHENOL**	17
Benzol	**BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)**	17
Benzole	**BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)**	17
Benzophenol	**PHENOL**	17
2-Benzothiazolethiol, sodium salt solution	**MERCAPTOBENZOTHIAZOL, SODIUM SALT SOLUTION**	17
Benzothiazole-2-thiol, sodium salt solution	**MERCAPTOBENZOTHIAZOL, SODIUM SALT SOLUTION**	17
(2-Benzothiazolylthio) sodium solution	**MERCAPTOBENZOTHIAZOL, SODIUM SALT SOLUTION**	17
BENZYL ACETATE		17
BENZYL ALCOHOL		17
Benzyl butyl phthalate	**BUTYL BENZYL PHTHALATE**	17
BENZYL CHLORIDE		17
Betaprone	**BETA-PROPIOLACTONE**	17
Betula oil	**METHYL SALICYLATE**	17
Biformyl	**GLYOXAL SOLUTION (40% OR LESS)**	17
BIO-FUEL BLENDS OF DIESEL/GAS OIL AND FAME (>25% BUT <99% BY VOLUME)		17
BIO-FUEL BLENDS OF DIESEL/GAS OIL AND VEGETABLE OIL (>25% BUT <99% BY VOLUME)		17
BIO-FUEL BLENDS OF GASOLINE AND ETHYL ALCOHOL (>25% BUT <99% BY VOLUME)		17
Biphenyl	**DIPHENYL**	17
Bis(methylcyclopentadiene)	**METHYLCYCLOPENTADIENE DIMER**	17
2,5-Bis(alkyl(C7+)thio)-1,3,4-thiadiazole	**ALKYL DITHIOTHIADIAZOLE (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

Index Name	Product Name	Chapter
Bis(2-ethylhexyl) hydrogen phosphate	**DI-(2-ETHYLHEXYL) PHOSPHORIC ACID**	17
Bis(2-ethylhexyl) phthalate	**DIOCTYL PHTHALATE**	17
BIS(2-ETHYLHEXYL) TEREPHTHALATE		17
Bis(2-hydroxyethyl)amine	**DIETHANOLAMINE**	17
Bis(2-hydroxyethyl)ammonium 2,4-dichlorophenoxyacetate solution	**2,4-DICHLOROPHENOXYACETIC ACID, DIETHANOLAMINE SALT SOLUTION**	17
Bis(2-hydroxyethyl) ether	**DIETHYLENE GLYCOL**	17
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
Bolus alba	**KAOLIN SLURRY**	18
BRAKE FLUID BASE MIX: POLY(2-8)ALKYLENE (C2-C3) GLYCOLS/POLYALKYLENE (C2-C10) GLYCOLS MONOALKYL (C1-C4) ETHERS AND THEIR BORATE ESTERS		17
Bran oil	**FURFURAL**	17
BROMOCHLOROMETHANE		17
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
Butane, 2-ethoxy-2-methyl-ether	**TERT-AMYL ETHYL ETHER**	17
Butanoic acid	**BUTYRIC ACID**	17
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
2-Butanol acetate (a)	**BUTYL ACETATE (ALL ISOMERS)**	17
1,4-Butanolide	**GAMMA-BUTYROLACTONE**	17
Butan-4-olide	**GAMMA-BUTYROLACTONE**	17
n-Butanol	**N-BUTYL ALCOHOL**	18
sec-Butanol	**SEC-BUTYL ALCOHOL**	18
tert-Butanol	**TERT-BUTYL ALCOHOL**	17
2-Butanone	**METHYL ETHYL KETONE**	17
Butan-2-one	**METHYL ETHYL KETONE**	17
2-Butenal	**CROTONALDEHYDE**	17
Butene dimer	**OCTENE (ALL ISOMERS)**	17
BUTENE OLIGOMER		17

Index Name	Product Name	Chapter
1-Butoxybutane	**N-BUTYL ETHER**	17
2-Butoxyethanol (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
2-tert-butoxyethanol (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
2-BUTOXYETHANOL (58%)/HYPERBRANCHED POLYESTERAMIDE (42%) (MIXTURE)		17
2-(2-Butoxyethoxy)ethanol (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
2-(2-Butoxyethoxy)ethyl acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
2-Butoxyethyl acetate	**ETHYLENE GLYCOL BUTYL ETHER ACETATE**	17
1-Butoxypropan-2-ol (a)	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
Butyl acetate (a)	**BUTYL ACETATE (ALL ISOMERS)**	17
BUTYL ACETATE (ALL ISOMERS)		17
n-Butyl acetate (a)	**BUTYL ACETATE (ALL ISOMERS)**	17
sec-Butyl acetate (a)	**BUTYL ACETATE (ALL ISOMERS)**	17
tert-Butyl acetate (a)	**BUTYL ACETATE (ALL ISOMERS)**	17
BUTYL ACRYLATE (ALL ISOMERS)		17
n-Butyl acrylate (a)	**BUTYL ACRYLATE (ALL ISOMERS)**	17
Butyl alcohol	**N-BUTYL ALCOHOL**	18
N-BUTYL ALCOHOL		18
SEC-BUTYL ALCOHOL		18
TERT-BUTYL ALCOHOL		17
n-Butyl aldehyde (a)	**BUTYRALDEHYDE (ALL ISOMERS)**	17
BUTYLAMINE (ALL ISOMERS)		17
n-Butylamine (a)	**BUTYLAMINE (ALL ISOMERS)**	17
sec-Butylamine (a)	**BUTYLAMINE (ALL ISOMERS)**	17
tert-Butylamine (a)	**BUTYLAMINE (ALL ISOMERS)**	17
BUTYLBENZENE (ALL ISOMERS)		17
tert-Butylbenzene (a)	**BUTYLBENZENE (ALL ISOMERS)**	17
BUTYL BENZYL PHTHALATE		17
Butyl butanoate (a)	**BUTYL BUTYRATE (ALL ISOMERS)**	17
BUTYL BUTYRATE (ALL ISOMERS)		17
n-Butyl butyrate (a)	**BUTYL BUTYRATE (ALL ISOMERS)**	17
n-Butylcarbinol	**N-AMYL ALCOHOL**	17
Butyl carbitol (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Butyl carbitol acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
Butyl cellosolve acetate	**ETHYLENE GLYCOL BUTYL ETHER ACETATE**	17
BUTYL/DECYL/CETYL/EICOSYL METHACRYLATE MIXTURE		17
Butyl/decyl/hexadecyl/icosyl methacrylate mixture (a)	**BUTYL/DECYL/CETYL/EICOSYL METHACRYLATE MIXTURE**	17
Butyl diglycol acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
BUTYLENE GLYCOL		17
alpha-Butylene glycol (a)	**BUTYLENE GLYCOL**	17
beta-Butylene glycol (a)	**BUTYLENE GLYCOL**	17

Index Name	Product Name	Chapter
1,3-Butylene glycol, 3-methyl ether	**3-METHOXY-1-BUTANOL**	17
1,3-Butylene glycol, 3-methyl ether, 1-acetate	**3-METHOXYBUTYL ACETATE**	17
Butylene oxide	**TETRAHYDROFURAN**	17
1,2-BUTYLENE OXIDE		17
Butyl ethanoate	**BUTYL ACETATE (ALL ISOMERS)**	17
Butyl ether	**N-BUTYL ETHER**	17
N-BUTYL ETHER		17
Butylethylacetic acid (a)	**OCTANOIC ACID (ALL ISOMERS)**	17
Butylethylene	**HEXENE (ALL ISOMERS)**	17
tert-Butyl ethyl ether	**ETHYL TERT-BUTYL ETHER**	17
iso-Butyl ketone	**DIISOBUTYL KETONE**	17
BUTYL METHACRYLATE		17
tert-Butyl methyl ether	**METHYL TERT-BUTYL ETHER**	17
Butyl methyl ketone	**METHYL BUTYL KETONE**	17
Butyl phthalate	**DIBUTYL PHTHALATE**	17
N-BUTYL PROPIONATE		17
BUTYRALDEHYDE (ALL ISOMERS)		17
n-Butyraldehyde	**BUTYRALDEHYDE (ALL ISOMERS)**	17
BUTYRIC ACID		17
n-Butyric acid	**BUTYRIC ACID**	17
Butyric alcohol	**N-BUTYL ALCOHOL**	18
Butyric aldehyde (a)	**BUTYRALDEHYDE (ALL ISOMERS)**	17
GAMMA-BUTYROLACTONE		17
Cajeputene	**DIPENTENE**	17
CALCIUM ALKARYL SULPHONATE (C11-C50)		17
Calcium alkyl(longchain) salicylate (overbased) in mineral oil (LOA) (b)	**CALCIUM LONG-CHAIN ALKYL SALICYLATE (C13+)**	17
CALCIUM ALKYL (C10-C28) SALICYLATE		17
Calcium bis(O-alkylsalicylate) (b)	**CALCIUM LONG-CHAIN ALKYL SALICYLATE (C13+)**	17
Calcium bromide / zinc bromide solution	**DRILLING BRINES (CONTAINING ZINC CHLORIDE)**	17
CALCIUM CARBONATE SLURRY		18
CALCIUM HYDROXIDE SLURRY		17
CALCIUM HYPOCHLORITE SOLUTION (15% OR LESS)		17
CALCIUM HYPOCHLORITE SOLUTION (MORE THAN 15%)		17
CALCIUM LIGNOSULPHONATE SOLUTIONS		17
CALCIUM LONG-CHAIN ALKYL (C5-C10) PHENATE		17
CALCIUM LONG-CHAIN ALKYL (C11-C40) PHENATE		17
CALCIUM LONG-CHAIN ALKYL PHENATE SULPHIDE (C8-C40)		17
CALCIUM LONG-CHAIN ALKYL SALICYLATE (C13+)		17
CALCIUM LONG-CHAIN ALKYL (C18-C28) SALICYLATE		17
CALCIUM NITRATE/MAGNESIUM NITRATE/POTASSIUM CHLORIDE SOLUTION		17
CALCIUM NITRATE SOLUTIONS (50% OR LESS)		17

Index Name	Product Name	Chapter
CAMELINA OIL		17
Camelina Sativa Oil	**CAMELINA OIL**	17
Camelina Sativa Seed Oil	**CAMELINA OIL**	17
Cane molasses (a)	**MOLASSES**	18
Canola oil	**RAPESEED OIL (LOW ERUCIC ACID CONTAINING LESS THAN 4% FREE FATTY ACIDS)**	17
Capric acid	**DECANOIC ACID**	17
Caproic acid	**HEXANOIC ACID**	17
Caprolactam	**EPSILON-CAPROLACTAM (MOLTEN OR AQUEOUS SOLUTIONS)**	17
EPSILON-CAPROLACTAM (MOLTEN OR AQUEOUS SOLUTIONS)		17
Caproyl alcohol	**HEXANOL**	17
Capryl alcohol (a)	**OCTANOL (ALL ISOMERS)**	17
Caprylic acid (a)	**OCTANOIC ACID (ALL ISOMERS)**	17
Caprylyl acetate	**N-OCTYL ACETATE**	17
Carbamide solution	**UREA SOLUTION**	17
Carbinol	**METHYL ALCOHOL (*)**	17
Carbitol acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
Carbitol solvent (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Carbolic acid	**PHENOL**	17
CARBOLIC OIL		17
Carbon bisulphide	**CARBON DISULPHIDE**	17
CARBON DISULPHIDE		17
CARBON TETRACHLORIDE		17
Carbonyldiamide solution	**UREA SOLUTION**	17
Carbonyldiamine solution	**UREA SOLUTION**	17
Carboxyethyliminobis(ethylenenitrilo)tetraacetic acid, pentasodium salt solution	**DIETHYLENETRIAMINEPENTAACETIC ACID, PENTASODIUM SALT SOLUTION**	17
CASHEW NUT SHELL OIL (UNTREATED)		17
CASTOR OIL		17
Caustic potash solution	**POTASSIUM HYDROXIDE SOLUTION (*)**	17
Caustic soda	**SODIUM HYDROXIDE SOLUTION (*)**	17
Caustic soda solution	**SODIUM HYDROXIDE SOLUTION (*)**	17
Cellosolve acetate	**2-ETHOXYETHYL ACETATE**	17
Cesium formate solution	**CESIUM FORMATE SOLUTION (*)**	17
CESIUM FORMATE SOLUTION (*)		17
CETYL/EICOSYL METHACRYLATE MIXTURE		17
Cetyl / stearyl alcohol (a)	**ALCOHOLS (C13+)**	17
China clay	**KAOLIN SLURRY**	18
CHLORINATED PARAFFINS (C10-C13)		17
CHLORINATED PARAFFINS (C14-C17) (WITH 50% CHLORINE OR MORE, AND LESS THAN 1% C13 OR SHORTER CHAINS)		17
CHLOROACETIC ACID (80% OR LESS)		17
alpha-Chloroallyl chloride	**1,3-DICHLOROPROPENE**	17

Index Name	Product Name	Chapter
Chloroallylene	**ALLYL CHLORIDE**	17
CHLOROBENZENE		17
Chlorobenzol	**CHLOROBENZENE**	17
Chlorobromomethane	**BROMOCHLOROMETHANE**	17
1-Chloro-2-(beta-chloroethoxy)ethane	**DICHLOROETHYL ETHER**	17
1-Chloro-2,3-epoxypropane	**EPICHLOROHYDRIN**	17
2-Chloroethanol	**ETHYLENE CHLOROHYDRIN**	17
2-Chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide	**ACETOCHLOR**	17
2-Chloro-N-(ethoxymethyl)-N-(2-ethyl-6-methylphenyl)acetamide	**ACETOCHLOR**	17
2-Chloroethyl alcohol	**ETHYLENE CHLOROHYDRIN**	17
beta-Chloroethyl alcohol	**ETHYLENE CHLOROHYDRIN**	17
Chloroethyl ether	**DICHLOROETHYL ETHER**	17
2-Chloro-6'-ethyl-N-(2-methoxy-1-methylethyl)acet-o-toluidide	**N-(2-METHOXY-1-METHYL ETHYL)-2-ETHYL-6-METHYL CHLOROACETANILIDE**	17
2-Chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide	**N-(2-METHOXY-1-METHYL ETHYL)-2-ETHYL-6-METHYL CHLOROACETANILIDE**	17
CHLOROFORM		17
CHLOROHYDRINS (CRUDE)		17
m-Chloromethylbenzene	**M-CHLOROTOLUENE**	17
o-Chloromethylbenzene	**O-CHLOROTOLUENE**	17
p-Chloromethylbenzene	**P-CHLOROTOLUENE**	17
(Chloromethyl)ethylene oxide	**EPICHLOROHYDRIN**	17
(2-Chloro-l-methylethyl) ether	**2,2'-DICHLOROISOPROPYL ETHER**	17
2-Chloro-1-methylethyl ether	**2,2'-DICHLOROISOPROPYL ETHER**	17
Chloromethyloxirane	**EPICHLOROHYDRIN**	17
4-CHLORO-2-METHYLPHENOXYACETIC ACID, DIMETHYLAMINE SALT SOLUTION		17
1-Chloro-2-nitrobenzene	**O-CHLORONITROBENZENE**	17
O-CHLORONITROBENZENE		17
1-(4-CHLOROPHENYL)-4,4- DIMETHYL-PENTAN-3-ONE		17
2- or 3- Chloropropanoic acid	**2- OR 3-CHLOROPROPIONIC ACID**	17
3-Chloropropene	**ALLYL CHLORIDE**	17
2- OR 3-CHLOROPROPIONIC ACID		17
alpha- or beta- Chloropropionic acid	**2- OR 3-CHLOROPROPIONIC ACID**	17
3-Chloropropylene	**ALLYL CHLORIDE**	17
alpha-Chloropropylene	**ALLYL CHLORIDE**	17
Chloropropylene oxide	**EPICHLOROHYDRIN**	17
CHLOROSULPHONIC ACID		17
Chlorosulphuric acid	**CHLOROSULPHONIC ACID**	17
3-Chlorotoluene	**M-CHLOROTOLUENE**	17
4-Chlorotoluene	**P-CHLOROTOLUENE**	17
alpha-Chlorotoluene	**BENZYL CHLORIDE**	17
M-CHLOROTOLUENE		17
O-CHLOROTOLUENE		17
P-CHLOROTOLUENE		17
CHLOROTOLUENES (MIXED ISOMERS)		17

Index Name	Product Name	Chapter
CHOLINE CHLORIDE SOLUTIONS		17
Cinene	**DIPENTENE**	17
Cinnamene	**STYRENE MONOMER**	17
Cinnamol	**STYRENE MONOMER**	17
cis-Butenedioic anhydride	**MALEIC ANHYDRIDE**	17
cis-9-Octadecenoic acid	**OLEIC ACID**	17
CITRIC ACID (70% OR LESS)		17
CLAY SLURRY		18
COAL SLURRY		18
COAL TAR		17
Coal tar distillate	**COAL TAR NAPHTHA SOLVENT**	17
COAL TAR NAPHTHA SOLVENT		17
COAL TAR PITCH (MOLTEN) (*)		17
COCOA BUTTER		17
COCONUT OIL		17
COCONUT OIL FATTY ACID		17
COCONUT OIL FATTY ACID METHYL ESTER		17
Colamine	**ETHANOLAMINE**	17
Cold pressed grape seed oil	**GRAPE SEED OIL**	17
Cologne spirits	**ETHYL ALCOHOL**	18
Colonial spirit	**METHYL ALCOHOL (*)**	17
Colophony	**ROSIN**	17
Columbian spirit	**METHYL ALCOHOL (*)**	17
Columbian spirits	**METHYL ALCOHOL (*)**	17
COPPER SALT OF LONG CHAIN (C17+) ALKANOIC ACID		17
CORN OIL		17
COTTON SEED OIL		17
CREOSOTE (COAL TAR)		17
CRESOL/PHENOL/XYLENOL MIXTURE		17
CRESOLS (ALL ISOMERS)		17
CRESYLIC ACID, DEPHENOLIZED		17
Cresylic acids	**CRESOLS (ALL ISOMERS)**	17
CRESYLIC ACID, SODIUM SALT SOLUTION		17
Cresylols	**CRESOLS (ALL ISOMERS)**	17
CROTONALDEHYDE		17
Crotonic aldehyde	**CROTONALDEHYDE**	17
Crude grape seed oil	**GRAPE SEED OIL**	17
CTMP (Chemi Thermo Mechanical Pulp) concentrate	**WOOD LIGNIN WITH SODIUM ACETATE/OXALATE**	17
Cumene (a)	**PROPYLBENZENE (ALL ISOMERS)**	17
Cumol (a)	**PROPYLBENZENE (ALL ISOMERS)**	17
Cyanoethylene	**ACRYLONITRILE**	17
2-Cyanopropan-2-ol	**ACETONE CYANOHYDRIN**	17
2-Cyano-2-propanol	**ACETONE CYANOHYDRIN**	17

Index Name	Product Name	Chapter
2-cyanopropene-1	**METHACRYLONITRILE**	17
Cyclic propylene carbonate	**PROPYLENE CARBONATE**	17
1,5,9-CYCLODODECATRIENE		17
CYCLOHEPTANE		17
Cyclohexamethylenimine	**HEXAMETHYLENEIMINE**	17
CYCLOHEXANE		17
CYCLOHEXANE-1,2-DICARBOXYLIC ACID, DIISONONYL ESTER		17
Cyclohexane1,2-Di-Isononyldicarboxylate	**CYCLOHEXANE-1,2-DICARBOXYLIC ACID, DIISONONYL ESTER**	17
CYCLOHEXANE OXIDATION PRODUCTS, SODIUM SALTS SOLUTION		17
Cyclohexane, oxidized, aqueous extraction, sodium salt	**CYCLOHEXANE OXIDATION PRODUCTS, SODIUM SALTS SOLUTION**	17
CYCLOHEXANOL		17
CYCLOHEXANONE		17
CYCLOHEXANONE, CYCLOHEXANOL MIXTURE		17
Cyclohexatriene	**BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)**	17
CYCLOHEXYL ACETATE		17
CYCLOHEXYLAMINE		17
Cyclohexyldimethylamine	**N,N-DIMETHYLCYCLOHEXYLAMINE**	17
Cyclohexyl(ethyl)amine	**N-ETHYLCYCLOHEXYLAMINE**	17
Cyclohexyl(ethyl)amine	**N-ETHYLCYCLOHEXYLAMINE**	17
Cyclohexyl ketone	**CYCLOHEXANONE**	17
Cyclohexylmethane	**METHYLCYCLOHEXANE**	17
1,3-CYCLOPENTADIENE DIMER (MOLTEN)		17
CYCLOPENTANE		17
CYCLOPENTENE		17
Cyclotetramethylene oxide	**TETRAHYDROFURAN**	17
P-CYMENE		17
Cymol	**P-CYMENE**	17
Dalapon (ISO)	**2,2-DICHLOROPROPIONIC ACID**	17
DCDP	**DICYCLOPENTADIENE, RESIN GRADE, 81-89%**	17
Deanol	**DIMETHYLETHANOLAMINE**	17
DECAHYDRONAPHTHALENE		17
DECANOIC ACID		17
Decan-1-ol	**DECYL ALCOHOL (ALL ISOMERS)**	17
n-Decanol	**DECYL ALCOHOL (ALL ISOMERS)**	17
Decatoic acid	**DECANOIC ACID**	17
DECENE		17
Decoic acid	**DECANOIC ACID**	17
DECYL ACRYLATE		17
Decyl alcohol	**DECYL ALCOHOL (ALL ISOMERS)**	17
DECYL ALCOHOL (ALL ISOMERS)		17
Decylbenzene (a)	**ALKYL(C9+)BENZENES**	17

Index Name	Product Name	Chapter
DECYL/DODECYL/TETRADECYL ALCOHOL MIXTURE		17
Decylic acid	**DECANOIC ACID**	17
Decyl octyl adipate	**OCTYL DECYL ADIPATE**	17
DECYLOXYTETRAHYDROTHIOPHENE DIOXIDE		17
Degummed grape seed oil	**GRAPE SEED OIL**	17
1-Deoxy-1-methylamino-D-glucitol solution (70% or less)	**N-METHYLGLUCAMINE SOLUTION (70% OR LESS)**	17
Detergent alkylate	**ALKYL(C9+)BENZENES**	17
Diacetic ester	**ETHYL ACETOACETATE**	17
Diacetone	**DIACETONE ALCOHOL**	17
DIACETONE ALCOHOL		17
Di[alkyl/alkenyl(C10-C20)] hydrogen phosphite (a)	**ALKYL (C10-C20, SATURATED AND UNSATURATED) PHOSPHITE**	17
DIALKYL (C8-C9) DIPHENYLAMINES		17
DIALKYL (C7-C13) PHTHALATES		17
DIALKYL (C9 - C10) PHTHALATES		17
DIALKYL THIOPHOSPHATES SODIUM SALTS SOLUTION		17
1,2-Diaminoethane	**ETHYLENEDIAMINE**	17
1,6-Diaminohexane	**HEXAMETHYLENEDIAMINE (MOLTEN)**	17
1,6-Diaminohexane solutions	**HEXAMETHYLENEDIAMINE SOLUTION**	17
2,6-Diaminohexanoic acid	**L-LYSINE SOLUTION (60% OR LESS)**	17
2,6-DIAMINOHEXANOIC ACID PHOSPHONATE MIXED SALTS SOLUTION		17
Diaminotoluene (a)	**TOLUENEDIAMINE**	17
2,4-Diaminotoluene (a)	**TOLUENEDIAMINE**	17
2,6-Diaminotoluene (a)	**TOLUENEDIAMINE**	17
3,6-Diazaoctane-1,8-diamine	**TRIETHYLENETETRAMINE**	17
1,2-Dibromoethane	**ETHYLENE DIBROMIDE**	17
DIBROMOMETHANE		17
2,2'-Dibutoxyethyl ether	**DIETHYLENE GLYCOL DIBUTYL ETHER**	17
DIBUTYLAMINE		17
Dibutylbenzene-1,2-dicarboxylate	**DIBUTYL PHTHALATE**	17
Dibutyl carbinol (a)	**NONYL ALCOHOL (ALL ISOMERS)**	17
Dibutyl ether	**N-BUTYL ETHER**	17
n-Dibutyl ether	**N-BUTYL ETHER**	17
Dibutyl hydrogen phosphite	**DIBUTYL HYDROGEN PHOSPHONATE**	17
DIBUTYL HYDROGEN PHOSPHONATE		17
2,6-DI-TERT-BUTYLPHENOL		17
Dibutyl phosphonate	**DIBUTYL HYDROGEN PHOSPHONATE**	17
DIBUTYL PHTHALATE		17
Dibutyl ortho-phthalate	**DIBUTYL PHTHALATE**	17
DIBUTYL TEREPHTHALATE		17
DICHLOROBENZENE (ALL ISOMERS)		17
1,2-Dichlorobenzene (a)	**DICHLOROBENZENE (ALL ISOMERS)**	17
m-Dichlorobenzene (a)	**DICHLOROBENZENE (ALL ISOMERS)**	17
o-Dichlorobenzene (a)	**DICHLOROBENZENE (ALL ISOMERS)**	17

Index Name	Product Name	Chapter
3,4-Dichlorobut-1-ene	**3,4-DICHLORO-1-BUTENE**	17
3,4-DICHLORO-1-BUTENE		17
2,2'-Dichlorodiethyl ether	**DICHLOROETHYL ETHER**	17
Dichlorodiisopropyl ether	**2,2'-DICHLOROISOPROPYL ETHER**	17
1,1-DICHLOROETHANE		17
1,2-Dichloroethane	**ETHYLENE DICHLORIDE**	17
1,1-Dichloroethene	**VINYLIDENE CHLORIDE**	17
Dichloroether	**DICHLOROETHYL ETHER**	17
1,1-Dichloroethylene	**VINYLIDENE CHLORIDE**	17
DICHLOROETHYL ETHER		17
2,2'-Dichloroethyl ether	**DICHLOROETHYL ETHER**	17
Dichloroethyl oxide	**DICHLOROETHYL ETHER**	17
1,6-DICHLOROHEXANE		17
2,2'-DICHLOROISOPROPYL ETHER		17
DICHLOROMETHANE		17
2,4-DICHLOROPHENOL		17
2,4-DICHLOROPHENOXYACETIC ACID, DIETHANOLAMINE SALT SOLUTION		17
2,4-DICHLOROPHENOXYACETIC ACID, DIMETHYLAMINE SALT SOLUTION (70% OR LESS)		17
2,4-DICHLOROPHENOXYACETIC ACID, TRIISOPROPANOLAMINE SALT SOLUTION		17
1,1-DICHLOROPROPANE		17
1,2-DICHLOROPROPANE		17
Dichloropropane / dichloropropene mixtures	**DICHLOROPROPENE/DICHLOROPROPANE MIXTURES**	17
2,2-Dichloropropanoic acid	**2,2-DICHLOROPROPIONIC ACID**	17
1,3-DICHLOROPROPENE		17
DICHLOROPROPENE/DICHLOROPROPANE MIXTURES		17
2,2-DICHLOROPROPIONIC ACID		17
Dichloropropylene	**1,3-DICHLOROPROPENE**	17
1,4-Dicyanobutane	**ADIPONITRILE**	17
Dicyclopentadiene	**1,3-CYCLOPENTADIENE DIMER (MOLTEN)**	17
DICYCLOPENTADIENE, RESIN GRADE, 81-89%		17
Didecyl phthalate (a)	**DIALKYL (C7-C13) PHTHALATES**	17
Didodecyl phthalate (a)	**DIALKYL (C7-C13) PHTHALATES**	17
DIETHANOLAMINE		17
DIETHYLAMINE		17
DIETHYLAMINOETHANOL		17
2-Diethylaminoethanol	**DIETHYLAMINOETHANOL**	17
2,6-DIETHYLANILINE		17
DIETHYLBENZENE		17
Diethyl 'carbitol'	**DIETHYLENE GLYCOL DIETHYL ETHER**	17
Diethylene dioxide	**1,4-DIOXANE**	17
1,4-Diethylene dioxide	**1,4-DIOXANE**	17
Diethylene ether	**1,4-DIOXANE**	17

Index Name	Product Name	Chapter
DIETHYLENE GLYCOL		17
Diethylene glycol butyl ether (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Diethylene glycol butyl ether acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
DIETHYLENE GLYCOL DIBUTYL ETHER		17
DIETHYLENE GLYCOL DIETHYL ETHER		17
Diethylene glycol ethyl ether (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Diethylene glycol ethyl ether acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
Diethylene glycol methyl ether (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Diethylene glycol methyl ether acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
Diethylene glycol monobutyl ether (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Diethylene glycol monobutyl ether acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
Diethylene glycol monoethyl ether (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Diethylene glycol monoethyl ether acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
Diethylene glycol monomethyl ether (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Diethylene glycol monomethyl ether acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
DIETHYLENE GLYCOL PHTHALATE		17
DIETHYLENETRIAMINE		17
DIETHYLENETRIAMINEPENTAACETIC ACID, PENTASODIUM SALT SOLUTION		17
N,N-Diethylethanamine	**TRIETHYLAMINE**	17
N,N-Diethylethanolamine	**DIETHYLAMINOETHANOL**	17
DIETHYL ETHER (*)		17
DI-(2-ETHYLHEXYL) ADIPATE		17
DI-(2-ETHYLHEXYL) PHOSPHORIC ACID		17
Di (2-ethylhexyl) Terephthalate	**BIS(2-ETHYLHEXYL) TEREPHTHALATE**	17
Diethyl oxide	**DIETHYL ETHER (*)**	17
DIETHYL PHTHALATE		17
DIETHYL SULPHATE		17
Diformyl	**GLYOXAL SOLUTION (40% OR LESS)**	17
DIGLYCIDYL ETHER OF BISPHENOL A		17
DIGLYCIDYL ETHER OF BISPHENOL F		17
Diglycol	**DIETHYLENE GLYCOL**	17
Diglycolamine	**2-(2-AMINOETHOXY) ETHANOL**	17
Diglycol phthalate	**DIETHYLENE GLYCOL PHTHALATE**	17
DIHEPTYL PHTHALATE		17
DI-N-HEXYL ADIPATE		17
DIHEXYL PHTHALATE		17
1,3-Dihydroisobenzofuran-1,3-dione (molten)	**PHTHALIC ANHYDRIDE (MOLTEN)**	17

Index Name	Product Name	Chapter
2,3-Dihydroxybutane (a)	**BUTYLENE GLYCOL**	17
2,2'-Dihydroxydiethylamine	**DIETHANOLAMINE**	17
Di-(2-hydroxyethyl)amine	**DIETHANOLAMINE**	17
Dihydroxyethyl ether	**DIETHYLENE GLYCOL**	17
1,6-Dihydroxyhexane	**HEXAMETHYLENE GLYCOL**	17
1,2-Dihydroxypropane	**PROPYLENE GLYCOL**	18
Diisobutene	**DIISOBUTYLENE**	17
DIISOBUTYLAMINE		17
Diisobutylcarbinol (a)	**NONYL ALCOHOL (ALL ISOMERS)**	17
DIISOBUTYLENE		17
alpha-Diisobutylene (a)	**DIISOBUTYLENE**	17
beta-Diisobutylene (a)	**DIISOBUTYLENE**	17
DIISOBUTYL KETONE		17
DIISOBUTYL PHTHALATE		17
2,4-diisocyanato-1-methylbenzene	**TOLUENE DIISOCYANATE**	17
2,4-Diisocyanatotoluene	**TOLUENE DIISOCYANATE**	17
Diisodecyl phthalate (a)	**DIALKYL (C7-C13) PHTHALATES**	17
DIISONONYL ADIPATE		17
Diisononyl phthalate (a)	**DIALKYL (C7-C13) PHTHALATES**	17
DIISOOCTYL PHTHALATE		17
DIISOPROPANOLAMINE		17
DIISOPROPYLAMINE		17
DIISOPROPYLBENZENE (ALL ISOMERS)		17
Diisopropyl ether	**ISOPROPYL ETHER**	17
DIISOPROPYLNAPHTHALENE		17
Diisopropyl oxide	**ISOPROPYL ETHER**	17
N,N-DIMETHYLACETAMIDE		17
N,N-DIMETHYLACETAMIDE SOLUTION (40% OR LESS)		17
Dimethylacetylene carbinol	**2-METHYL-2-HYDROXY-3-BUTYNE**	17
DIMETHYL ADIPATE		17
DIMETHYLAMINE SOLUTION (45% OR LESS)		17
DIMETHYLAMINE SOLUTION (GREATER THAN 45% BUT NOT GREATER THAN 55%)		17
DIMETHYLAMINE SOLUTION (GREATER THAN 55% BUT NOT GREATER THAN 65%)		17
Dimethylaminoethanol	**DIMETHYLETHANOLAMINE**	17
2-(Dimethylamino)ethanol	**DIMETHYLETHANOLAMINE**	17
Dimethylbenzenes	**XYLENES**	17
1,3-Dimethylbutanol	**METHYLAMYL ALCOHOL**	17
1,3-Dimethylbutan-1-ol	**METHYLAMYL ALCOHOL**	17
1,3-Dimethylbutyl acetate (a)	**METHYLAMYL ACETATE**	17
Dimethylcarbinol	**ISOPROPYL ALCOHOL**	18
N,N-DIMETHYLCYCLOHEXYLAMINE		17
DIMETHYL DISULPHIDE		17
N,N-Dimethyldodecanamine	**N,N-DIMETHYLDODECYLAMINE**	17

Index Name	Product Name	Chapter
N,N-Dimethyldodecan-1-amine	**N,N-DIMETHYLDODECYLAMINE**	17
N,N-DIMETHYLDODECYLAMINE		17
1,1-Dimethylethanol	**TERT-BUTYL ALCOHOL**	17
DIMETHYLETHANOLAMINE		17
1,1-Dimethylethyl alcohol	**TERT-BUTYL ALCOHOL**	17
Dimethyl ethyl carbinol	**TERT-AMYL ALCOHOL**	17
1,1-dimethylethyl methyl ether	**METHYL TERT-BUTYL ETHER**	17
Dimethylformaldehyde	**ACETONE**	18
DIMETHYLFORMAMIDE		17
DIMETHYL GLUTARATE		17
2,6-Dimethyl-4-heptanone	**DIISOBUTYL KETONE**	17
2,6-Dimethylheptan-4-one	**DIISOBUTYL KETONE**	17
N,N-Dimethylhexanamine (a)	**ALKYL (C12+) DIMETHYLAMINE**	17
DIMETHYL HYDROGEN PHOSPHITE		17
Dimethylhydroxybenzenes (all isomers)	**XYLENOL**	17
1,1'-Dimethyl-2,2'-iminodiethanol	**DIISOPROPANOLAMINE**	17
Dimethyl ketal	**ACETONE**	18
Dimethyl ketone	**ACETONE**	18
N,N-dimethyllaurylamine	**N,N-DIMETHYLDODECYLAMINE**	17
N,N-Dimethylmethanamine solution (30% or less)	**TRIMETHYLAMINE SOLUTION (30% OR LESS)**	17
6,6-Dimethyl-2-methylenebicyclo[3.1.1]heptane	**BETA-PINENE**	17
DIMETHYL OCTANOIC ACID		17
2,2-Dimethyloctanoic acid (a)	**NEODECANOIC ACID**	17
2,3-Dimethylphenol (a)	**XYLENOL**	17
2,4-Dimethylphenol (a)	**XYLENOL**	17
2,5-Dimethylphenol (a)	**XYLENOL**	17
2,6-Dimethylphenol (a)	**XYLENOL**	17
3,4-Dimethylphenol (a)	**XYLENOL**	17
3,5-Dimethylphenol (a)	**XYLENOL**	17
Dimethylphenols	**XYLENOL**	17
Dimethylphenyl phosphate (3:1) (all isomers)	**TRIXYLYL PHOSPHATE**	17
DIMETHYL PHTHALATE		17
DIMETHYLPOLYSILOXANE		17
2,2-Dimethylpropane (a)	**PENTANE (ALL ISOMERS)**	17
2,2-DIMETHYLPROPANE-1,3-DIOL (MOLTEN OR SOLUTION)		17
2,2-Dimethylpropanoic acid	**TRIMETHYLACETIC ACID**	17
1,1-Dimethylpropargyl alcohol	**2-METHYL-2-HYDROXY-3-BUTYNE**	17
2,2-Dimethylpropionic acid	**TRIMETHYLACETIC ACID**	17
1,1-Dimethylpropyl ethyl ether	**TERT-AMYL ETHYL ETHER**	17
1,1-Dimethylpropynol	**2-METHYL-2-HYDROXY-3-BUTYNE**	17
DIMETHYL SUCCINATE		17
N,N-Dimethyltetradecanamine (a)	**ALKYL (C12+) DIMETHYLAMINE**	17
Dimethyl(tetradecyl)amine (a)	**ALKYL (C12+) DIMETHYLAMINE**	17
3,9-Dimethyltricyclo[5.2.1.02,6]deca-3,9-diene	**METHYLCYCLOPENTADIENE DIMER**	17
Dimethyltrimethylene glycol	**2,2-DIMETHYLPROPANE-1,3-DIOL (MOLTEN OR SOLUTION)**	17

Index Name	Product Name	Chapter
DINITROTOLUENE (MOLTEN)		17
DINONYL PHTHALATE		17
Dinonyl phthalate (a)	**DIALKYL (C7-C13) PHTHALATES**	17
3,6-Dioaxaoctane-1,8-diol	**TRIETHYLENE GLYCOL**	18
Dioctyl adipate	**DI-(2-ETHYLHEXYL) ADIPATE**	17
Dioctyl hydrogen phosphate	**DI-(2-ETHYLHEXYL) PHOSPHORIC ACID**	17
Dioctyl phosphoric acid	**DI-(2-ETHYLHEXYL) PHOSPHORIC ACID**	17
DIOCTYL PHTHALATE		17
Dioctyl terephthalate	**BIS(2-ETHYLHEXYL) TEREPHTHALATE**	17
2,4-D-diolamine	**2,4-DICHLOROPHENOXYACETIC ACID, DIETHANOLAMINE SALT SOLUTION**	17
1,4-Dioxan	**1,4-DIOXANE**	17
1,4-DIOXANE		17
1,3-Dioxolan-2-one	**ETHYLENE CARBONATE**	17
Dioxolone-2	**ETHYLENE CARBONATE**	17
1,1-Dioxothiolan	**SULPHOLANE**	17
Dioxyethylene ether	**1,4-DIOXANE**	17
DIPENTENE		17
DIPHENYL		17
DIPHENYLAMINE (MOLTEN)		17
DIPHENYLAMINE, REACTION PRODUCT WITH 2,2,4-TRIMETHYLPENTENE		17
DIPHENYLAMINES, ALKYLATED		17
DIPHENYL/DIPHENYL ETHER MIXTURES		17
Diphenyl/diphenyl oxide mixtures	**DIPHENYL/DIPHENYL ETHER MIXTURES**	17
Diphenyl dodecyl ether disulphonate solution	**DODECYL DIPHENYL ETHER DISULPHONATE SOLUTION**	17
Diphenyl dodecyl oxide disulphonate solution	**DODECYL DIPHENYL ETHER DISULPHONATE SOLUTION**	17
DIPHENYL ETHER		17
DIPHENYL ETHER/DIPHENYL PHENYL ETHER MIXTURE		17
DIPHENYLMETHANE DIISOCYANATE		17
DIPHENYLOL PROPANE-EPICHLOROHYDRIN RESINS		17
Diphenyl oxide	**DIPHENYL ETHER**	17
Diphenyl oxide / diphenyl phenyl ether mixture	**DIPHENYL ETHER/DIPHENYL PHENYL ETHER MIXTURE**	17
Dipropylamine	**DI-N-PROPYLAMINE**	17
n-Dipropylamine	**DI-N-PROPYLAMINE**	17
DI-N-PROPYLAMINE		17
DIPROPYLENE GLYCOL		17
Dipropylene glycol methyl ether (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Dipropylene glycol monomethyl ether (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Disodium carbonate solution	**SODIUM CARBONATE SOLUTION (*)**	17
Distillates (Petroleum), Steam Cracked, C8 - C12 Fraction (a)	**RESIN OIL, DISTILLED**	17
DITHIOCARBAMATE ESTER (C7-C35)		17

Index Name	Product Name	Chapter
DITRIDECYL ADIPATE		17
DITRIDECYL PHTHALATE		17
DIUNDECYL PHTHALATE		17
dl-Lactic acid	**LACTIC ACID**	17
dl-p-Mentha-1,8-diene	**DIPENTENE**	17
1-Docosanol (a)	**ALCOHOLS (C13+)**	17
Docosan-1-ol (a)	**ALCOHOLS (C13+)**	17
DODECANE (ALL ISOMERS)		17
1-Dodecanethiol	**N-DODECYL MERCAPTAN**	17
TERT-DODECANETHIOL		17
Dodecanoic acid	**LAURIC ACID**	17
1-Dodecanol	**DODECYL ALCOHOL**	17
Dodecan-1-ol	**DODECYL ALCOHOL**	17
n-Dodecanol	**DODECYL ALCOHOL**	17
DODECENE (ALL ISOMERS)		17
1-DODECENE		17
Dodec-1-ene	**1-DODECENE**	17
DODECYL ALCOHOL		17
n-Dodecyl alcohol	**DODECYL ALCOHOL**	17
DODECYLAMINE/TETRADECYLAMINE MIXTURE		17
DODECYLBENZENE		17
Dodecylbenzenesulphonic acid (contains 1.5% sulphuric acid)	**ALKYL (C11-C17) BENZENE SULPHONIC ACID**	17
Dodecyldimethylamine	**N,N-DIMETHYLDODECYLAMINE**	17
DODECYL DIPHENYL ETHER DISULPHONATE SOLUTION		17
Dodecyl diphenyl oxide disulphonate solution	**DODECYL DIPHENYL ETHER DISULPHONATE SOLUTION**	17
Dodecylene	**DODECENE (ALL ISOMERS)**	17
DODECYL HYDROXYPROPYL SULPHIDE		17
Dodecylic acid	**LAURIC ACID**	17
N-DODECYL MERCAPTAN		17
tert-Dodecyl mercaptan	**TERT-DODECANETHIOL**	17
DODECYL METHACRYLATE		17
Dodecyl 2-methylprop-2-enoate	**DODECYL METHACRYLATE**	17
Dodecyl-2-methyl-2-propenoate	**DODECYL METHACRYLATE**	17
DODECYL/OCTADECYL METHACRYLATE MIXTURE		17
DODECYL/PENTADECYL METHACRYLATE MIXTURE		17
DODECYL PHENOL		17
Dodecyl, Tetradecyl, hexadecyl-dimethylamine mixture	**ALKYL (C12+) DIMETHYLAMINE**	17
2-Dodecylthio-1-methylethanol	**DODECYL HYDROXYPROPYL SULPHIDE**	17
1-(Dodecylthio)propan-2-ol	**DODECYL HYDROXYPROPYL SULPHIDE**	17
DODECYL XYLENE		17
Drilling brine: potassium chloride solution	**POTASSIUM CHLORIDE SOLUTION**	17
DRILLING BRINES (CONTAINING CALCIUM BROMIDE)		17
DRILLING BRINES (CONTAINING ZINC CHLORIDE)		17

Index Name	Product Name	Chapter
(E)-But-2-enal	**CROTONALDEHYDE**	17
Enanthic acid	**N-HEPTANOIC ACID**	17
Enanthylic acid	**N-HEPTANOIC ACID**	17
Engravers' acid	**NITRIC ACID (70% AND OVER)**	17
EPICHLOROHYDRIN		17
1,2-Epoxybutane	**1,2-BUTYLENE OXIDE**	17
1,4-epoxybutane	**TETRAHYDROFURAN**	17
1,2-Epoxypropane	**PROPYLENE OXIDE**	17
2,3-Epoxypropyl ester of mixed C10 trialkylacetic acids	**GLYCIDYL ESTER OF C10 TRIALKYLACETIC ACID**	17
2,3-Epoxypropyl neodecanoate	**GLYCIDYL ESTER OF C10 TRIALKYLACETIC ACID**	17
EPTC	**S-ETHYL DIPROPYLTHIOCARBAMATE**	17
Essence of Mirbane	**NITROBENZENE**	17
Essence of Myrbane	**NITROBENZENE**	17
Ethanamine solutions, 72% or less	**ETHYLAMINE SOLUTIONS (72% OR LESS)**	17
Ethanecarbonitrile	**PROPIONITRILE**	17
Ethanedial	**GLYOXAL SOLUTION (40% OR LESS)**	17
1,2-Ethanediol	**ETHYLENE GLYCOL**	17
Ethanoic acid	**ACETIC ACID**	17
Ethanoic anhydride	**ACETIC ANHYDRIDE**	17
Ethanol	**ETHYL ALCOHOL**	18
ETHANOLAMINE		17
ethenyl acetate	**VINYL ACETATE**	17
ethenyl ethanoate	**VINYL ACETATE**	17
Ether	**DIETHYL ETHER (*)**	17
Ethinyl trichloride	**TRICHLOROETHYLENE**	17
2-Ethoxyethanol (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
2-(2-Ethoxyethoxy)ethanol (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
2-(2-Ethoxyethoxy)ethyl acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
2-ETHOXYETHYL ACETATE		17
ETHOXYLATED LONG CHAIN (C16+) ALKYLOXYALKYLAMINE		17
ETHOXYLATED TALLOW AMINE (> 95%)		17
2-Ethoxy-2-methylpropane	**ETHYL TERT-BUTYL ETHER**	17
1-Ethoxypropan-2-ol (a)	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
ETHYL ACETATE		17
ETHYL ACETOACETATE		17
Ethyl acetone	**METHYL PROPYL KETONE**	17
ETHYL ACRYLATE		17
ETHYL ALCOHOL		18
ETHYLAMINE (*)		17
ETHYLAMINE SOLUTIONS (72% OR LESS)		17
Ethylaminocyclohexane	**N-ETHYLCYCLOHEXYLAMINE**	17
ETHYL AMYL KETONE		17

Index Name	Product Name	Chapter
ETHYLBENZENE		17
Ethyl benzol	**ETHYLBENZENE**	17
Ethyl butanoate	**ETHYL BUTYRATE**	17
ETHYL TERT-BUTYL ETHER		17
ETHYL BUTYRATE		17
2-Ethylcaproic acid	**2-ETHYLHEXANOIC ACID**	17
Ethyl carbinol	**N-PROPYL ALCOHOL**	17
Ethyl cyanide	**PROPIONITRILE**	17
ETHYLCYCLOHEXANE		17
N-ETHYLCYCLOHEXYLAMINE		17
Ethyldimethylmethane (a)	**PENTANE (ALL ISOMERS)**	17
S-Ethyl dipropylcarbamothioate	**S-ETHYL DIPROPYLTHIOCARBAMATE**	17
S-ETHYL DIPROPYLTHIOCARBAMATE		17
Ethylene alcohol	**ETHYLENE GLYCOL**	17
Ethylene bis(iminodiacetic acid) tetrasodium salt solution	**ETHYLENEDIAMINETETRAACETIC ACID, TETRASODIUM SALT SOLUTION**	17
Ethylene bromide	**ETHYLENE DIBROMIDE**	17
ETHYLENE CARBONATE		17
Ethylenecarboxylic acid	**ACRYLIC ACID**	17
Ethylene chloride	**ETHYLENE DICHLORIDE**	17
ETHYLENE CHLOROHYDRIN		17
ETHYLENE CYANOHYDRIN		17
Ethylene diacetate	**ETHYLENE GLYCOL DIACETATE**	17
ETHYLENEDIAMINE		17
ETHYLENEDIAMINETETRAACETIC ACID, TETRASODIUM SALT SOLUTION		17
ETHYLENE DIBROMIDE		17
ETHYLENE DICHLORIDE		17
Ethylenedinitrilotetraacetic acid tetrasodium salt solution	**ETHYLENEDIAMINETETRAACETIC ACID, TETRASODIUM SALT SOLUTION**	17
2,2'-Ethylenedioxydiethanol	**TRIETHYLENE GLYCOL**	18
ETHYLENE GLYCOL		17
ETHYLENE GLYCOL ACETATE		17
Ethylene glycol acrylate	**2-HYDROXYETHYL ACRYLATE**	17
Ethylene glycol butyl ether (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
ETHYLENE GLYCOL BUTYL ETHER ACETATE		17
Ethylene glycol n-butyl ether (58%)/ Hyperbranched polyesteramide (42%)	**2-BUTOXYETHANOL (58%)/HYPERBRANCHED POLYESTERAMIDE (42%) (MIXTURE)**	17
Ethylene glycol tert-butyl ether (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
ETHYLENE GLYCOL DIACETATE		17
Ethylene glycol ethyl ether (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
Ethylene glycol ethyl ether acetate	**2-ETHOXYETHYL ACETATE**	17
Ethylene glycol isopropyl ether (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
Ethylene glycol methyl ether (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
ETHYLENE GLYCOL METHYL ETHER ACETATE		17

Index Name	Product Name	Chapter
ETHYLENE GLYCOL MONOALKYL ETHERS		17
Ethylene glycol monoalkyl ethers (58%)/ Hyperbranched polyesteramide (42%)	**2-BUTOXYETHANOL (58%)/HYPERBRANCHED POLYESTERAMIDE (42%) (MIXTURE)**	17
Ethylene glycol monobutyl ether (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
Ethylene glycol monobutyl ether (58%)/ Hyperbranched polyesteramide (42%)	**2-BUTOXYETHANOL (58%)/HYPERBRANCHED POLYESTERAMIDE (42%) (MIXTURE)**	17
Ethylene glycol mono-tert-butyl ether (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
Ethylene glycol monoethyl ether (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
Ethylene glycol monoethyl ether acetate	**2-ETHOXYETHYL ACETATE**	17
Ethylene glycol monomethyl ether (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
Ethylene glycol monomethyl ether acetate	**ETHYLENE GLYCOL METHYL ETHER ACETATE**	17
Ethylene glycol monophenyl ether	**ETHYLENE GLYCOL PHENYL ETHER**	17
ETHYLENE GLYCOL PHENYL ETHER		17
ETHYLENE GLYCOL PHENYL ETHER/DIETHYLENE GLYCOL PHENYL ETHER MIXTURE		17
ETHYLENE GLYCOL (>75%)/SODIUM ALKYL CARBOXYLATES/BORAX MIXTURE		17
ETHYLENE GLYCOL (>85%)/SODIUM ALKYL CARBOXYLATES MIXTURE		17
ETHYLENE OXIDE/PROPYLENE OXIDE MIXTURE WITH AN ETHYLENE OXIDE CONTENT OF NOT MORE THAN 30% BY MASS		17
Ethylene tetrachloride	**PERCHLOROETHYLENE**	17
Ethylene trichloride	**TRICHLOROETHYLENE**	17
ETHYLENE-VINYL ACETATE COPOLYMER (EMULSION)		17
Ethyl ethanoate	**ETHYL ACETATE**	17
Ethyl ether	**DIETHYL ETHER (*)**	17
ETHYL-3-ETHOXYPROPIONATE		17
Ethyl fluid (a)	**MOTOR FUEL ANTI-KNOCK COMPOUND (CONTAINING LEAD ALKYLS)**	17
Ethylformic acid	**PROPIONIC ACID**	17
Ethyl glycol (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
2-Ethylhexaldehyde (a)	**OCTYL ALDEHYDES**	17
2-Ethylhexanal (a)	**OCTYL ALDEHYDES**	17
2-ETHYLHEXANOIC ACID		17
2-Ethylhexanol (a)	**OCTANOL (ALL ISOMERS)**	17
2-Ethylhexenal	**2-ETHYL-3-PROPYLACROLEIN**	17
2-Ethylhex-2-enal	**2-ETHYL-3-PROPYLACROLEIN**	17
2-Ethylhexoic acid (a)	**OCTANOIC ACID (ALL ISOMERS)**	17
2-ETHYLHEXYL ACRYLATE		17
2-Ethylhexyl alcohol (a)	**OCTANOL (ALL ISOMERS)**	17
2-ETHYLHEXYLAMINE		17
2-ETHYL-2-(HYDROXYMETHYL) PROPANE-1,3-DIOL (C8-C10) ESTER		17
Ethylic acid	**ACETIC ACID**	17
5-Ethylidenebicyclo(2.2.1)hept-2-ene	**ETHYLIDENE NORBORNENE**	17
Ethylidene chloride	**1,1-DICHLOROETHANE**	17
ETHYLIDENE NORBORNENE		17

Index Name	Product Name	Chapter
ETHYL METHACRYLATE		17
N-ETHYLMETHYLALLYLAMINE		17
N-Ethyl-2-methylallylamine	**N-ETHYLMETHYLALLYLAMINE**	17
2-Ethyl-6-methylaniline	**2-METHYL-6-ETHYL ANILINE**	17
2-Ethyl-6-methylbenzenamine	**2-METHYL-6-ETHYL ANILINE**	17
1-ethyl-4-methylbenzene	**ETHYL TOLUENE**	17
Ethyl methyl ketone	**METHYL ETHYL KETONE**	17
5-Ethyl-2-methylpyridine	**2-METHYL-5-ETHYL PYRIDINE**	17
Ethyl oxide	**DIETHYL ETHER (*)**	17
Ethyl phosphate	**TRIETHYL PHOSPHATE**	17
Ethyl phthalate	**DIETHYL PHTHALATE**	17
5-Ethyl-2-picoline	**2-METHYL-5-ETHYL PYRIDINE**	17
Ethyl propenoate	**ETHYL ACRYLATE**	17
ETHYL PROPIONATE		17
2-ETHYL-3-PROPYLACROLEIN		17
Ethyl sulphate	**DIETHYL SULPHATE**	17
ETHYL TOLUENE		17
6-Ethyl-2-toluidine	**2-METHYL-6-ETHYL ANILINE**	17
6-Ethyl-o-toluidine	**2-METHYL-6-ETHYL ANILINE**	17
Ethyl vinyl ether	**VINYL ETHYL ETHER**	17
Extra virgin grape seed oil	**GRAPE SEED OIL**	17
FATTY ACID (SATURATED C13+)		17
FATTY ACID METHYL ESTERS (M)		17
FATTY ACIDS, (C8-C10)		17
FATTY ACIDS, (C12+)		17
FATTY ACIDS, (C16+)		17
FATTY ACIDS, ESSENTIALLY LINEAR (C6-C18) 2-ETHYLHEXYL ESTER		17
Feeding corn molasses (a)	**MOLASSES**	18
Fermentation alcohol	**ETHYL ALCOHOL**	18
FERRIC CHLORIDE SOLUTIONS		17
FERRIC NITRATE/NITRIC ACID SOLUTION		17
FISH OIL		17
FISH PROTEIN CONCENTRATE (CONTAINING 4% OR LESS FORMIC ACID)		17
FISH SILAGE PROTEIN CONCENTRATE (CONTAINING 4% OR LESS FORMIC ACID)		17
FLUOROSILICIC ACID SOLUTION (20-30%)		17
FORMALDEHYDE SOLUTIONS (45% OR LESS)		17
Formaldehyde trimer	**1,3,5-TRIOXANE**	17
Formalin	**FORMALDEHYDE SOLUTIONS (45% OR LESS)**	17
FORMAMIDE		17
Formdimethylamide	**DIMETHYLFORMAMIDE**	17
FORMIC ACID (85% OR LESS ACID)		17
FORMIC ACID (OVER 85%)		17

Index Name	Product Name	Chapter
FORMIC ACID MIXTURE (CONTAINING UP TO 18% PROPIONIC ACID AND UP TO 25% SODIUM FORMATE)		17
Formic aldehyde	**FORMALDEHYDE SOLUTIONS (45% OR LESS)**	17
Formylformic acid	**GLYOXYLIC ACID SOLUTION (50 % OR LESS)**	17
Fural	**FURFURAL**	17
2-Furaldehyde	**FURFURAL**	17
2,5-Furandione	**MALEIC ANHYDRIDE**	17
Furan-2,5-dione	**MALEIC ANHYDRIDE**	17
FURFURAL		17
2-Furfuraldehyde	**FURFURAL**	17
FURFURYL ALCOHOL		17
Furylcarbinol	**FURFURYL ALCOHOL**	17
Fused poly(2+)cyclic aromatic hydrocarbons (b)	**POLY(2+)CYCLIC AROMATICS**	17
Gaultheria oil	**METHYL SALICYLATE**	17
Glacial acetic acid	**ACETIC ACID**	17
GLUCITOL/GLYCEROL BLEND PROPOXYLATED (CONTAINING 10% OR MORE AMINES)		17
GLUCITOL/GLYCEROL BLEND PROPOXYLATED (CONTAINING LESS THAN 10% AMINES)		17
Glucitol solution	**SORBITOL SOLUTION**	18
D-Glucitol solution	**SORBITOL SOLUTION**	18
GLUCOSE SOLUTION		18
GLUTARALDEHYDE SOLUTIONS (50% OR LESS)		17
Glycerin	**GLYCERINE**	17
GLYCERINE		17
Glycerin triacetate	**GLYCERYL TRIACETATE**	17
Glyceritol	**GLYCERINE**	17
Glycerol	**GLYCERINE**	17
GLYCEROL ETHOXYLATED		18
GLYCEROL MONOOLEATE		17
Glycerol oleate	**GLYCEROL MONOOLEATE**	17
Glycerol 1-oleate	**GLYCEROL MONOOLEATE**	17
GLYCEROL PROPOXYLATED		17
GLYCEROL, PROPOXYLATED AND ETHOXYLATED		17
GLYCEROL/SUCROSE BLEND PROPOXYLATED AND ETHOXYLATED		17
Glycerol triacetate	**GLYCERYL TRIACETATE**	17
GLYCERYL TRIACETATE		17
GLYCIDYL ESTER OF C10 TRIALKYLACETIC ACID		17
Glycidyl neodecanoate	**GLYCIDYL ESTER OF C10 TRIALKYLACETIC ACID**	17
GLYCINE, SODIUM SALT SOLUTION		17
Glycol	**ETHYLENE GLYCOL**	17
Glycol carbonate	**ETHYLENE CARBONATE**	17
Glycol chlorohydrin	**ETHYLENE CHLOROHYDRIN**	17
Glycol dichloride	**ETHYLENE DICHLORIDE**	17

Index Name	Product Name	Chapter
GLYCOLIC ACID SOLUTION (70% OR LESS)		17
Glycol monobutyl ether (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
Glycols, polyethylene mono(p-nonylphenyl) ether (b)	**ALKARYL POLYETHERS (C9-C20)**	17
Glycyl alcohol	**GLYCERINE**	17
Glyoxaldehyde	**GLYOXAL SOLUTION (40% OR LESS)**	17
Glyoxalic acid	**GLYOXYLIC ACID SOLUTION (50 % OR LESS)**	17
GLYOXAL SOLUTION (40% OR LESS)		17
GLYOXYLIC ACID SOLUTION (50 % OR LESS)		17
Glyphosate	**GLYPHOSATE SOLUTION (NOT CONTAINING SURFACTANT)**	17
Glyphosate-mono(isopropylammonium)	**GLYPHOSATE SOLUTION (NOT CONTAINING SURFACTANT)**	17
GLYPHOSATE SOLUTION (NOT CONTAINING SURFACTANT)		17
Grain alcohol	**ETHYL ALCOHOL**	18
GRAPE SEED OIL		17
GROUNDNUT OIL		17
Hemimellitene (a)	**TRIMETHYLBENZENE (ALL ISOMERS)**	17
Hendecanoic acid	**UNDECANOIC ACID**	17
1-Hendecanol	**UNDECYL ALCOHOL**	17
cyclo-Heptamethylene	**CYCLOHEPTANE**	17
HEPTANE (ALL ISOMERS)		17
1-Heptanecarboxylic acid (a)	**OCTANOIC ACID (ALL ISOMERS)**	17
3-Heptanecarboxylic acid (a)	**OCTANOIC ACID (ALL ISOMERS)**	17
Heptanoic acid	**N-HEPTANOIC ACID**	17
N-HEPTANOIC ACID		17
HEPTANOL (ALL ISOMERS) (D)		17
2-Heptanone	**METHYL AMYL KETONE**	17
Heptan-2-one	**METHYL AMYL KETONE**	17
HEPTENE (ALL ISOMERS)		17
Heptoic acid	**N-HEPTANOIC ACID**	17
HEPTYL ACETATE		17
Heptyl alcohol, all isomers (a)	**HEPTANOL (ALL ISOMERS) (D)**	17
Heptylcarbinol (a)	**OCTANOL (ALL ISOMERS)**	17
Heptylene, mixed isomers	**HEPTENE (ALL ISOMERS)**	17
Heptylic acid	**N-HEPTANOIC ACID**	17
n-Heptylic acid	**N-HEPTANOIC ACID**	17
1-Hexadecene	**OLEFINS (C13+, ALL ISOMERS)**	17
Hexadecyl and icosyl methacrylate mixture (a)	**CETYL/EICOSYL METHACRYLATE MIXTURE**	17
1-HEXADECYLNAPHTHALENE / 1,4-BIS(HEXADECYL)NAPHTHALENE MIXTURE		17
Hexadecylnaphthalene/dihexadecylnaphthalene mixture	**1-HEXADECYLNAPHTHALENE / 1,4-BIS(HEXADECYL)NAPHTHALENE MIXTURE**	17
Hexadecyl / octadecyl alcohol (a)	**ALCOHOLS (C13+)**	17
Hexaethylene glycol (a)	**POLYETHYLENE GLYCOL**	17
Hexafluorosilicate solution (20-30%)	**FLUOROSILICIC ACID SOLUTION (20-30%)**	17
Hexahydroaniline	**CYCLOHEXYLAMINE**	17

Index Name	Product Name	Chapter
Hexahydro-1H-azepine	**HEXAMETHYLENEIMINE**	17
Hexahydrobenzene	**CYCLOHEXANE**	17
Hexahydro-l-H-azepine	**HEXAMETHYLENEIMINE**	17
Hexahydrophenol	**CYCLOHEXANOL**	17
Hexahydrotoluene	**METHYLCYCLOHEXANE**	17
Hexamethylene	**CYCLOHEXANE**	17
HEXAMETHYLENEDIAMINE (MOLTEN)		17
HEXAMETHYLENEDIAMINE ADIPATE (50% IN WATER)		17
HEXAMETHYLENEDIAMINE SOLUTION		17
1,6-Hexamethylenediamine solution	**HEXAMETHYLENEDIAMINE SOLUTION**	17
Hexamethylenediammonium adipate solution (50% solution)	**HEXAMETHYLENEDIAMINE ADIPATE (50% IN WATER)**	17
HEXAMETHYLENE DIISOCYANATE		17
Hexamethylene-1,6-diisocyanate	**HEXAMETHYLENE DIISOCYANATE**	17
HEXAMETHYLENE GLYCOL		17
HEXAMETHYLENEIMINE		17
HEXAMETHYLENETETRAMINE SOLUTIONS		17
Hexamine	**HEXAMETHYLENETETRAMINE SOLUTIONS**	17
Hexanaphthene	**CYCLOHEXANE**	17
1,6-Hexandiamine hexanedioate (1:1)	**HEXAMETHYLENEDIAMINE ADIPATE (50% IN WATER)**	17
HEXANE (ALL ISOMERS)		17
1,6-Hexanediamine	**HEXAMETHYLENEDIAMINE (MOLTEN)**	17
1,6-Hexanediamine solutions	**HEXAMETHYLENEDIAMINE SOLUTION**	17
Hexane-1,6-diamine solutions	**HEXAMETHYLENEDIAMINE SOLUTION**	17
Hexanedioic acid, bis(2-ethylhexyl) ester	**DI-(2-ETHYLHEXYL) ADIPATE**	17
1,6-Hexanediol	**HEXAMETHYLENE GLYCOL**	17
Hexane-1,6-diol	**HEXAMETHYLENE GLYCOL**	17
1,6-HEXANEDIOL, DISTILLATION OVERHEADS		17
n-Hexane	**HEXANE (ALL ISOMERS)**	17
HEXANOIC ACID		17
HEXANOL		17
Hexan-1-ol	**HEXANOL**	17
2-Hexanone	**METHYL BUTYL KETONE**	17
Hexan-2-one	**METHYL BUTYL KETONE**	17
HEXENE (ALL ISOMERS)		17
1-Hexene (a)	**HEXENE (ALL ISOMERS)**	17
Hex-1-ene (a)	**HEXENE (ALL ISOMERS)**	17
2-Hexene (a)	**HEXENE (ALL ISOMERS)**	17
Hexone	**METHYL ISOBUTYL KETONE**	17
HEXYL ACETATE		17
sec-Hexyl acetate	**METHYLAMYL ACETATE**	17
Hexyl alcohol	**HEXANOL**	17
Hexylene (a)	**HEXENE (ALL ISOMERS)**	17
HEXYLENE GLYCOL		17
Hexyl ethanoate	**HEXYL ACETATE**	17

Index Name	Product Name	Chapter
Highly-Reactive Polyisobutylene	**POLY(4+)ISOBUTYLENE (MW>224)**	17
Homopiperidine	**HEXAMETHYLENEIMINE**	17
HYDROCARBON WAX		17
HYDROCHLORIC ACID (*)		17
Hydrofluorosilic acid solution (20-30%)	**FLUOROSILICIC ACID SOLUTION (20-30%)**	17
Hydrofuran	**TETRAHYDROFURAN**	17
Hydrogenated maltose syrup	**MALTITOL SOLUTION**	18
Hydrogenated oligosaccharide	**HYDROGENATED STARCH HYDROLYSATE**	18
HYDROGENATED STARCH HYDROLYSATE		18
Hydrogencarboxylic acid	**FORMIC ACID (85% OR LESS ACID)**	17
Hydrogen chloride, aqueous	**HYDROCHLORIC ACID (*)**	17
HYDROGEN PEROXIDE SOLUTIONS (OVER 60% BUT NOT OVER 70% BY MASS)		17
HYDROGEN PEROXIDE SOLUTIONS (OVER 8% BUT NOT OVER 60% BY MASS)		17
Hydrogen sulphate	**SULPHURIC ACID**	17
alpha-Hydro-omega-hydroxypoly[oxy(methyl-1,2-ethanediyl)]	**POLYPROPYLENE GLYCOL**	17
Hydroxyacetic acid	**GLYCOLIC ACID SOLUTION (70% OR LESS)**	17
Hydroxybenzene	**PHENOL**	17
4-Hydroxybutanoic acid lactone	**GAMMA-BUTYROLACTONE**	17
4-Hydroxybutyric acid lactone	**GAMMA-BUTYROLACTONE**	17
gamma-Hydroxybutyric acid lactone	**GAMMA-BUTYROLACTONE**	17
Hydroxydimethylbenzenes	**XYLENOL**	17
Hydroxyethanoic acid	**GLYCOLIC ACID SOLUTION (70% OR LESS)**	17
2-Hydroxyethyl acetate	**ETHYLENE GLYCOL ACETATE**	17
2-HYDROXYETHYL ACRYLATE		17
beta-Hydroxyethyl acrylate	**2-HYDROXYETHYL ACRYLATE**	17
2-Hydroxyethylamine	**ETHANOLAMINE**	17
N-beta-Hydroxyethylethylenediamine	**AMINOETHYL ETHANOLAMINE**	17
N-(HYDROXYETHYL)ETHYLENEDIAMINETRIACETIC ACID, TRISODIUM SALT SOLUTION		17
beta-Hydroxyethyl phenyl ether	**ETHYLENE GLYCOL PHENYL ETHER**	17
2-Hydroxyethyl propenoate	**2-HYDROXYETHYL ACRYLATE**	17
2-Hydroxyethyl 2-propenoate	**2-HYDROXYETHYL ACRYLATE**	17
alpha-Hydroxyisobutyronitrile	**ACETONE CYANOHYDRIN**	17
4-Hydroxy-2-keto-4-methylpentane	**DIACETONE ALCOHOL**	17
4-Hydroxy-4-methylpentanone-2	**DIACETONE ALCOHOL**	17
4-Hydroxy-4-methylpentan-2-one	**DIACETONE ALCOHOL**	17
2-Hydroxy-2-methylpropiononitrile	**ACETONE CYANOHYDRIN**	17
2-HYDROXY-4-(METHYLTHIO)BUTANOIC ACID		17
2-Hydroxy-4-(methylthio)butyric acid	**2-HYDROXY-4-(METHYLTHIO)BUTANOIC ACID**	17
2-Hydroxynitrobenzene (molten)	**O-NITROPHENOL (MOLTEN)**	17
1-Hydroxy-2-phenoxyethane	**ETHYLENE GLYCOL PHENYL ETHER**	17
2-Hydroxypropanoic acid	**LACTIC ACID**	17
2-Hydroxypropionic acid	**LACTIC ACID**	17
alpha-Hydroxypropionic acid	**LACTIC ACID**	17
3-Hydroxypropionic acid, lactone.	**BETA-PROPIOLACTONE**	17

Index Name	Product Name	Chapter
beta-Hydroxypropionitrile	**ETHYLENE CYANOHYDRIN**	17
2-Hydroxypropionitrile solution (80% or less)	**LACTONITRILE SOLUTION (80% OR LESS)**	17
alpha-Hydroxypropionitrile solution (80% or less)	**LACTONITRILE SOLUTION (80% OR LESS)**	17
3-Hydroxypropiononitrile	**ETHYLENE CYANOHYDRIN**	17
2-Hydroxypropiononitrile solution (80% or less)	**LACTONITRILE SOLUTION (80% OR LESS)**	17
2-[2-(2-hydroxypropoxy)propoxy]propan-1-ol	**TRIPROPYLENE GLYCOL**	17
2-Hydroxypropylamine	**ISOPROPANOLAMINE**	17
3-Hydroxypropylamine	**N-PROPANOLAMINE**	17
alpha-Hydroxytoluene	**BENZYL ALCOHOL**	17
3-Hydroxy-2,2,4-trimethylpentyl isobutyrate	**2,2,4-TRIMETHYL-1,3-PENTANEDIOL-1-ISOBUTYRATE**	17
ILLIPE OIL		17
2,2'-Iminodi(ethylamine)	**DIETHYLENETRIAMINE**	17
2,2'-Iminodiethanol	**DIETHANOLAMINE**	17
1,1'-Iminodipropan-2-ol	**DIISOPROPANOLAMINE**	17
Iron (III) chloride solutions	**FERRIC CHLORIDE SOLUTIONS**	17
Iron (III) nitrate / nitric acid solution	**FERRIC NITRATE/NITRIC ACID SOLUTION**	17
Isoacetophenone	**ISOPHORONE**	17
Isoamyl acetate (a)	**AMYL ACETATE (ALL ISOMERS)**	17
ISOAMYL ALCOHOL		17
Isobutaldehyde (a)	**BUTYRALDEHYDE (ALL ISOMERS)**	17
Isobutanal (a)	**BUTYRALDEHYDE (ALL ISOMERS)**	17
Isobutanol	**ISOBUTYL ALCOHOL**	17
Isobutanolamine	**2-AMINO-2-METHYL-1-PROPANOL**	17
Isobutyl acetate	**BUTYL ACETATE (ALL ISOMERS)**	17
Isobutyl acrylate (a)	**BUTYL ACRYLATE (ALL ISOMERS)**	17
ISOBUTYL ALCOHOL		17
Isobutyl aldehyde (a)	**BUTYRALDEHYDE (ALL ISOMERS)**	17
Isobutylamine (a)	**BUTYLAMINE (ALL ISOMERS)**	17
Isobutylcarbinol	**ISOAMYL ALCOHOL**	17
ISOBUTYL FORMATE		17
Isobutyl ketone	**DIISOBUTYL KETONE**	17
ISOBUTYL METHACRYLATE		17
Isobutylmethylcarbinol	**METHYLAMYL ALCOHOL**	17
Isobutyl methyl ketone	**METHYL ISOBUTYL KETONE**	17
Isobutylmethylmethanol	**METHYLAMYL ALCOHOL**	17
Isobutyraldehyde (a)	**BUTYRALDEHYDE (ALL ISOMERS)**	17
Isobutyric aldehyde (a)	**BUTYRALDEHYDE (ALL ISOMERS)**	17
alpha-Isocyanatobenzyl-omega-isocyanatophenylpoly[(phenyl isocyanate)-alt-formaldehyde]	**POLYMETHYLENE POLYPHENYL ISOCYANATE**	17
3-Isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate	**ISOPHORONE DIISOCYANATE**	17
Isodecanol	**DECYL ALCOHOL (ALL ISOMERS)**	17
Isodecyl alcohol	**DECYL ALCOHOL (ALL ISOMERS)**	17
Isododecane (a)	**DODECANE (ALL ISOMERS)**	17
Isodurene (a)	**TETRAMETHYLBENZENE (ALL ISOMERS)**	17
Isononanoic acid	**NONANOIC ACID (ALL ISOMERS)**	17
Isononanol	**NONYL ALCOHOL (ALL ISOMERS)**	17

Index Name	Product Name	Chapter
Isooctane (a)	**OCTANE (ALL ISOMERS)**	17
Isooctanol	**OCTANOL (ALL ISOMERS)**	17
Isopentane (a)	**PENTANE (ALL ISOMERS)**	17
Isopentanol	**AMYL ALCOHOL, PRIMARY**	17
Isopentanol	**ISOAMYL ALCOHOL**	17
Isopentyl acetate (a)	**AMYL ACETATE (ALL ISOMERS)**	17
Isopentyl alcohol	**ISOAMYL ALCOHOL**	17
ISOPHORONE		17
ISOPHORONEDIAMINE		17
ISOPHORONE DIISOCYANATE		17
ISOPRENE		17
Isopropanol	**ISOPROPYL ALCOHOL**	18
ISOPROPANOLAMINE		17
Isopropenylbenzene	**ALPHA-METHYLSTYRENE**	17
2-Isopropoxyethanol (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
2-Isopropoxypropane	**ISOPROPYL ETHER**	17
ISOPROPYL ACETATE		17
Isopropylacetone	**METHYL ISOBUTYL KETONE**	17
ISOPROPYL ALCOHOL		18
ISOPROPYLAMINE		17
ISOPROPYLAMINE (70% OR LESS) SOLUTION		17
Isopropylammonium N-(phosphonomethyl)glycine	**GLYPHOSATE SOLUTION (NOT CONTAINING SURFACTANT)**	17
Isopropylcarbinol	**ISOBUTYL ALCOHOL**	17
Isopropyl carbinol	**ISOBUTYL ALCOHOL**	17
ISOPROPYLCYCLOHEXANE		17
1-Isopropyl-2,2-dimethyltrimethylene diisobutyrate	**2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE**	17
ISOPROPYL ETHER		17
Isopropylideneacetone	**MESITYL OXIDE**	17
Isopropyl oxide	**ISOPROPYL ETHER**	17
4-Isopropyltoluene	**P-CYMENE**	17
p-Isopropyltoluene	**P-CYMENE**	17
4-Isopropyltoluol	**P-CYMENE**	17
Isovaleral	**VALERALDEHYDE (ALL ISOMERS)**	17
Isovaleraldehyde	**VALERALDEHYDE (ALL ISOMERS)**	17
Isovaleric aldehyde	**VALERALDEHYDE (ALL ISOMERS)**	17
Isovalerone	**DIISOBUTYL KETONE**	17
JATROPHA OIL		17
Kaolin clay slurry	**KAOLIN SLURRY**	18
Kaolinite slurry	**KAOLIN SLURRY**	18
KAOLIN SLURRY		18
Ketohexamethylene	**CYCLOHEXANONE**	17
Ketone propane	**ACETONE**	18
Ketopropane	**ACETONE**	18
LACTIC ACID		17

Index Name	Product Name	Chapter
LACTONITRILE SOLUTION (80% OR LESS)		17
LARD		17
LATEX, AMMONIA (1% OR LESS)- INHIBITED		17
LATEX: CARBOXYLATED STYRENE-BUTADIENE COPOLYMER; STYRENE-BUTADIENE RUBBER		17
LAURIC ACID		17
Lauryl alcohol	**DODECYL ALCOHOL**	17
Lead alkyls, n.o.s. (a)	**MOTOR FUEL ANTI-KNOCK COMPOUND (CONTAINING LEAD ALKYLS)**	17
Lead tetraethyl (a)	**MOTOR FUEL ANTI-KNOCK COMPOUND (CONTAINING LEAD ALKYLS)**	17
Lead tetramethyl (a)	**MOTOR FUEL ANTI-KNOCK COMPOUND (CONTAINING LEAD ALKYLS)**	17
LECITHIN		18
LIGNINSULPHONIC ACID, MAGNESIUM SALT SOLUTION		17
LIGNINSULPHONIC ACID, SODIUM SALT SOLUTION		17
Limonene	**DIPENTENE**	17
Linear alkylbenzene (LAB) bottoms (a)	**ALKYLBENZENE DISTILLATION BOTTOMS**	17
Linear alkyl(C12-C16) propoxyamine ethoxylate	**ALKYL(C12-C16) PROPOXYAMINE ETHOXYLATE**	17
LINSEED OIL		17
LIQUID CHEMICAL WASTES		17
Liquid paraffin	**N-ALKANES (C10-C20)**	17
LONG-CHAIN ALKARYL POLYETHER (C11-C20)		17
LONG-CHAIN ALKARYL SULPHONIC ACID (C16-C60)		17
LONG-CHAIN ALKYLPHENATE/PHENOL SULPHIDE MIXTURE		17
LONG-CHAIN ALKYLPHENOL (C14-C18)		17
LONG-CHAIN ALKYLPHENOL (C18-C30)		17
Lye, soda solution	**SODIUM HYDROXIDE SOLUTION (*)**	17
L-LYSINE SOLUTION (60% OR LESS)		17
Magnesia hydrate	**MAGNESIUM HYDROXIDE SLURRY**	17
MAGNESIUM CHLORIDE SOLUTION		17
MAGNESIUM HYDROXIDE SLURRY		17
Magnesium Lignasulphonate solution	**LIGNINSULPHONIC ACID, MAGNESIUM SALT SOLUTION**	17
MAGNESIUM LONG-CHAIN ALKARYL SULPHONATE (C11-C50)		17
MAGNESIUM LONG-CHAIN ALKYL SALICYLATE (C11+)		17
MALEIC ANHYDRIDE		17
MALEIC ANHYDRIDE-SODIUM ALLYLSULPHONATE COPOLYMER SOLUTION		17
Maltitol	**MALTITOL SOLUTION**	18
MALTITOL SOLUTION		18
Maltitol syrup	**MALTITOL SOLUTION**	18
MANGO KERNEL OIL		17
Meglumine solution (70% or less)	**N-METHYLGLUCAMINE SOLUTION (70% OR LESS)**	17

Index Name	Product Name	Chapter
MERCAPTOBENZOTHIAZOL, SODIUM SALT SOLUTION		17
Mesitylene	**TRIMETHYLBENZENE (ALL ISOMERS)**	17
MESITYL OXIDE		17
Metaformaldehyde	**1,3,5-TRIOXANE**	17
Metam-sodium	**METAM SODIUM SOLUTION**	17
METAM SODIUM SOLUTION		17
METHACRYLIC ACID		17
METHACRYLIC ACID - ALKOXYPOLY (ALKYLENE OXIDE) METHACRYLATE COPOLYMER, SODIUM SALT AQUEOUS SOLUTION (45% OR LESS)		17
alpha-Methacrylic acid	**METHACRYLIC ACID**	17
Methacrylic acid, dodecyl ester	**DODECYL METHACRYLATE**	17
Methacrylic acid, lauryl ester	**DODECYL METHACRYLATE**	17
METHACRYLIC RESIN IN ETHYLENE DICHLORIDE		17
METHACRYLONITRILE		17
Methanal	**FORMALDEHYDE SOLUTIONS (45% OR LESS)**	17
Methanamide	**FORMAMIDE**	17
Methanamine	**METHYLAMINE SOLUTIONS (42% OR LESS)**	17
Methanecarboxylic acid	**ACETIC ACID**	17
Methanoic acid	**FORMIC ACID (85% OR LESS ACID)**	17
Methanol	**METHYL ALCOHOL (*)**	17
Methenamine	**HEXAMETHYLENETETRAMINE SOLUTIONS**	17
3-METHOXY-1-BUTANOL		17
3-Methoxybutan-1-ol	**3-METHOXY-1-BUTANOL**	17
3-METHOXYBUTYL ACETATE		17
2-Methoxyethanol (a)	**ETHYLENE GLYCOL MONOALKYL ETHERS**	17
2-(2-Methoxyethoxy)ethanol (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
2-[2-(2-Methoxyethoxy)ethoxy]ethanol (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
2-(2-Methoxyethoxy)ethyl acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
2-Methoxyethyl acetate	**ETHYLENE GLYCOL METHYL ETHER ACETATE**	17
2-Methoxy-2-methylbutane	**TERT-AMYL METHYL ETHER**	17
3-Methoxy-3-methylbutan-1-ol	**3-METHYL-3-METHOXYBUTANOL**	17
2-Methoxy-1-methylethyl acetate	**PROPYLENE GLYCOL METHYL ETHER ACETATE**	17
N-(2-METHOXY-1-METHYL ETHYL)-2-ETHYL-6-METHYL CHLOROACETANILIDE		17
2-methoxy-2-methylpropane	**METHYL TERT-BUTYL ETHER**	17
1-Methoxypropan-2-ol (a)	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
1-Methoxy-2-propanol acetate	**PROPYLENE GLYCOL METHYL ETHER ACETATE**	17
1-(2-Methoxypropoxy)propan-2-ol (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
3-[3-(3-Methoxypropoxy)propoxy]propan-1-ol (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17
Methoxytriglycol (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17

Index Name	Product Name	Chapter
Methylacetaldehyde	**PROPIONALDEHYDE**	17
METHYL ACETATE		17
Methylacetic acid	**PROPIONIC ACID**	17
METHYL ACETOACETATE		17
Methyl acetylacetate	**METHYL ACETOACETATE**	17
beta-Methylacrolein	**CROTONALDEHYDE**	17
METHYL ACRYLATE		17
2-Methylacrylic acid	**METHACRYLIC ACID**	17
2-Methylacrylic acid, dodecyl ester	**DODECYL METHACRYLATE**	17
2-Methylacrylic acid, lauryl ester	**DODECYL METHACRYLATE**	17
METHYL ALCOHOL (*)		17
METHYLAMINE SOLUTIONS (42% OR LESS)		17
1-Methyl-2-aminobenzene	**O-TOLUIDINE**	17
2-Methyl-1-aminobenzene	**O-TOLUIDINE**	17
METHYLAMYL ACETATE		17
METHYLAMYL ALCOHOL		17
METHYL AMYL KETONE		17
Methyl n-amyl ketone	**METHYL AMYL KETONE**	17
2-Methylaniline	**O-TOLUIDINE**	17
N-METHYLANILINE		17
o-Methylaniline	**O-TOLUIDINE**	17
2-Methylbenzenamine	**O-TOLUIDINE**	17
o-Methylbenzenamine	**O-TOLUIDINE**	17
Methylbenzene	**TOLUENE**	17
Methylbenzol	**TOLUENE**	17
ALPHA-METHYLBENZYL ALCOHOL WITH ACETOPHENONE (15% OR LESS)		17
2-Methyl-1,3-butadiene	**ISOPRENE**	17
3-Methyl-1,3-butadiene	**ISOPRENE**	17
2-Methylbutanal	**VALERALDEHYDE (ALL ISOMERS)**	17
3-Methylbutanal	**VALERALDEHYDE (ALL ISOMERS)**	17
2-Methylbutane (a)	**PENTANE (ALL ISOMERS)**	17
Methyl butanoate	**METHYL BUTYRATE**	17
2-Methyl-2-butanol	**TERT-AMYL ALCOHOL**	17
2-Methylbutan-2-ol	**TERT-AMYL ALCOHOL**	17
2-Methyl-4-butanol	**ISOAMYL ALCOHOL**	17
3-Methyl-1-butanol	**AMYL ALCOHOL, PRIMARY**	17
3-Methylbutan-1-ol	**AMYL ALCOHOL, PRIMARY**	17
3-Methyl-1-butanol	**ISOAMYL ALCOHOL**	17
3-Methylbutan-1-ol	**ISOAMYL ALCOHOL**	17
3-Methylbutan-3-ol	**TERT-AMYL ALCOHOL**	17
3-Methylbut-1-ene (a)	**PENTENE (ALL ISOMERS)**	17
Methylbutenes (a)	**PENTENE (ALL ISOMERS)**	17
METHYLBUTENOL		17
1-Methylbutyl acetate (a)	**AMYL ACETATE (ALL ISOMERS)**	17
2-Methyl-2-butyl alcohol	**TERT-AMYL ALCOHOL**	17

Index Name	Product Name	Chapter
3-Methyl-1-butyl alcohol	**ISOAMYL ALCOHOL**	17
3-Methyl-3-butyl alcohol	**TERT-AMYL ALCOHOL**	17
METHYL TERT-BUTYL ETHER		17
METHYL BUTYL KETONE		17
METHYLBUTYNOL		17
2-Methyl-3-butyn-2-ol	**2-METHYL-2-HYDROXY-3-BUTYNE**	17
2-Methylbut-3-yn-2-ol	**2-METHYL-2-HYDROXY-3-BUTYNE**	17
2-Methylbut-3-yn-2-ol	**METHYLBUTYNOL**	17
2-Methyl-3-butyn-2-ol	**METHYLBUTYNOL**	17
2-Methylbutyraldehyde	**VALERALDEHYDE (ALL ISOMERS)**	17
3-Methylbutyraldehyde	**VALERALDEHYDE (ALL ISOMERS)**	17
METHYL BUTYRATE		17
Methyl 'carbitol' acetate (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE**	17
Methyl 'cellosolve' acetate	**ETHYLENE GLYCOL METHYL ETHER ACETATE**	17
Methylchloroform	**1,1,1-TRICHLOROETHANE**	17
Methyl cyanide	**ACETONITRILE**	17
METHYLCYCLOHEXANE		17
1-Methyl-1,3-cyclopentadiene	**METHYLCYCLOPENTADIENE DIMER**	17
METHYLCYCLOPENTADIENE DIMER		17
METHYLCYCLOPENTADIENYL MANGANESE TRICARBONYL		17
METHYL DIETHANOLAMINE		17
4-Methyl-1,3-dioxolan-2-one	**PROPYLENE CARBONATE**	17
Methyl disulphide	**DIMETHYL DISULPHIDE**	17
Methylenebis(4-isocyanatobenzene)	**DIPHENYLMETHANE DIISOCYANATE**	17
Methylenebis(4-phenyl isocyanate)	**DIPHENYLMETHANE DIISOCYANATE**	17
Methylenebis(4-phenylene isocyanate)	**DIPHENYLMETHANE DIISOCYANATE**	17
Methylenebis(p-phenylene isocyanate)	**DIPHENYLMETHANE DIISOCYANATE**	17
4,4'-Methylenebis(4-phenyl isocyanate)	**DIPHENYLMETHANE DIISOCYANATE**	17
Methylene bromide	**DIBROMOMETHANE**	17
Methylene chloride	**DICHLOROMETHANE**	17
4,4'-Methylenedi(phenyl isocyanate)	**DIPHENYLMETHANE DIISOCYANATE**	17
Methylene dichloride	**DICHLOROMETHANE**	17
4,4'-Methylenediphenyl diisocyanate	**DIPHENYLMETHANE DIISOCYANATE**	17
Methylenedi-p-phenylene diisocyanate	**DIPHENYLMETHANE DIISOCYANATE**	17
2-Methylenepropionic acid	**METHACRYLIC ACID**	17
Methyl ethanoate	**METHYL ACETATE**	17
1-Methylethyl acetate	**ISOPROPYL ACETATE**	17
1-Methylethylamine	**ISOPROPYLAMINE**	17
2-METHYL-6-ETHYL ANILINE		17
Methylethylcarbinol	**SEC-BUTYL ALCOHOL**	18
Methylethylene glycol	**PROPYLENE GLYCOL**	18
Methylethylene oxide	**PROPYLENE OXIDE**	17
METHYL ETHYL KETONE		17
N-(1-Methylethyl)propan-2-amine	**DIISOPROPYLAMINE**	17

Index Name	Product Name	Chapter
2-METHYL-5-ETHYL PYRIDINE		17
METHYL FORMATE		17
N-METHYLGLUCAMINE SOLUTION (70% OR LESS)		17
N-methyl-D-glucamine solution (70% or less)	**N-METHYLGLUCAMINE SOLUTION (70% OR LESS)**	17
2-METHYLGLUTARONITRILE WITH 2-ETHYLSUCCINONITRILE (12% OR LESS)		17
Methyl glycol	**PROPYLENE GLYCOL**	18
5-Methylheptan-3-one	**ETHYL AMYL KETONE**	17
5-Methyl-3-heptanone	**ETHYL AMYL KETONE**	17
Methylhexylcarbinol	**OCTANOL (ALL ISOMERS)**	17
Methyl 2-hydroxybenzoate	**METHYL SALICYLATE**	17
Methyl o-hydroxybenzoate	**METHYL SALICYLATE**	17
2-METHYL-2-HYDROXY-3-BUTYNE		17
2-Methyl-2-hydroxy-3-butyne	**METHYLBUTYNOL**	17
2,2'-(Methylimino)diethanol	**METHYL DIETHANOLAMINE**	17
N-Methyl-2,2'-iminodiethanol	**METHYL DIETHANOLAMINE**	17
Methyl isoamyl ketone	**METHYL AMYL KETONE**	17
Methyl isobutenyl ketone	**MESITYL OXIDE**	17
Methylisobutylcarbinol	**METHYLAMYL ALCOHOL**	17
Methylisobutylcarbinol acetate	**METHYLAMYL ACETATE**	17
METHYL ISOBUTYL KETONE		17
p-Methylisopropyl benzene	**P-CYMENE**	17
2-Methyllactonitrile	**ACETONE CYANOHYDRIN**	17
methyl mercaptopropionaldehyde	**3-(METHYLTHIO)PROPIONALDEHYDE**	17
METHYL METHACRYLATE		17
Methyl methanoate	**METHYL FORMATE**	17
3-METHYL-3-METHOXYBUTANOL		17
Methyl alpha-methylacrylate	**METHYL METHACRYLATE**	17
7-Methyl-3-methylene-1,6-octadiene	**MYRCENE**	17
Methyl 2-methylprop-2-enoate	**METHYL METHACRYLATE**	17
METHYL NAPHTHALENE (MOLTEN)		17
alpha-Methylnaphthalene (molten) (a)	**METHYL NAPHTHALENE (MOLTEN)**	17
beta-Methylnaphthalene (molten) (a)	**METHYL NAPHTHALENE (MOLTEN)**	17
(o- and p-) Methylnitrobenzene	**O- OR P-NITROTOLUENES**	17
8-Methylnonan-1-ol	**DECYL ALCOHOL (ALL ISOMERS)**	17
Methylolpropane	**N-BUTYL ALCOHOL**	18
alpha-Methyl-omega-methoxypoly(ethylene oxide)	**POLYETHYLENE GLYCOL DIMETHYL ETHER**	17
alpha-Methyl-omega-methoxypoly(oxy-1,2-ethanediyl)	**POLYETHYLENE GLYCOL DIMETHYL ETHER**	17
alpha-Methyl-omega-methoxypoly(oxyethylene)	**POLYETHYLENE GLYCOL DIMETHYL ETHER**	17
Methyloxirane	**PROPYLENE OXIDE**	17
2-Methyl-2,4-pentanediol	**HEXYLENE GLYCOL**	17
2-Methylpentane-2,4-diol	**HEXYLENE GLYCOL**	17
4-Methylpentanol-2	**METHYLAMYL ALCOHOL**	17
4-Methylpentan-2-ol	**METHYLAMYL ALCOHOL**	17
4-Methyl-2-pentanol acetate	**METHYLAMYL ACETATE**	17
4-Methyl-2-pentanone	**METHYL ISOBUTYL KETONE**	17

Index Name	Product Name	Chapter
4-Methylpentan-2-one	**METHYL ISOBUTYL KETONE**	17
2-Methylpentene (a)	**HEXENE (ALL ISOMERS)**	17
2-Methylpent-1-ene (a)	**HEXENE (ALL ISOMERS)**	17
2-Methyl-1-pentene (a)	**HEXENE (ALL ISOMERS)**	17
4-Methyl-1-pentene (a)	**HEXENE (ALL ISOMERS)**	17
4-Methyl-3-penten-2-one	**MESITYL OXIDE**	17
4-Methylpent-3-en-2-one	**MESITYL OXIDE**	17
4-Methyl-2-pentyl acetate	**METHYLAMYL ACETATE**	17
Methylpentyl acetates	**METHYLAMYL ACETATE**	17
Methyl tert-pentyl ether	**TERT-AMYL METHYL ETHER**	17
Methyl pentyl ketone	**METHYL AMYL KETONE**	17
2-Methyl-m-phenylenediamine (a)	**TOLUENEDIAMINE**	17
4-Methyl-m-phenylenediamine (a)	**TOLUENEDIAMINE**	17
Methylphenylene diisocyanate	**TOLUENE DIISOCYANATE**	17
4-methyl-1,3-phenylene diisocyanate	**TOLUENE DIISOCYANATE**	17
4-Methyl-m-phenylene diisocyanate	**TOLUENE DIISOCYANATE**	17
2-Methyl-2-phenylpropane (a)	**BUTYLBENZENE (ALL ISOMERS)**	17
2-Methylpropanal (a)	**BUTYRALDEHYDE (ALL ISOMERS)**	17
2-METHYL-1,3-PROPANEDIOL		17
2-Methylpropan-1-ol	**ISOBUTYL ALCOHOL**	17
2-Methyl-1-propanol	**ISOBUTYL ALCOHOL**	17
2-Methylpropan-2-ol	**TERT-BUTYL ALCOHOL**	17
2-Methyl-2-propanol	**TERT-BUTYL ALCOHOL**	17
2-Methylprop-2-enenitrile	**METHACRYLONITRILE**	17
2-Methylpropenoic acid	**METHACRYLIC ACID**	17
alpha-Methylpropenoic acid	**METHACRYLIC ACID**	17
2-Methylprop-1-enyl methyl ketone	**MESITYL OXIDE**	17
2-Methylpropyl acrylate (a)	**BUTYL ACRYLATE (ALL ISOMERS)**	17
2-Methyl-1-propyl alcohol	**ISOBUTYL ALCOHOL**	17
2-Methyl-2-propyl alcohol	**TERT-BUTYL ALCOHOL**	17
Methylpropylcarbinol	**SEC-AMYL ALCOHOL**	17
2-Methylpropyl formate	**ISOBUTYL FORMATE**	17
METHYL PROPYL KETONE		17
2-METHYLPYRIDINE		17
3-METHYLPYRIDINE		17
4-METHYLPYRIDINE		17
alpha-Methylpyridine	**2-METHYLPYRIDINE**	17
1-Methylpyrrolidin-2-one	**N-METHYL-2-PYRROLIDONE**	17
1-Methyl-2-pyrrolidinone	**N-METHYL-2-PYRROLIDONE**	17
N-Methylpyrrolidinone	**N-METHYL-2-PYRROLIDONE**	17
1-Methyl-2-pyrrolidone	**N-METHYL-2-PYRROLIDONE**	17
N-METHYL-2-PYRROLIDONE		17
METHYL SALICYLATE		17
Methyl soyate	**SOYBEAN OIL FATTY ACID METHYL ESTER**	17
Methylstyrene (all isomers)	**VINYLTOLUENE**	17
ALPHA-METHYLSTYRENE		17

Index Name	Product Name	Chapter
3-(METHYLTHIO)PROPIONALDEHYDE		17
2-Methyltrimethylene glycol	**2-METHYL-1,3-PROPANEDIOL**	17
Metolachlor	**N-(2-METHOXY-1-METHYL ETHYL)-2-ETHYL-6-METHYL CHLOROACETANILIDE**	17
MICROSILICA SLURRY		18
Middle oil	**CARBOLIC OIL**	17
Milk acid	**LACTIC ACID**	17
Milk of magnesia	**MAGNESIUM HYDROXIDE SLURRY**	18
Mineral wax	**HYDROCARBON WAX**	17
Mixed aliphatic oxygenated hydrocarbons, primary aliphatic alcohols and aliphatic ethers: mol wt: >200 (a)	**OXYGENATED ALIPHATIC HYDROCARBON MIXTURE**	17
MOLASSES		18
MOLYBDENUM POLYSULPHIDE LONG CHAIN ALKYL DITHIOCARBAMIDE COMPLEX		17
Monochlorobenzene	**CHLOROBENZENE**	17
Monochlorobenzol	**CHLOROBENZENE**	17
Monoethanolamine	**ETHANOLAMINE**	17
Monoethylamine	**ETHYLAMINE (*)**	17
Monoethylamine solutions, 72% or less	**ETHYLAMINE SOLUTIONS (72% OR LESS)**	17
Monoisopropanolamine	**ISOPROPANOLAMINE**	17
Monoisopropylamine	**ISOPROPYLAMINE**	17
Monomethylamine solutions, 42% or less	**METHYLAMINE SOLUTIONS (42% OR LESS)**	17
Monopropylamine	**N-PROPYLAMINE**	17
Monopropylene glycol	**PROPYLENE GLYCOL**	18
MORPHOLINE		17
MOTOR FUEL ANTI-KNOCK COMPOUND (CONTAINING LEAD ALKYLS)		17
Muriatic acid	**HYDROCHLORIC ACID (*)**	17
MYRCENE		17
Naphtha, coal tar	**COAL TAR NAPHTHA SOLVENT**	17
NAPHTHALENE (MOLTEN)		17
NAPHTHALENE CRUDE (MOLTEN)		17
NAPHTHALENESULPHONIC ACID-FORMALDEHYDE COPOLYMER, SODIUM SALT SOLUTION		17
Naphtha (petroleum), Light Steam-cracked Aromatics (a)	**ALKYLBENZENE MIXTURES (CONTAINING AT LEAST 50% OF TOLUENE)**	17
Naphtha safety solvent	**WHITE SPIRIT, LOW (15-20%) AROMATIC**	17
NEODECANOIC ACID		17
Neodecanoic acid, 2,3-epoxypropyl ester	**GLYCIDYL ESTER OF C10 TRIALKYLACETIC ACID**	17
Neodecanoic acid, glycidyl ester	**GLYCIDYL ESTER OF C10 TRIALKYLACETIC ACID**	17
Neodecanoic acid vinyl ester	**VINYL NEODECANOATE**	17
Neopentane (a)	**PENTANE (ALL ISOMERS)**	17
Neopentanoic acid	**TRIMETHYLACETIC ACID**	17
Neopentylene glycol	**2,2-DIMETHYLPROPANE-1,3-DIOL (MOLTEN OR SOLUTION)**	17
NITRATING ACID (MIXTURE OF SULPHURIC AND NITRIC ACIDS)		17
NITRIC ACID (70% AND OVER)		17

Index Name	Product Name	Chapter
NITRIC ACID (LESS THAN 70%)		17
Nitric acid, fuming (a)	**NITRIC ACID (70% AND OVER)**	17
Nitric acid, red fuming	**NITRIC ACID (70% AND OVER)**	17
NITRILOTRIACETIC ACID, TRISODIUM SALT SOLUTION		17
2,2',2''-Nitrilotriethanol	**TRIETHANOLAMINE**	17
Nitrilo-2,2',2''-triethanol	**TRIETHANOLAMINE**	17
1,1',1''-Nitrilotripropan-2-ol	**TRIISOPROPANOLAMINE**	17
1,1',1''-Nitrilotri-2-propanol	**TRIISOPROPANOLAMINE**	17
NITROBENZENE		17
Nitrobenzol	**NITROBENZENE**	17
o-Nitrochlorobenzene	**O-CHLORONITROBENZENE**	17
NITROETHANE		17
NITROETHANE(80%)/ NITROPROPANE(20%)		17
NITROETHANE, 1-NITROPROPANE (EACH 15% OR MORE) MIXTURE		17
ortho-Nitrophenol (molten)	**O-NITROPHENOL (MOLTEN)**	17
2-Nitrophenol (molten)	**O-NITROPHENOL (MOLTEN)**	17
O-NITROPHENOL (MOLTEN)		17
1- OR 2-NITROPROPANE		17
NITROPROPANE (60%)/NITROETHANE (40%) MIXTURE		17
2-Nitrotoluene (a)	**O- OR P-NITROTOLUENES**	17
4-Nitrotoluene (a)	**O- OR P-NITROTOLUENES**	17
o-Nitrotoluene (a)	**O- OR P-NITROTOLUENES**	17
p-Nitrotoluene (a)	**O- OR P-NITROTOLUENES**	17
O- OR P-NITROTOLUENES		17
NONANE (ALL ISOMERS)		17
1-Nonanecarboxylic acid	**DECANOIC ACID**	17
n-Nonane (a)	**NONANE (ALL ISOMERS)**	17
NONANOIC ACID (ALL ISOMERS)		17
Nonanols	**NONYL ALCOHOL (ALL ISOMERS)**	17
NON-EDIBLE INDUSTRIAL GRADE PALM OIL		17
NONENE (ALL ISOMERS)		17
NONYL ALCOHOL (ALL ISOMERS)		17
Nonylcarbinol	**DECYL ALCOHOL (ALL ISOMERS)**	17
Nonylene (a)	**NONENE (ALL ISOMERS)**	17
Nonyl hydride (a)	**NONANE (ALL ISOMERS)**	17
NONYL METHACRYLATE MONOMER		17
NONYLPHENOL		17
NONYLPHENOL POLY(4+)ETHOXYLATE		17
alpha-4-Nonylphenyl-omega-hydroxypoly(oxyethylene) (b)	**ALKARYL POLYETHERS (C9-C20)**	17
Nopinen	**BETA-PINENE**	17
Nopinene	**BETA-PINENE**	17
NOXIOUS LIQUID, NF, (1) N.O.S. (TRADE NAME ...., CONTAINS ....) ST1, CAT. X		17
NOXIOUS LIQUID, F, (2) N.O.S. (TRADE NAME ...., CONTAINS ....) ST1, CAT. X		17

Index Name	Product Name	Chapter
NOXIOUS LIQUID, NF, (3) N.O.S. (TRADE NAME ...., CONTAINS ....) ST2, CAT. X		17
NOXIOUS LIQUID, F, (4) N.O.S. (TRADE NAME ...., CONTAINS ....) ST2, CAT. X		17
NOXIOUS LIQUID, NF, (5) N.O.S. (TRADE NAME ...., CONTAINS ....) ST2, CAT. Y		17
NOXIOUS LIQUID, F, (6) N.O.S. (TRADE NAME ...., CONTAINS ....) ST2, CAT. Y		17
NOXIOUS LIQUID, NF, (7) N.O.S. (TRADE NAME ...., CONTAINS ....) ST3, CAT. Y		17
NOXIOUS LIQUID, F, (8) N.O.S. (TRADE NAME ...., CONTAINS ....) ST3, CAT. Y		17
NOXIOUS LIQUID, NF, (9) N.O.S. (TRADE NAME ...., CONTAINS ....) ST3, CAT. Z		17
NOXIOUS LIQUID, F, (10) N.O.S. (TRADE NAME ...., CONTAINS ....) ST3, CAT. Z		17
NOXIOUS LIQUID, (11) N.O.S. (TRADE NAME ...., CONTAINS ....) CAT. Z		18
NON NOXIOUS LIQUID, (12) N.O.S. (TRADE NAME ...., CONTAINS ....) CAT. OS		18
Octadecan-1-o1	**ALCOHOLS (C14-C18), PRIMARY, LINEAR AND ESSENTIALLY LINEAR**	17
1-Octadecanol	**ALCOHOLS (C14-C18), PRIMARY, LINEAR AND ESSENTIALLY LINEAR**	17
OCTAMETHYLCYCLOTETRASILOXANE		17
Octanal (a)	**OCTYL ALDEHYDES**	17
OCTANE (ALL ISOMERS)		17
1-Octanethiol	**N-OCTYL MERCAPTAN**	17
OCTANOIC ACID (ALL ISOMERS)		17
OCTANOL (ALL ISOMERS)		17
Octan-1-ol (a)	**OCTANOL (ALL ISOMERS)**	17
OCTENE (ALL ISOMERS)		17
Octic acid (a)	**OCTANOIC ACID (ALL ISOMERS)**	17
Octoic acid (a)	**OCTANOIC ACID (ALL ISOMERS)**	17
Octyl acetate	**N-OCTYL ACETATE**	17
N-OCTYL ACETATE		17
Octyl acrylate	**2-ETHYLHEXYL ACRYLATE**	17
Octyl adipate	**DI-(2-ETHYLHEXYL) ADIPATE**	17
Octyl alcohol (a)	**OCTANOL (ALL ISOMERS)**	17
OCTYL ALDEHYDES		17
Octylcarbinol	**NONYL ALCOHOL (ALL ISOMERS)**	17
OCTYL DECYL ADIPATE		17
Octyl decyl phthalate (a)	**DIALKYL (C7-C13) PHTHALATES**	17
Octylic acid (a)	**OCTANOIC ACID (ALL ISOMERS)**	17
N-OCTYL MERCAPTAN		17
Octyl nitrate	**ALKYL (C7-C9) NITRATES**	17
Octyl nitrates (all isomers)	**ALKYL (C7-C9) NITRATES**	17
Octyl phthalate (a)	**DIALKYL (C7-C13) PHTHALATES**	17
Oenanthic acid	**N-HEPTANOIC ACID**	17
Oenanthylic acid	**N-HEPTANOIC ACID**	17
OFFSHORE CONTAMINATED BULK LIQUID P*		17

Index Name	Product Name	Chapter
OFFSHORE CONTAMINATED BULK LIQUID S*		17
Oil of Mirbane	**NITROBENZENE**	17
Oil of Myrbane	**NITROBENZENE**	17
Oil of turpentine	**TURPENTINE**	17
Oil of vitriol	**SULPHURIC ACID**	17
Oil of wintergreen	**METHYL SALICYLATE**	17
Oleamine	**OLEYLAMINE**	17
OLEFIN-ALKYL ESTER COPOLYMER (MOLECULAR WEIGHT 2000+)		17
OLEFIN MIXTURE (C7-C9) C8 RICH, STABILIZED		17
OLEFIN MIXTURES (C5-C7)		17
OLEFIN MIXTURES (C5-C15)		17
OLEFINS (C13+, ALL ISOMERS)		17
ALPHA-OLEFINS (C6-C18) MIXTURES		17
OLEIC ACID		17
OLEUM		17
OLEYLAMINE		17
OLIVE OIL		17
ORANGE JUICE (CONCENTRATED)		18
ORANGE JUICE (NOT CONCENTRATED)		18
Orthophosphoric acid	**PHOSPHORIC ACID**	17
Oxal	**GLYOXAL SOLUTION (40% OR LESS)**	17
Oxalaldehyde	**GLYOXAL SOLUTION (40% OR LESS)**	17
3-Oxapentane-1,5-diol	**DIETHYLENE GLYCOL**	17
1,4-Oxazinane	**MORPHOLINE**	17
2-Oxetanone	**BETA-PROPIOLACTONE**	17
Oxoacetic acid	**GLYOXYLIC ACID SOLUTION (50 % OR LESS)**	17
Oxoethanoic acid	**GLYOXYLIC ACID SOLUTION (50 % OR LESS)**	17
2,2'-Oxybis(1-chloropropane)	**2,2'-DICHLOROISOPROPYL ETHER**	17
2,2'-Oxybis(ethyleneoxy)diethanol	**TETRAETHYLENE GLYCOL**	17
2,2'-Oxybispropane	**ISOPROPYL ETHER**	17
2,2'-Oxydiethanol	**DIETHYLENE GLYCOL**	17
1,1'-Oxydipropan-2-ol	**DIPROPYLENE GLYCOL**	17
OXYGENATED ALIPHATIC HYDROCARBON MIXTURE		17
Oxymethylene	**FORMALDEHYDE SOLUTIONS (45% OR LESS)**	17
PALM ACID OIL		17
PALM FATTY ACID DISTILLATE		17
PALM KERNEL ACID OIL		17
PALM KERNEL FATTY ACID DISTILLATE		17
PALM KERNEL OIL		17
PALM KERNEL OLEIN		17
PALM KERNEL STEARIN		17

Index Name	Product Name	Chapter
PALM MID-FRACTION		17
PALM OIL		17
PALM OIL FATTY ACID METHYL ESTER		17
PALM OLEIN		17
PALM STEARIN		17
Paraffin	**HYDROCARBON WAX**	17
C9-C11 n-Paraffin	**N-ALKANES (C9-C11)**	17
Paraffin, food grade	**PARAFFIN WAX, HIGHLY-REFINED**	17
n-Paraffin (C9-C11)	**N-ALKANES (C9-C11)**	17
n-Paraffins (C10-C20) (a)	**N-ALKANES (C10-C20)**	17
Paraffin wax	**HYDROCARBON WAX**	17
Paraffin wax, cosmetic	**PARAFFIN WAX, HIGHLY-REFINED**	17
Paraffin wax feedstock	**PARAFFIN WAX, SEMI-REFINED**	17
PARAFFIN WAX, HIGHLY-REFINED		17
PARAFFIN WAX, SEMI-REFINED		17
Paraffin wax, technical	**PARAFFIN WAX, SEMI-REFINED**	17
PARALDEHYDE		17
PARALDEHYDE-AMMONIA REACTION PRODUCT		17
Petrolatum	**HYDROCARBON WAX**	17
Pelargonic acid	**NONANOIC ACID (ALL ISOMERS)**	17
Pelargonic alcohol	**NONYL ALCOHOL (ALL ISOMERS)**	17
PENTACHLOROETHANE		17
Pentadecanol (a)	**ALCOHOLS (C13+)**	17
1-Pentadecene	**OLEFINS (C13+, ALL ISOMERS)**	17
Pentadec-1-ene (a)	**OLEFINS (C13+, ALL ISOMERS)**	17
1,3-PENTADIENE		17
Penta-1,3-diene	**1,3-PENTADIENE**	17
1,3-PENTADIENE (GREATER THAN 50%), CYCLOPENTENE AND ISOMERS, MIXTURES		17
Pentaethylene glycol (a)	**POLYETHYLENE GLYCOL**	17
PENTAETHYLENEHEXAMINE		17
Pentalin	**PENTACHLOROETHANE**	17
Pentamethylene	**CYCLOPENTANE**	17
Pentanal	**VALERALDEHYDE (ALL ISOMERS)**	17
Pentane (a)	**PENTANE (ALL ISOMERS)**	17
PENTANE (ALL ISOMERS)		17
Pentanedial solutions, 50% or less	**GLUTARALDEHYDE SOLUTIONS (50% OR LESS)**	17
n-Pentane (a)	**PENTANE (ALL ISOMERS)**	17
PENTANOIC ACID		17
N-PENTANOIC ACID (64%)/2-METHYL BUTYRIC ACID (36%) MIXTURE		17
tert-Pentanoic acid	**TRIMETHYLACETIC ACID**	17
1-Pentanol	**N-AMYL ALCOHOL**	17
Pentan-1-ol	**N-AMYL ALCOHOL**	17
2-Pentanol	**SEC-AMYL ALCOHOL**	17

Index Name	Product Name	Chapter
Pentan-2-ol	**SEC-AMYL ALCOHOL**	17
3-Pentanol	**SEC-AMYL ALCOHOL**	17
Pentan-3-ol	**SEC-AMYL ALCOHOL**	17
1-Pentanol acetate (a)	**AMYL ACETATE (ALL ISOMERS)**	17
n-Pentanol	**N-AMYL ALCOHOL**	17
sec-Pentanol	**SEC-AMYL ALCOHOL**	17
tert-Pentanol	**TERT-AMYL ALCOHOL**	17
2-Pentanone	**METHYL PROPYL KETONE**	17
Pentan-2-one	**METHYL PROPYL KETONE**	17
Pentasodium diethylenetriaminepentaacetate solution	**DIETHYLENETRIAMINEPENTAACETIC ACID, PENTASODIUM SALT SOLUTION**	17
PENTENE (ALL ISOMERS)		17
Pent-1-ene (a)	**PENTENE (ALL ISOMERS)**	17
n-Pentene (a)	**PENTENE (ALL ISOMERS)**	17
Pentenes	**PENTENE (ALL ISOMERS)**	17
Pentyl acetate (a)	**AMYL ACETATE (ALL ISOMERS)**	17
sec-Pentyl acetate (a)	**AMYL ACETATE (ALL ISOMERS)**	17
Pentyl alcohol	**N-AMYL ALCOHOL**	17
sec-Pentyl alcohol	**SEC-AMYL ALCOHOL**	17
tert-Pentyl alcohol	**TERT-AMYL ALCOHOL**	17
Pentyl propanoate	**N-PENTYL PROPIONATE**	17
N-PENTYL PROPIONATE		17
PERCHLOROETHYLENE		17
Perchloromethane	**CARBON TETRACHLORIDE**	17
Perhydroazepine	**HEXAMETHYLENEIMINE**	17
Petrolatum, highly-refined	**PARAFFIN WAX, HIGHLY-REFINED**	17
Petrolatum, industrial grade	**PARAFFIN WAX, SEMI-REFINED**	17
Petrolatum, USP-grade	**PARAFFIN WAX, HIGHLY-REFINED**	17
Petroleum jelly, technical	**PARAFFIN WAX, SEMI-REFINED**	17
Phene	**BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)**	17
Phenic acid	**PHENOL**	17
PHENOL		17
2-Phenoxyethanol	**ETHYLENE GLYCOL PHENYL ETHER**	17
Phenyl alkane(C10-C21)sulphonate (a)	**ALKYL SULPHONIC ACID ESTER OF PHENOL**	17
Phenylamine	**ANILINE**	17
N-Phenylaniline	**DIPHENYLAMINE (MOLTEN)**	17
N-Phenylbenzenamine	**DIPHENYLAMINE (MOLTEN)**	17
1-Phenylbutane (a)	**BUTYLBENZENE (ALL ISOMERS)**	17
2-Phenylbutane (a)	**BUTYLBENZENE (ALL ISOMERS)**	17
Phenyl carbinol	**BENZYL ALCOHOL**	17
Phenyl 'cellosolve'	**ETHYLENE GLYCOL PHENYL ETHER**	17
Phenyl chloride	**CHLOROBENZENE**	17
1-Phenyldecane (b)	**ALKYL(C9+)BENZENES**	17
1-Phenyldodecane	**ALKYL(C9+)BENZENES**	17
Phenylethane	**ETHYLBENZENE**	17
Phenyl ether	**DIPHENYL ETHER**	17

Index Name	Product Name	Chapter
Phenylethylene	**STYRENE MONOMER**	17
1-(Phenylethyl)xylene	**1-PHENYL-1-XYLYL ETHANE**	17
Phenyl hydride	**BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)**	17
Phenyl hydroxide	**PHENOL**	17
Phenylic acid	**PHENOL**	17
Phenylmethane	**TOLUENE**	17
Phenylmethanol	**BENZYL ALCOHOL**	17
Phenylmethyl acetate	**BENZYL ACETATE**	17
1-Phenylpropane (a)	**PROPYLBENZENE (ALL ISOMERS)**	17
2-Phenylpropane (a)	**PROPYLBENZENE (ALL ISOMERS)**	17
2-Phenylpropene	**ALPHA-METHYLSTYRENE**	17
1-Phenyltetradecane	**ALKYL(C9+)BENZENES**	17
1-Phenyltridecane	**ALKYL(C9+)BENZENES**	17
1-Phenylundecane	**ALKYL(C9+)BENZENES**	17
Phenylxylylethane	**1-PHENYL-1-XYLYL ETHANE**	17
1-PHENYL-1-XYLYL ETHANE		17
1-Phenyl-1-(2,5-xylyl)ethane (a)	**1-PHENYL-1-XYLYL ETHANE**	17
1-Phenyl-1-(3,4-xylyl)ethane (a)	**1-PHENYL-1-XYLYL ETHANE**	17
PHOSPHATE ESTERS, ALKYL (C12-C14) AMINE		17
L-alpha-Phosphatidyl choline	**LECITHIN**	18
N-(phosphonomethyl)glycine	**GLYPHOSATE SOLUTION (NOT CONTAINING SURFACTANT)**	17
PHOSPHORIC ACID		17
PHOSPHORUS, YELLOW OR WHITE (*)		17
Phthalandione (molten)	**PHTHALIC ANHYDRIDE (MOLTEN)**	17
Phthalic acid anhydride (molten)	**PHTHALIC ANHYDRIDE (MOLTEN)**	17
Phthalic acid, diundecyl ester	**DIUNDECYL PHTHALATE**	17
PHTHALIC ANHYDRIDE (MOLTEN)		17
2-Picoline	**2-METHYLPYRIDINE**	17
3-Picoline	**3-METHYLPYRIDINE**	17
4-Picoline	**4-METHYLPYRIDINE**	17
alpha-Picoline	**2-METHYLPYRIDINE**	17
beta-Picoline	**3-METHYLPYRIDINE**	17
gamma-Picoline	**4-METHYLPYRIDINE**	17
Pimelic ketone	**CYCLOHEXANONE**	17
2-Pinene	**ALPHA-PINENE**	17
2(10)-Pinene	**BETA-PINENE**	17
ALPHA-PINENE		17
BETA-PINENE		17
PINE OIL		17
PIPERAZINE, 68% SOLUTION		17
2-Piperazin-1-ylethylamine	**N-AMINOETHYLPIPERAZINE**	17
Piperylene	**1,3-PENTADIENE**	17
Piperylene concentrates (Mixed)	**1,3-PENTADIENE (GREATER THAN 50%), CYCLOPENTENE AND ISOMERS, MIXTURES**	17
Pivalic acid	**TRIMETHYLACETIC ACID**	17

Index Name	Product Name	Chapter
Poly(oxyethylene)	**POLYETHER (MOLECULAR WEIGHT 1350+)**	17
Poly(oxyethyleneoxyethyleneoxyphthaloyl)	**DIETHYLENE GLYCOL PHTHALATE**	17
Poly(sodium carboxylatoethylene)	**SODIUM POLY(4+)ACRYLATE SOLUTIONS**	17
POLYACRYLIC ACID SOLUTION (40% OR LESS)		17
POLYALKYL (C18-C22) ACRYLATE IN XYLENE		17
POLYALKYLALKENAMINESUCCINIMIDE, MOLYBDENUM OXYSULPHIDE		17
POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER		17
POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE		17
Poly (2-8) alkylene (C2-C3) glycols / Polyalkylene (C2-C10) glycol monoalkyl (C1-C4) ethers and their borate esters (a)	**BRAKE FLUID BASE MIX: POLY(2-8)ALKYLENE (C2-C3) GLYCOLS/POLYALKYLENE (C2-C10) GLYCOLS MONOALKYL (C1-C4) ETHERS AND THEIR BORATE ESTERS**	17
POLYALKYL (C10-C20) METHACRYLATE		17
POLYALKYL (C10-C18) METHACRYLATE/ETHYLENE-PROPYLENE COPOLYMER MIXTURE		17
POLYALUMINIUM CHLORIDE SOLUTION		17
POLYBUTENE		17
POLYBUTENYL SUCCINIMIDE		17
POLY(2+)CYCLIC AROMATICS		17
POLYETHER (MOLECULAR WEIGHT 1350+)		17
POLYETHYLENE GLYCOL		17
Poly(4-12)ethylene glycol alkyl(C7-C11)phenyl ether	**NONYLPHENOL POLY(4+)ETHOXYLATE**	17
POLYETHYLENE GLYCOL DIMETHYL ETHER		17
POLY(ETHYLENE GLYCOL) METHYLBUTENYL ETHER (MW>1000)		17
Polyethylene glycols, mono(p-nonylphenyl) ether (b)	**ALKARYL POLYETHERS (C9-C20)**	17
Poly(ethylene oxide) (molecular weight 1350+) (a)	**POLYETHER (MOLECULAR WEIGHT 1350+)**	17
POLYETHYLENE POLYAMINES		17
POLYETHYLENE POLYAMINES (MORE THAN 50% C5 -C20 PARAFFIN OIL)		17
POLYFERRIC SULPHATE SOLUTION		17
Polyglucitol	**HYDROGENATED STARCH HYDROLYSATE**	18
POLYGLYCERIN, SODIUM SALT SOLUTION (CONTAINING LESS THAN 3% SODIUM HYDROXIDE)		17
Polyglycitol syrup	**HYDROGENATED STARCH HYDROLYSATE**	18
POLY(IMINOETHYLENE)-GRAFT-N-POLY(ETHYLENEOXY) SOLUTION (90% OR LESS)		17
POLYISOBUTENAMINE IN ALIPHATIC (C10-C14) SOLVENT		17
(POLYISOBUTENE) AMINO PRODUCTS IN ALIPHATIC HYDROCARBONS		17
POLYISOBUTENYL ANHYDRIDE ADDUCT		17
POLY(4+)ISOBUTYLENE (MW>224)		17
POLYISOBUTYLENE (MW≤224)		17
POLYMETHYLENE POLYPHENYL ISOCYANATE		17
POLYOLEFIN (MOLECULAR WEIGHT 300+)		17
POLYOLEFIN AMIDE ALKENEAMINE (C17+)		17

Index Name	Product Name	Chapter
POLYOLEFIN AMIDE ALKENEAMINE BORATE (C28-C250)		17
POLYOLEFIN AMIDE ALKENEAMINE POLYOL		17
POLYOLEFINAMINE (C28-C250)		17
POLYOLEFINAMINE IN ALKYL (C2-C4) BENZENES		17
POLYOLEFINAMINE IN AROMATIC SOLVENT		17
POLYOLEFIN AMINOESTER SALTS (MOLECULAR WEIGHT 2000+)		17
POLYOLEFIN ANHYDRIDE		17
POLYOLEFIN ESTER (C28-C250)		17
POLYOLEFIN PHENOLIC AMINE (C28-C250)		17
POLYOLEFIN PHOSPHOROSULPHIDE, BARIUM DERIVATIVE (C28-C250)		17
Poly(oxyalkylene)alkenyl ether (MW>1000)	**POLY(ETHYLENE GLYCOL) METHYLBUTENYL ETHER (MW>1000)**	17
Poly(oxy-1,2-ethanediyl), alpha-(3-methyl-3-butenyl)-, omega-hydroxy-	**POLY(ETHYLENE GLYCOL) METHYLBUTENYL ETHER (MW>1000)**	17
POLY(20)OXYETHYLENE SORBITAN MONOOLEATE		17
Poly(oxypropylene) (molecular weight 1350+) (a)	**POLYETHER (MOLECULAR WEIGHT 1350+)**	17
poly[(phenyl isocyanate)-alt-formaldehyde] (a)	**POLYMETHYLENE POLYPHENYL ISOCYANATE**	17
Poly[(phenyl isocyanate)-co-formaldehyde] (a)	**POLYMETHYLENE POLYPHENYL ISOCYANATE**	17
Poly[propene oxide]	**POLYETHER (MOLECULAR WEIGHT 1350+)**	17
Polypropylene	**POLY(5+)PROPYLENE**	17
POLY(5+)PROPYLENE		17
POLYPROPYLENE GLYCOL		17
POLYSILOXANE		17
Potash lye solution	**POTASSIUM HYDROXIDE SOLUTION (*)**	17
Potassium chloride brine (<26%)	**POTASSIUM CHLORIDE SOLUTION (LESS THAN 26%)**	18
Potassium chloride drilling brine	**POTASSIUM CHLORIDE SOLUTION**	17
POTASSIUM CHLORIDE SOLUTION		17
POTASSIUM CHLORIDE SOLUTION (LESS THAN 26%)		18
POTASSIUM FORMATE SOLUTIONS (*)		17
POTASSIUM HYDROXIDE SOLUTION (*)		17
POTASSIUM OLEATE		17
POTASSIUM THIOSULPHATE (50% OR LESS)		17
Propanal	**PROPIONALDEHYDE**	17
Propan-1-amine	**N-PROPYLAMINE**	17
2-Propanamine	**ISOPROPYLAMINE**	17
1,2-Propanediol	**PROPYLENE GLYCOL**	18
Propane-1,2-diol	**PROPYLENE GLYCOL**	18
1,2-Propanediol cyclic carbonate	**PROPYLENE CARBONATE**	17
Propanenitrile	**PROPIONITRILE**	17
1,2,3-Propanetriol	**GLYCERINE**	17
Propane-1,2,3-triol	**GLYCERINE**	17
1,2,3-Propanetriol triacetate	**GLYCERYL TRIACETATE**	17

Index Name	Product Name	Chapter
Propanoic acid	**PROPIONIC ACID**	17
Propanoic anhydride	**PROPIONIC ANHYDRIDE**	17
Propanol	**N-PROPYL ALCOHOL**	17
1-Propanol	**N-PROPYL ALCOHOL**	17
Propan-1-ol	**N-PROPYL ALCOHOL**	17
2-Propanol	**ISOPROPYL ALCOHOL**	18
Propan-2-ol	**ISOPROPYL ALCOHOL**	18
N-PROPANOLAMINE		17
3-Propanolide	**BETA-PROPIOLACTONE**	17
n-Propanol	**N-PROPYL ALCOHOL**	17
Propanone	**ACETONE**	18
2-Propanone	**ACETONE**	18
Propan-2-one	**ACETONE**	18
Propenamide solution, 50% or less	**ACRYLAMIDE SOLUTION (50% OR LESS)**	17
2-PROPENE-1-AMINIUM, N,N-DIMETHYL-N-2-PROPENYL-, CHLORIDE, HOMOPOLYMER SOLUTION		17
Propenenitrile	**ACRYLONITRILE**	17
Propene oxide	**PROPYLENE OXIDE**	17
Propenoic acid	**ACRYLIC ACID**	17
2-Propenoic acid, homopolymer solution (40% or less)	**POLYACRYLIC ACID SOLUTION (40% OR LESS)**	17
1-Propenol-3	**ALLYL ALCOHOL**	17
2-Propen-1-ol	**ALLYL ALCOHOL**	17
Prop-2-en-1-ol	**ALLYL ALCOHOL**	17
Propenyl alcohol	**ALLYL ALCOHOL**	17
Propiolactone	**BETA-PROPIOLACTONE**	17
BETA-PROPIOLACTONE		17
PROPIONALDEHYDE		17
PROPIONIC ACID		17
Propionic aldehyde	**PROPIONALDEHYDE**	17
PROPIONIC ANHYDRIDE		17
PROPIONITRILE		17
beta-Propionolactone	**BETA-PROPIOLACTONE**	17
Propiononitrile	**PROPIONITRILE**	17
Propionyl oxide	**PROPIONIC ANHYDRIDE**	17
1-Propoxypropan-2-ol (a)	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
Propyl acetate	**N-PROPYL ACETATE**	17
N-PROPYL ACETATE		17
Propyl acetone	**METHYL BUTYL KETONE**	17
Propyl alcohol	**N-PROPYL ALCOHOL**	17
2-Propyl alcohol	**ISOPROPYL ALCOHOL**	18
N-PROPYL ALCOHOL		17
sec-Propyl alcohol	**ISOPROPYL ALCOHOL**	18
Propyl aldehyde	**PROPIONALDEHYDE**	17
Propylamine	**N-PROPYLAMINE**	17
N-PROPYLAMINE		17

Index Name	Product Name	Chapter
PROPYLBENZENE (ALL ISOMERS)		17
n-Propylbenzene (a)	**PROPYLBENZENE (ALL ISOMERS)**	17
Propylcarbinol	**N-BUTYL ALCOHOL**	18
Propylene aldehyde	**CROTONALDEHYDE**	17
2,2'-[Propylenebis(nitrilomethylene)]diphenol in aromatic solvent	**ALKYL (C8-C9) PHENYLAMINE IN AROMATIC SOLVENTS**	17
PROPYLENE CARBONATE		17
Propylene chloride	**1,2-DICHLOROPROPANE**	17
Propylene dichloride	**1,2-DICHLOROPROPANE**	17
alpha,alpha'- (Propylenedinitrilo)di-o-cresol in aromatic solvent	**ALKYL (C8-C9) PHENYLAMINE IN AROMATIC SOLVENTS**	17
Propylene epoxide	**PROPYLENE OXIDE**	17
PROPYLENE GLYCOL		18
1,2-Propylene glycol	**PROPYLENE GLYCOL**	18
Propylene glycol n-butyl ether (a)	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
Propylene glycol ethyl ether (a)	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
Propylene glycol methyl ether (a)	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
PROPYLENE GLYCOL METHYL ETHER ACETATE		17
PROPYLENE GLYCOL MONOALKYL ETHER		17
Propylene glycol monobutyl ether (a)	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
Propylene glycol beta-monoethyl ether	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
Propylene glycol monomethyl ether (a)	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
PROPYLENE GLYCOL PHENYL ETHER		17
Propylene glycol propyl ether (a)	**PROPYLENE GLYCOL MONOALKYL ETHER**	17
Propylene glycol trimer	**TRIPROPYLENE GLYCOL**	17
1,2-Propylene glycol trimer	**TRIPROPYLENE GLYCOL**	17
PROPYLENE OXIDE		17
PROPYLENE TETRAMER		17
PROPYLENE TRIMER		17
Propylethylene (a)	**PENTENE (ALL ISOMERS)**	17
Propyl methyl ketone	**METHYL PROPYL KETONE**	17
N-Propyl-1-propanamine	**DI-N-PROPYLAMINE**	17
Pseudobutylene glycol	**BUTYLENE GLYCOL**	17
Pseudocumene	**TRIMETHYLBENZENE (ALL ISOMERS)**	17
Pseudopinen	**BETA-PINENE**	17
Psuedopinene	**BETA-PINENE**	17
Pygas	**PYROLYSIS GASOLINE (CONTAINING BENZENE)**	17
PYRIDINE		17
Pyroacetic acid	**ACETONE**	18
Pyroacetic ether	**ACETONE**	18
PYROLYSIS GASOLINE (CONTAINING BENZENE)		17
Pyrolysis gasoline (steam-cracked naphtha)	**BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)**	17
Pyrolysis gasoline, containing 10% or more benzene	**BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)**	17
Pyromucic aldehyde	**FURFURAL**	17

Index Name	Product Name	Chapter
RAPESEED OIL		17
RAPESEED OIL (LOW ERUCIC ACID CONTAINING LESS THAN 4% FREE FATTY ACIDS)		17
RAPE SEED OIL FATTY ACID METHYL ESTERS		17
Refined, bleached, deodorized grape seed oil (RBD)	**GRAPE SEED OIL**	17
RESIN OIL, DISTILLED		17
RICE BRAN OIL		17
ROSIN		17
SAFFLOWER OIL		17
Saturated fatty acid (C13 and above) (a)	**FATTY ACID (SATURATED C13+)**	17
SHEA BUTTER		17
Silicofluoric acid solution (20-30%)	**FLUOROSILICIC ACID SOLUTION (20-30%)**	17
Slack wax	**HYDROCARBON WAX**	17
Sludge acid	**SULPHURIC ACID, SPENT**	17
SME	**SOYBEAN OIL FATTY ACID METHYL ESTER**	17
Soda ash solution	**SODIUM CARBONATE SOLUTION (*)**	17
Soda lye solution	**SODIUM HYDROXIDE SOLUTION (*)**	17
SODIUM ACETATE SOLUTIONS		18
Sodium acid sulphite solution (45% or less)	**SODIUM HYDROGEN SULPHITE SOLUTION (45% OR LESS)**	17
Sodium alkylbenzene sulphonate solution	**ALKYLBENZENE SULPHONIC ACID, SODIUM SALT SOLUTION**	17
SODIUM ALKYL (C14-C17) SULPHONATES (60-65% SOLUTION)		17
SODIUM ALUMINOSILICATE SLURRY		17
Sodium aminoacetate solution	**GLYCINE, SODIUM SALT SOLUTION**	17
SODIUM BENZOATE		17
Sodium 1,3-benzothiazole-2-thiolate solution	**MERCAPTOBENZOTHIAZOL, SODIUM SALT SOLUTION**	17
Sodium 1,3-benzothiazol-2-yl sulphide solution	**MERCAPTOBENZOTHIAZOL, SODIUM SALT SOLUTION**	17
SODIUM BICARBONATE SOLUTION (LESS THAN 10%)		18
Sodium bichromate solution (70% or less)	**SODIUM DICHROMATE SOLUTION (70% OR LESS)**	17
Sodium bisulphide solution (45% or less)	**SODIUM HYDROSULPHIDE SOLUTION (45% OR LESS) (*)**	17
SODIUM BOROHYDRIDE (15% OR LESS)/SODIUM HYDROXIDE SOLUTION (*)		17
SODIUM BROMIDE SOLUTION (LESS THAN 50%) (*)		17
SODIUM CARBONATE SOLUTION (*)		17
Sodium carboxylate solution	**CYCLOHEXANE OXIDATION PRODUCTS, SODIUM SALTS SOLUTION**	17
SODIUM CHLORATE SOLUTION (50% OR LESS) (*)		17
Sodium cresylate solution	**CRESYLIC ACID, SODIUM SALT SOLUTION**	17
SODIUM DICHROMATE SOLUTION (70% OR LESS)		17
Sodium glycinate solution	**GLYCINE, SODIUM SALT SOLUTION**	17
Sodium hydrate solution	**SODIUM HYDROXIDE SOLUTION (*)**	17
SODIUM HYDROGEN SULPHIDE (6% OR LESS)/SODIUM CARBONATE (3% OR LESS) SOLUTION		17

Index Name	Product Name	Chapter
Sodium hydrogensulphide solution (45% or less)	**SODIUM HYDROSULPHIDE SOLUTION (45% OR LESS) (*)**	17
SODIUM HYDROGEN SULPHITE SOLUTION (45% OR LESS)		17
SODIUM HYDROSULPHIDE/AMMONIUM SULPHIDE SOLUTION (*)		17
SODIUM HYDROSULPHIDE SOLUTION (45% OR LESS) (*)		17
SODIUM HYDROXIDE SOLUTION (*)		17
SODIUM HYPOCHLORITE SOLUTION (15% OR LESS)		17
Sodium lignosulphonate	**LIGNINSULPHONIC ACID, SODIUM SALT SOLUTION**	17
Sodium methanolate	**SODIUM METHYLATE 21-30% IN METHYL ALCOHOL**	17
Sodium methoxide	**SODIUM METHYLATE 21-30% IN METHYL ALCOHOL**	17
SODIUM METHYLATE 21-30% IN METHYL ALCOHOL		17
Sodium methylcarbamodithioate	**METAM SODIUM SOLUTION**	17
Sodium N-methyldithiocarbamate	**METAM SODIUM SOLUTION**	17
Sodium methyldithiocarbamate solution	**METAM SODIUM SOLUTION**	17
SODIUM NITRITE SOLUTION		17
SODIUM PETROLEUM SULPHONATE		17
SODIUM POLY(4+)ACRYLATE SOLUTIONS		17
Sodium rhodanate solution (56% or less)	**SODIUM THIOCYANATE SOLUTION (56% OR LESS)**	17
Sodium rhodanide solution (56% or less)	**SODIUM THIOCYANATE SOLUTION (56% OR LESS)**	17
Sodium salt of sulphonated naphthalene - formaldehyde condensate	**NAPHTHALENESULPHONIC ACID-FORMALDEHYDE COPOLYMER, SODIUM SALT SOLUTION**	17
SODIUM SILICATE SOLUTION		17
SODIUM SULPHATE SOLUTIONS		17
SODIUM SULPHIDE SOLUTION (15% OR LESS)		17
SODIUM SULPHITE SOLUTION (25% OR LESS)		17
Sodium sulphocyanate solution (56% or less)	**SODIUM THIOCYANATE SOLUTION (56% OR LESS)**	17
Sodium sulphocyanide solution (56% or less)	**SODIUM THIOCYANATE SOLUTION (56% OR LESS)**	17
Sodium tetrahydroborate (15% or less) / sodium hydroxide solution	**SODIUM BOROHYDRIDE (15% OR LESS)/SODIUM HYDROXIDE SOLUTION (*)**	17
SODIUM THIOCYANATE SOLUTION (56% OR LESS)		17
Sodium tolyl oxides solution	**CRESYLIC ACID, SODIUM SALT SOLUTION**	17
'D-D Soil fumigant'	**DICHLOROPROPENE/DICHLOROPROPANE MIXTURES**	17
d-Sorbite solution	**SORBITOL SOLUTION**	18
SORBITOL SOLUTION		18
d-Sorbitol solution	**SORBITOL SOLUTION**	18
SOYABEAN OIL		17
Soya Methyl Ester (SME)	**SOYBEAN OIL FATTY ACID METHYL ESTER**	17
SOYBEAN OIL FATTY ACID METHYL ESTER		17
Soybean Oil Methyl Ester	**SOYBEAN OIL FATTY ACID METHYL ESTER**	17
Spirit of turpentine	**TURPENTINE**	17

Index Name	Product Name	Chapter
Spirits of wine	**ETHYL ALCOHOL**	18
Stoddard solvent	**WHITE SPIRIT, LOW (15-20%) AROMATIC**	17
STYRENE MONOMER		17
Styrol	**STYRENE MONOMER**	17
Suberane	**CYCLOHEPTANE**	17
Sulfonic acid, alkane(C10-C21) phenyl ester (a)	**ALKYL SULPHONIC ACID ESTER OF PHENOL**	17
SULPHOHYDROCARBON (C3-C88)		17
SULPHOLANE		17
SULPHONATED POLYACRYLATE SOLUTION		18
SULPHUR (MOLTEN) (*)		17
SULPHURIC ACID		17
Sulphuric acid, fuming	**OLEUM**	17
SULPHURIC ACID, SPENT		17
Sulphuric chlorohydrin	**CHLOROSULPHONIC ACID**	17
Sulphuric ether	**DIETHYL ETHER (*)**	17
SULPHURIZED FAT (C14-C20)		17
SULPHURIZED POLYOLEFINAMIDE ALKENE (C28-C250) AMINE		17
SUNFLOWER SEED OIL		17
Sweet-birch oil	**METHYL SALICYLATE**	17
sym-Dichloroethane	**ETHYLENE DICHLORIDE**	17
sym-Dichloroethyl ether	**DICHLOROETHYL ETHER**	17
sym-Diisopropylacetone	**DIISOBUTYL KETONE**	17
sym-Dimethylethylene glycol	**BUTYLENE GLYCOL**	17
sym-Tetrachloroethane	**TETRACHLOROETHANE**	17
sym-Trioxane	**1,3,5-TRIOXANE**	17
TALL OIL, CRUDE		17
TALL OIL, DISTILLED		17
TALL OIL FATTY ACID (RESIN ACIDS LESS THAN 20%)		17
TALL OIL PITCH		17
TALL OIL SOAP, CRUDE		17
TALLOW		17
TALLOW FATTY ACID		17
Tar acids (cresols)	**CRESOLS (ALL ISOMERS)**	17
Tar camphor	**NAPHTHALENE (MOLTEN)**	17
Terephthalic acid, dibutyl ester	**DIBUTYL TEREPHTHALATE**	17
3,6,9,12-Tetraazatetradecamethylenediamine	**PENTAETHYLENEHEXAMINE**	17
3,6,9,12-Tetraazatetradecane-1,14-diamine	**PENTAETHYLENEHEXAMINE**	17
1,3,5,7-Tetraazatricyclo[3.3.1.13,7]decane	**HEXAMETHYLENETETRAMINE SOLUTIONS**	17
TETRACHLOROETHANE		17
1,1,2,2-Tetrachloroethane	**TETRACHLOROETHANE**	17
Tetrachloroethylene	**PERCHLOROETHYLENE**	17
1,1,2,2-tetrachloroethylene	**PERCHLOROETHYLENE**	17
Tetrachloromethane	**CARBON TETRACHLORIDE**	17

Index Name	Product Name	Chapter
Tetradecan-1-o1	**ALCOHOLS (C14-C18), PRIMARY, LINEAR AND ESSENTIALLY LINEAR**	17
1-Tetradecanol	**ALCOHOLS (C14-C18), PRIMARY, LINEAR AND ESSENTIALLY LINEAR**	17
Tetradecene (a)	**OLEFINS (C13+, ALL ISOMERS)**	17
Tetradecylbenzene	**ALKYL(C9+)BENZENES**	17
TETRAETHYLENE GLYCOL		17
TETRAETHYLENE PENTAMINE		17
Tetraethyllead	**MOTOR FUEL ANTI-KNOCK COMPOUND (CONTAINING LEAD ALKYLS)**	17
Tetraethylplumbane	**MOTOR FUEL ANTI-KNOCK COMPOUND (CONTAINING LEAD ALKYLS)**	17
TETRAETHYL SILICATE MONOMER/OLIGOMER (20% IN ETHANOL)		18
3a,4,7,7a-Tetrahydro-3,5-dimethyl-4,7-methano-1H-indene	**METHYLCYCLOPENTADIENE DIMER**	17
TETRAHYDROFURAN		17
TETRAHYDRONAPHTHALENE		17
1,2,3,4-Tetrahydronapthalene	**TETRAHYDRONAPHTHALENE**	17
Tetrahydro-1,4-oxazine	**MORPHOLINE**	17
2H-Tetrahydro-1,4-oxazine	**MORPHOLINE**	17
Tetrahydro-2H-1,4-oxazine	**MORPHOLINE**	17
Tetrahydrothiophene-1-dioxide	**SULPHOLANE**	17
Tetrahydrothiophene 1,1-dioxide	**SULPHOLANE**	17
Tetralin	**TETRAHYDRONAPHTHALENE**	17
TETRAMETHYLBENZENE (ALL ISOMERS)		17
1,2,3,4-Tetramethylbenzene (a)	**TETRAMETHYLBENZENE (ALL ISOMERS)**	17
1,2,3,5-Tetramethylbenzene (a)	**TETRAMETHYLBENZENE (ALL ISOMERS)**	17
1,2,4,5-Tetramethylbenzene (a)	**TETRAMETHYLBENZENE (ALL ISOMERS)**	17
Tetramethylene cyanide	**ADIPONITRILE**	17
Tetramethylene dicyanide	**ADIPONITRILE**	17
Tetramethylene glycol (a)	**BUTYLENE GLYCOL**	17
Tetramethylene oxide	**TETRAHYDROFURAN**	17
Tetramethylenesulphone	**SULPHOLANE**	17
Tetramethyllead	**MOTOR FUEL ANTI-KNOCK COMPOUND (CONTAINING LEAD ALKYLS)**	17
Tetrapropylbenzene	**ALKYL(C9+)BENZENES**	17
Tetrapropylenebenzene	**DODECYLBENZENE**	17
Tetryl formate	**ISOBUTYL FORMATE**	17
4-thiapentanal	**3-(METHYLTHIO)PROPIONALDEHYDE**	17
Thiophan sulphone	**SULPHOLANE**	17
Thiosulphuric acid, dipotassium salt (50% or less)	**POTASSIUM THIOSULPHATE (50% OR LESS)**	17
Titaniuim(IV) oxide slurry	**TITANIUM DIOXIDE SLURRY**	17
TITANIUM DIOXIDE SLURRY		17
TOLUENE		17
TOLUENEDIAMINE		17
2,4-Toluenediamine (a)	**TOLUENEDIAMINE**	17
2,6-Toluenediamine (a)	**TOLUENEDIAMINE**	17
TOLUENE DIISOCYANATE		17

Index Name	Product Name	Chapter
2-Toluidine	**O-TOLUIDINE**	17
O-TOLUIDINE		17
Toluol	**TOLUENE**	17
o-Tolylamine	**O-TOLUIDINE**	17
2,4-Tolylenediamine (a)	**TOLUENEDIAMINE**	17
2,6-Tolylenediamine (a)	**TOLUENEDIAMINE**	17
Tolylenediisocyanate	**TOLUENE DIISOCYANATE**	17
2,4-Tolylene diisocyanate	**TOLUENE DIISOCYANATE**	17
m-Tolylene diisocyanate	**TOLUENE DIISOCYANATE**	17
Toxilic anhydride	**MALEIC ANHYDRIDE**	17
Treacle (a)	**MOLASSES**	18
Triacetin	**GLYOXAL SOLUTION (40% OR LESS)**	17
3,6,9-Triazaundecamethylenediamine	**TETRAETHYLENE PENTAMINE**	17
3,6,9-Triazaundecane-1,11-diamine	**TETRAETHYLENE PENTAMINE**	17
TRIBUTYL PHOSPHATE		17
1,2,3-TRICHLOROBENZENE (MOLTEN)		17
1,2,4-TRICHLOROBENZENE		17
1,1,1-TRICHLOROETHANE		17
1,1,2-TRICHLOROETHANE		17
beta-Trichloroethane	**1,1,2-TRICHLOROETHANE**	17
Trichloroethene	**TRICHLOROETHYLENE**	17
TRICHLOROETHYLENE		17
Trichloromethane	**CHLOROFORM**	17
1,2,3-TRICHLOROPROPANE		17
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE		17
TRICRESYL PHOSPHATE (CONTAINING 1% OR MORE ORTHO-ISOMER)		17
TRICRESYL PHOSPHATE (CONTAINING LESS THAN 1% ORTHO-ISOMER)		17
TRIDECANE		17
TRIDECANOIC ACID		17
Tridecanol (a)	**ALCOHOLS (C13+)**	17
Tridecene (a)	**OLEFINS (C13+, ALL ISOMERS)**	17
Tridecoic acid	**TRIDECANOIC ACID**	17
TRIDECYL ACETATE		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
TRIETHANOLAMINE		17
TRIETHYLAMINE		17
TRIETHYLBENZENE		17
TRIETHYLENE GLYCOL		18
Triethylene glycol butyl ether (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17

Index Name	Product Name	Chapter
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
TRIETHYLENETETRAMINE		17
TRIETHYL PHOSPHATE		17
TRIETHYL PHOSPHITE		17
Triformol	**1,3,5-TRIOXANE**	17
Triglycol	**TRIETHYLENE GLYCOL**	18
Trihydroxypropane	**GLYCERINE**	17
Trihydroxytriethylamine	**TRIETHANOLAMINE**	17
TRIISOPROPANOLAMINE		17
TRIISOPROPYLATED PHENYL PHOSPHATES		17
TRIMETHYLACETIC ACID		17
TRIMETHYLAMINE SOLUTION (30% OR LESS)		17
TRIMETHYLBENZENE (ALL ISOMERS)		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
TRIMETHYLOL PROPANE PROPOXYLATED		17
2,2,4-Trimethylpentane (a)	**OCTANE (ALL ISOMERS)**	17
2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE		17
2,2,4-Trimethylpentane-1,3-diol diisobutyrate	**2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE**	17
2,2,4-TRIMETHYL-1,3-PENTANEDIOL-1-ISOBUTYRATE		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
1,3,5-TRIOXANE		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
TRIPROPYLENE GLYCOL		17
Tripropylene glycol methyl ether (a)	**POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER**	17

Index Name	Product Name	Chapter
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
TRIXYLYL PHOSPHATE		17
TUNG OIL		17
TURPENTINE		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
UNDECANOIC ACID		17
Undecan-1-ol	**UNDECYL ALCOHOL**	17
1-UNDECENE		17
Undec-1-ene	**1-UNDECENE**	17
UNDECYL ALCOHOL		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
UREA/AMMONIUM NITRATE SOLUTION		17
UREA/AMMONIUM PHOSPHATE SOLUTION		17
UREA SOLUTION		17
USED COOKING OIL (M)		17
USED COOKING OIL (TRIGLYCERIDES, C16-C18 AND C18 UNSATURATED) (M)**		17
Valeral	**VALERALDEHYDE (ALL ISOMERS)**	17
VALERALDEHYDE (ALL ISOMERS)		17

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

Index Name	Product Name	Chapter
2,5-Xylenol (a)	**XYLENOL**	17
2,6-Xylenol (a)	**XYLENOL**	17
3,4-Xylenol (a)	**XYLENOL**	17
3,5-Xylenol (a)	**XYLENOL**	17
Xylols	**XYLENES**	17
ZINC ALKARYL DITHIOPHOSPHATE (C7-C16)		17
ZINC ALKENYL CARBOXAMIDE		17
ZINC ALKYL DITHIOPHOSPHATE (C3-C14)		17
Zinc bromide drilling brine	**DRILLING BRINES (CONTAINING ZINC CHLORIDE)**	17
z-Octadec-9-enamine	**OLEYLAMINE**	17
(Z)-Octadec-9-enoic acid	**OLEIC ACID**	17
Z-Octadec-9-enoic acid	**OLEIC ACID**	17
(Z)-Octadec-9-enylamine	**OLEYLAMINE**	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_{50} 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_{50}/ATE ≤ 20 mg/L/4h (see paragraph 21.7.1.3) (C3 = 1, 2, 3 or 4);

.2 dermal LD_{50}/ATE ≤ 2000 mg/kg (see paragraph 21.7.1.2) (C2 = 1, 2, 3, or 4);

.3 oral LD_{50}/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[1]		
5			4				**Y**
6			3				
7			2				
8	≥ 4	NR		Not 0			
9				≥ 1			
10						Fp, F or S If not Inorganic	
11					CMRTNI[1]		
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_{50}/ATE≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC_{50} ≥ 20; and/or
Dermal LD_{50}/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).

[1] Applies if the D3 rating contains any of these letters or any combination thereof.

Ship Type 2:

Inhalation LC_{50}/ATE ≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC_{50} < 20; or
Inhalation LC_{50}/ATE > 0.5 mg/L/4h – ≤ 2mg/L/4h (C3 = 3) and SVC/LC_{50} ≥ 2 (see note); and/or
Dermal LD_{50}/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^3 (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[2]		
3	≥ 4	NR			CMRTNI[2]		**2**
4			4				
5	≥ 4		3				
6		NR	3				
7				≥ 1			
8						Fp	
9					CMRTNI[2]	F	
10			≥ 2			S	
11	≥ 4						**3**
12		NR					
13			≥ 1				
14	All other category Y Substances						
15	All other category Z Substances All "Other Substances" (OS)						**NA**

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_{50}/ATE ≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC_{50} ≥ 1000; and/or
Dermal LD_{50}/ATE ≤ 50 mg/kg (C2 = 4); and/or;
WRI=3; and/or
Auto-ignition temperature ≤ 65°C; and/or

[2] Applies if the D3 rating contains any of these letters or any combination thereof.

Explosive range ≥ 40% v/v in air and the flashpoint < 23°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 LC_{50}/ATE ≤ 10 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 ≤ 60°C; and
Corrosive to skin (≤ 4h 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 ≤ 200°C; and/or
Reacts with air to cause a hazard; and/or
Explosive range ≥ 40% and the flashpoint < 23°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 ≤ 60°C or the product is heated to within 15°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 ≥ 450°C
T2 Auto-ignition temperature ≥ 300°C but < 450°C
T3 Auto-ignition temperature ≥ 200°C but < 300°C
T4 Auto-ignition temperature ≥ 135°C but < 200°C
T5 Auto-ignition temperature ≥ 100°C but < 135°C
T6 Auto-ignition temperature ≥ 85°C but < 100°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_{50}/ATE ≤ 2 mg/L/4h (C3 = 3 or 4), unless in accordance with 21.7.12; and/or
Dermal LD_{50}/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_{50}/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_{50}/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 as 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 ≤ 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 (≤ 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 ≤ 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 - ≤ 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 ≤ 1000 mg/kg (C2 = 2, 3, or 4); and/or
Oral LD_{50}/ATE ≤ 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 ≤ 37.8°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 LC_{50}/ATE > 0.5 - ≤ 2 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 (≤ 1h 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 LC_{50}/ATE ≤ 0.5 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 LC_{50}/ATE ≤ 2 mg/L/4h (C3 = 3 or 4), unless in accordance with 21.7.12; and/or
Dermal LD_{50}/ATE ≤ 1000 mg/kg (C2 = 2, 3, or 4); and/or
Oral LD_{50}/ATE ≤ 300 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 (≤ 3 min exposure) (D1 = 3C); and/or
Auto-ignition temperature ≤ 200°C; and/or
Explosive range ≥ 40% v/v in air and flashpoint < 23°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 mg/L/4h - ≤10 mg/L/4h (C3 = 2), unless in accordance with 21.7.12; and/or
Dermal LD_{50}/ATE > 1000 mg/kg - ≤ 2000 mg/kg (C2 = 1); and/or
Oral LD_{50}/ATE > 300 mg/kg - ≤ 2000 mg/kg (C1 = 1); and/or
Skin sensitizer (D3=Ss); and/or
Highly corrosive to skin (> 3 min - ≤ 1h exposure) (D1 = 3B); and/or
Flashpoint ≤ 60ºC; 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 ≥ 50 mPa·s at 20ºC.

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 ≥ 0ºC.

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 mPa·s at 20ºC and/or with a melting point greater than or equal to 0ºC.

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_{50}/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_{50}/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_{50}/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[3]

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

[3] 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 ≤ 60°C or are heated to within 15°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 ≤ 60°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_{50} 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_{50}[4] 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[5] of this solid rather than that of water may be used in the calculation of the SVC/LC_{50} ratio.

21.7.12.4 Application of the SVC/LC_{50} 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_{50} ratio method is optional. Should this method be used, the vapour pressure at 20°C shall be used when calculating the SVC/LC_{50} ratio.

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

$$SVC(mg/L) = \left(\frac{Vapour\ pressure\ @\ 20^0\ C\ (Pa)}{101300\ (Pa)} \quad x\,10^6 \right) x \frac{M_w \left(g/mol \right)}{24(L/mol)x\,1000}$$

4 ATE values can be considered as equivalent to LC_{50} values. See paragraph 21.7.1.

5 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_{50} 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_{50} 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_{50} ratio method is optional. If the SVC/LC_{50} 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_{50} ratio. If the carriage temperature is higher than 40°C, then the SVC/LC_{50} ratio should be calculated at that temperature.

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

$$SVC(mg/L) = \left(\frac{Vapour\ pressure@\ 40^0\ C\,(Pa)}{101300(Pa)} \quad x\,10^6 \right) x \frac{M_w \left(g/mol \right)}{26\,(L/mol) x\,1000}$$

where M_W is the molecular weight of the substance.

21.7.12.5.3 The SVC/LC_{50} 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_{50} 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_{50}/ATE ≤ 10 mg/L/4h (C3 = 2, 3, or 4) and SVC/LC_{50} < 0.2

.2 ***Column j* – Gauging**

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

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

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

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

.4 ***Column n* – Emergency Equipment**

Inhalation LC_{50}/ATE ≤ 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 ≤ 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 - ≤ 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 ≤ 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 ≤ 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 ≤ 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 - ≤ 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.

* 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[1]

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.

[1] 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].

~~1~~3 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.

~~2~~4 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.

~~3~~5 Arrangements, equipment and fittings provided in accordance with paragraph ~~2~~4 above shall meet the appropriate requirements of the Administration or an organization recognized by the Administration under regulation I/6.*

~~4~~6 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, ~~E~~except as provided in paragraph 6.~~2~~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 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 ~~9~~8.1 and in regulation 14.

4 Subject to paragraph ~~10~~9, 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 ~~9~~8.1 or regulation 14, shall be power-operated sliding doors complying with the requirements of paragraph ~~7~~6 ~~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.~~

~~7~~6.1 Each power-operated sliding watertight door:

.1 shall have a vertical or horizontal motion;

.2 shall, subject to paragraph ~~10~~9, 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.

~~7~~6.2 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.

~~7~~6.3 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 15º. 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 15º. 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 15º.

For the systems specified in paragraphs ~~7~~6.3.1, ~~7~~6.3.2 and ~~7~~6.3.3, 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.

~~7~~6.4 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.

~~7~~6.5 As far as practicable, electrical equipment and components for watertight doors shall be situated above the bulkhead deck and outside hazardous areas and spaces.

~~7~~6.6 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.

~~7~~6.7 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.

~~7~~6.8 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 ~~7~~6.3. 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.

~~8~~7.1 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.~~

~~8~~7.2 For ships subject to the provisions of regulation 1.1.1.1 and constructed before 1 January 2024, t~~T~~he 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.

~~8~~7.~~3~~4 It shall not be possible to remotely open any door from the central operating console.

~~9~~8.1 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.

~~9~~8.2 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.

~~10~~9 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 ~~7~~6.1.2 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 ~~7~~6.1.4 regarding complete closure by hand-operated gear in 90 s.

1~~1~~0.1 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, ~~G~~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, ~~T~~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~~T~~he 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.~~9~~8.1 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, ~~G~~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 openedin 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[1]

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;"

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[1] Deleted text is shown in strike-through and grey shading and new text is shown in grey shading.

ANNEX 15

DRAFT AMENDMENTS TO THE IGC CODE*

Chapter 6 Materials of construction and quality control

6.5 Welding of metallic materials and non-destructive testing

6.5.3 Welding procedure tests for cargo tanks and process pressure vessels

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;"

***

* Newly inserted text is shown in grey shading.

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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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.

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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

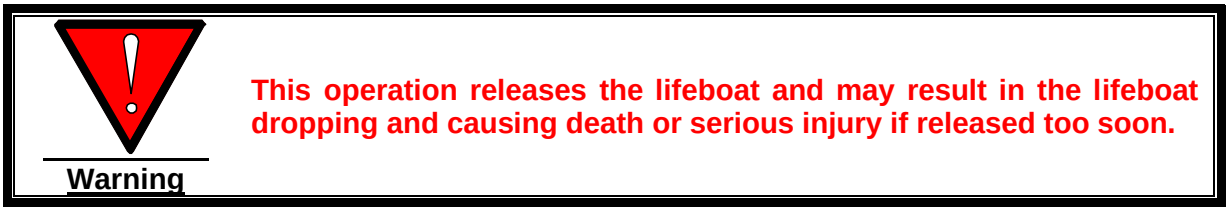
The operation of the lifeboat system should be described using the following elements:

.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:

Caution

Incorrect or incomplete resetting may cause the lifeboat to drop resulting in death or serious injury.

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

Mandatory

Place the manual gripe out of the way to prevent tangling round the lifeboat.

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

Note

In case 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 above mentioned off-load release operation, the on-load release procedure, described in the following pages, is possible.

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

Never

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

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[2]

Table of contents

[2] 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.

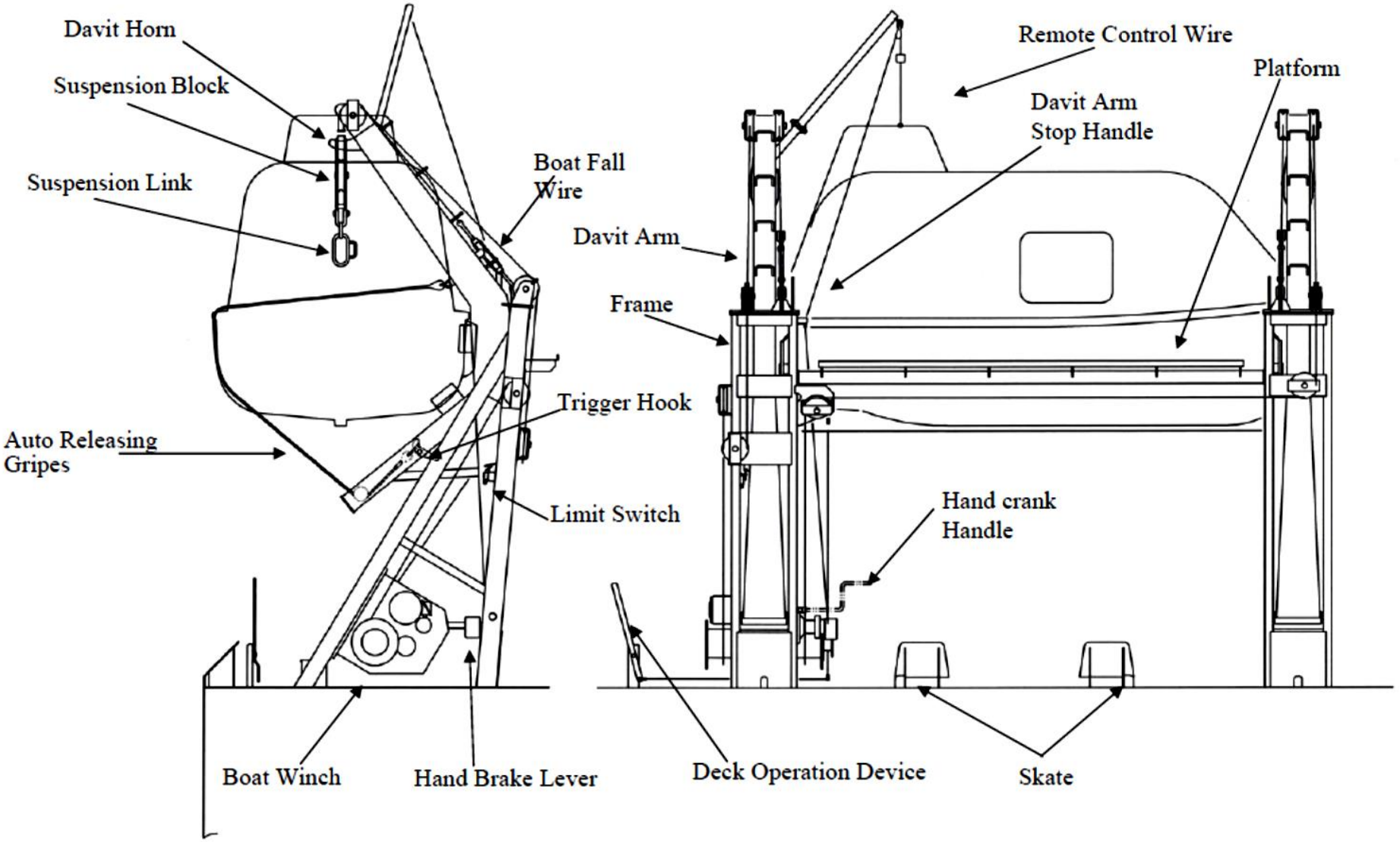


Fig. 1.1 Lifeboat davit arrangement

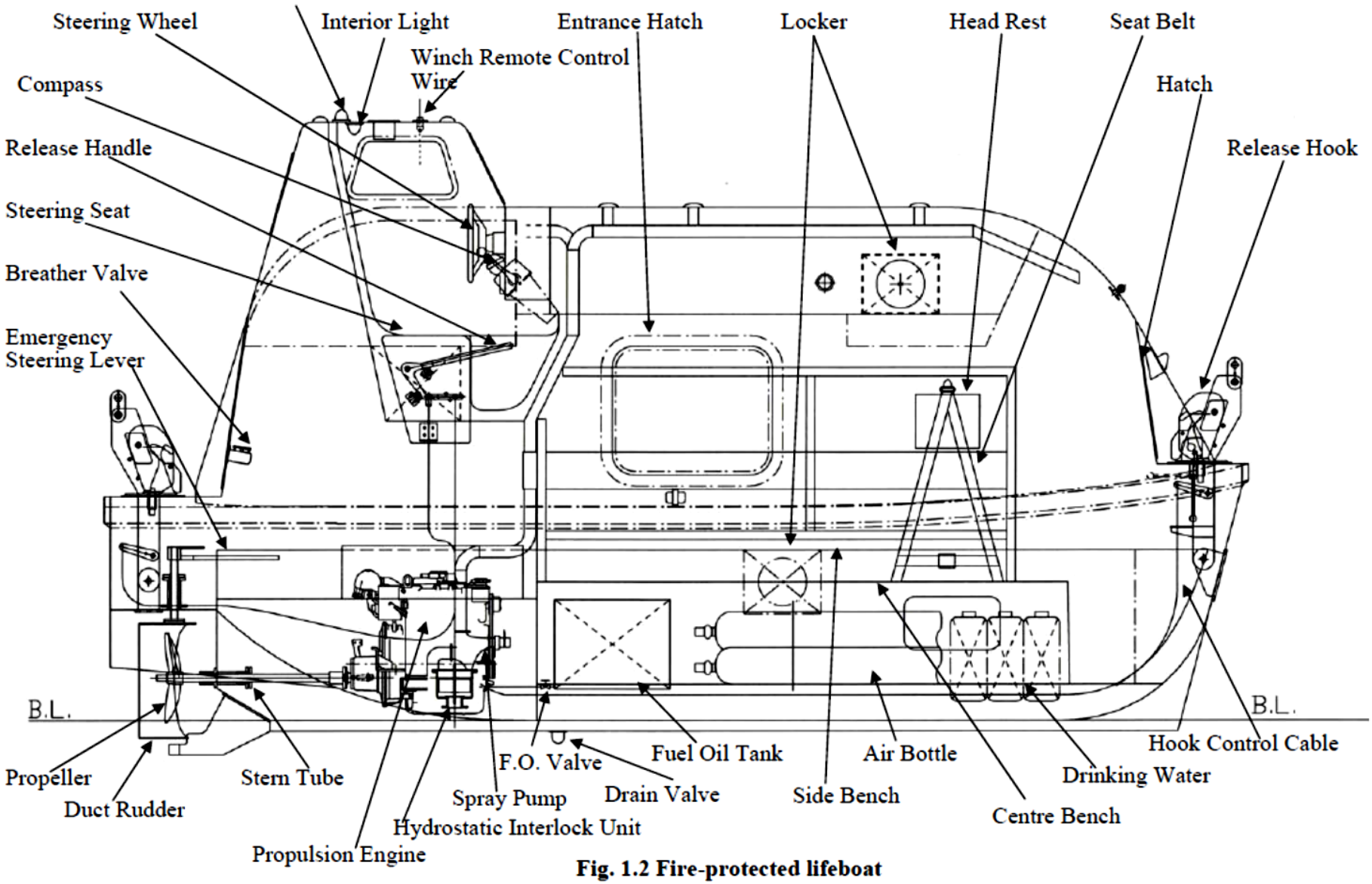


Fig. 1.2 Fire-protected lifeboat

2 Method of checking proper closure of release hooks

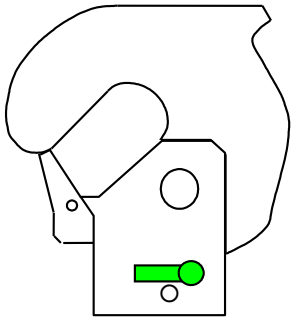
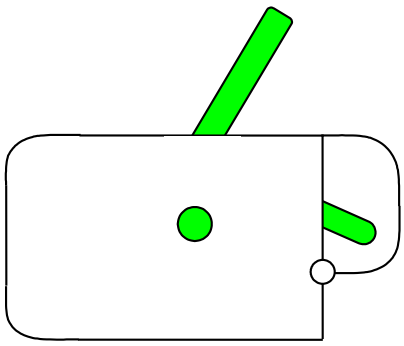
2.1 Safe use and operation of lifeboats during drills and inspection and maintenance is dependent on knowing that the release gear is properly reset.

Never

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.

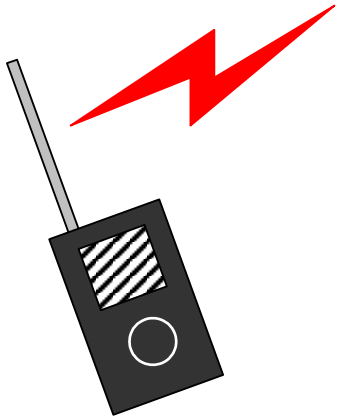
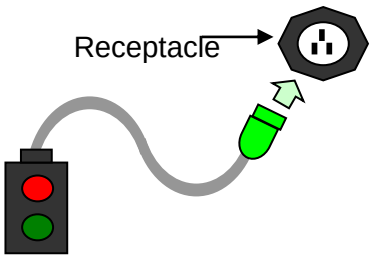
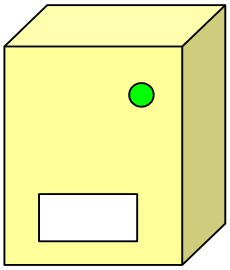
2.2 Purpose of on-load release. The IMO LSA Code requires, among other things, that the lifeboat be fitted with "***on-load release capability which will release the lifeboat with a load on the hooks. The release mechanism shall be so designed that crew members in the lifeboat can clearly observe when 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:

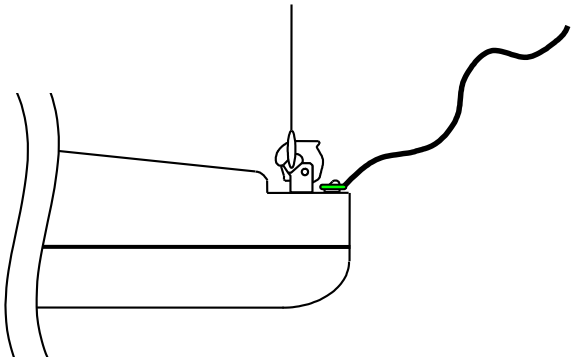
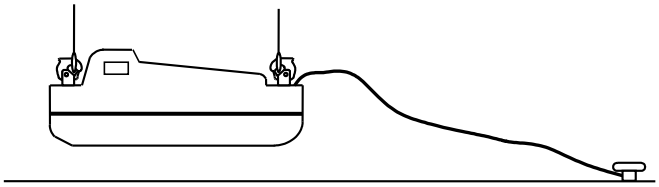
No.	Operation Guide	Schematic Diagram
1	Check that the reset lever on each hook is horizontal and in contact with its stop. <Activity in the lifeboat>	
2	Check that the release handle is in the closed (locked) position and safety pin is installed. <Activity in the lifeboat>	

3 Launching operation

3.1 Preparation before launching

No.	Operation Guide	Schematic Diagram
1	Prepare transceivers, and confirm the communication condition. <Activity on the ship>	
2	<In case of drill> Connect the push-button switch for recovering to the receptacle. <Activity on the ship>	
3	<In case of drill> Turn on the power switch of start panel. ✓ Detach the cable for the storage battery charge. <Activity on the ship>	
4	Don life jackets. <Activity on the ship>	

3.2 Setting of painter

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

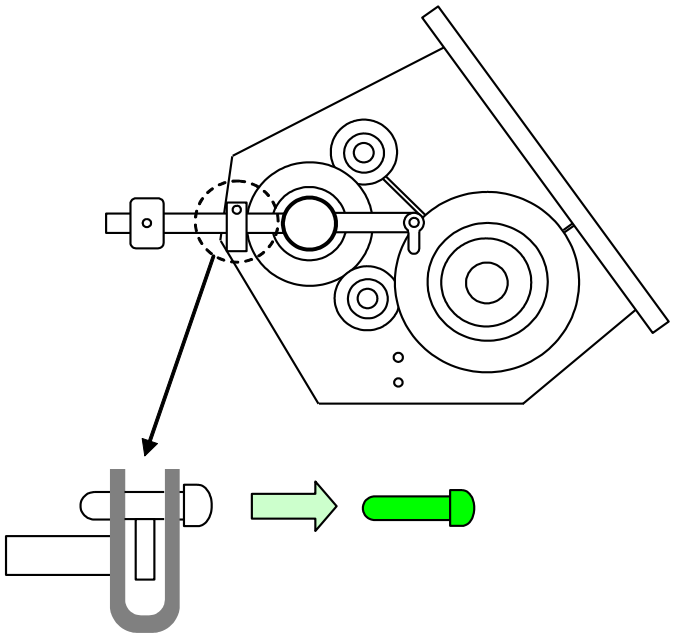
Caution

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

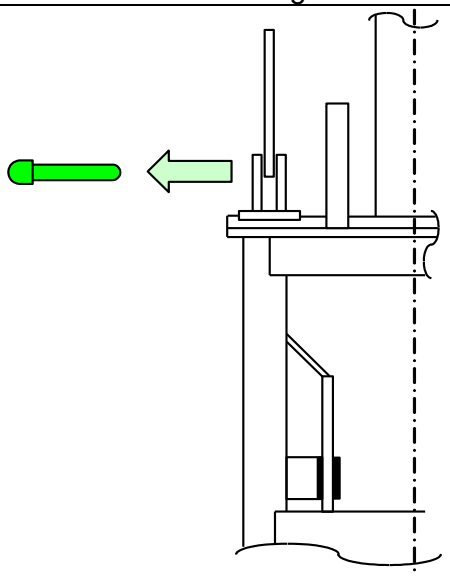
Caution

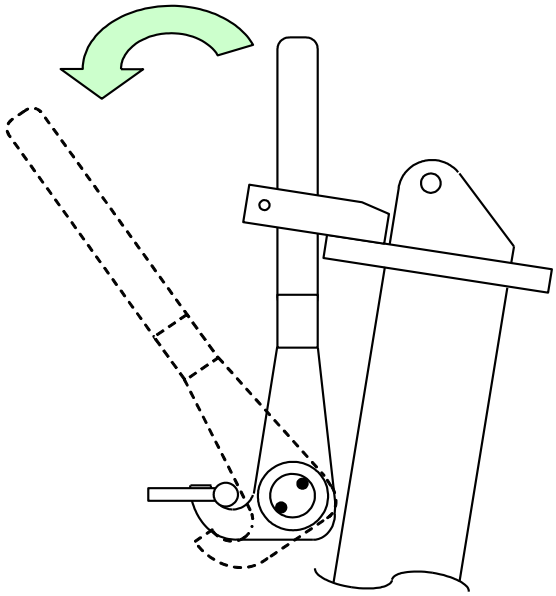
The safety pin of the winch hand brake should not be pulled out until the completion of the preparation described in paragraphs 3.1 and 3.2.

No.	Operation Guide	Schematic Diagram
1	Pull out the safety pin (if fitted). <Activity on the ship>	

3.4 Release of davit arm stopper

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

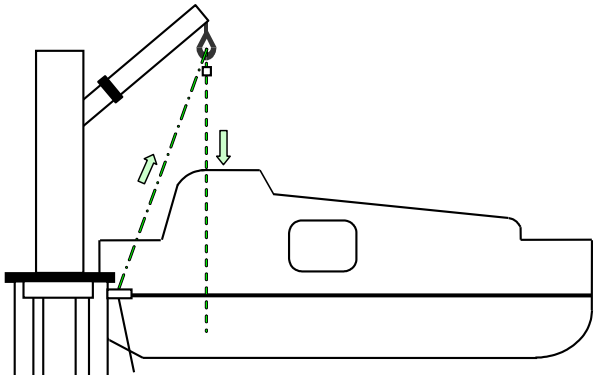
No.	Operation Guide	Schematic Diagram
1	Wind the boat fall manually to take off the slack. Pull out the safety pin of the davit arm stop, if fitted. <Activity on the ship> Note: Safety pins are generally intended only for use during maintenance or in port.	

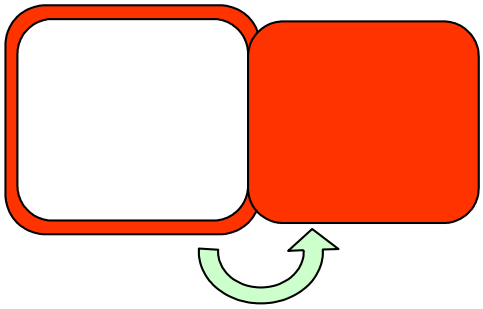
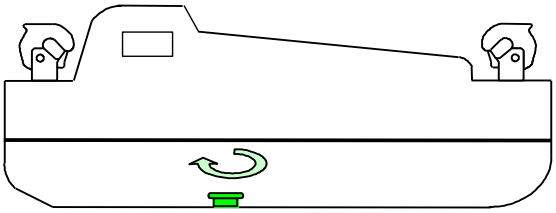
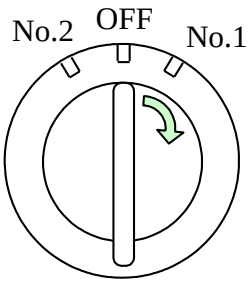
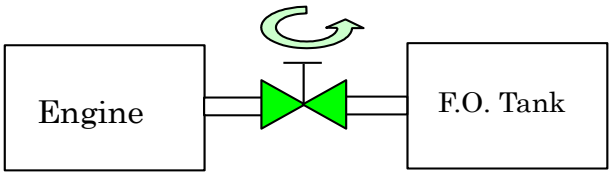
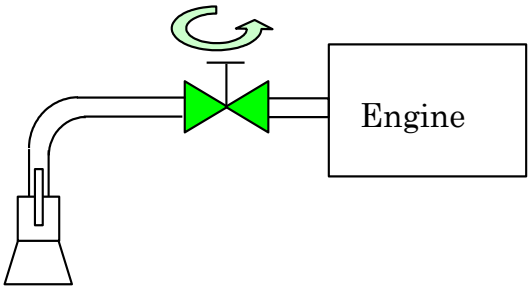
No.	Operation Guide	Schematic Diagram
2	Release the davit arm stop by operating the handle. <Activity on the ship>	

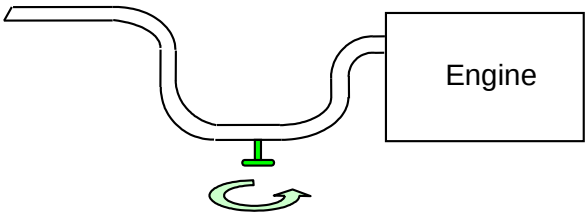
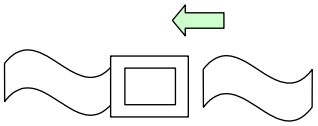
Caution

The handle should be fully operated to prevent the davit arm stop from being caught with the lock device.

3.5 Boarding the lifeboat

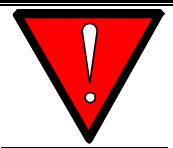
No.	Operation Guide	Schematic Diagram
1	Confirm that the remote control wire is drawn into the lifeboat. <Activity on the ship>	

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

No.	Operation Guide	Schematic Diagram
7	Close the drain valve on exhaust pipe. <Activity in the lifeboat>	
8	Fasten seatbelt. <Activity in the lifeboat>	 

Caution

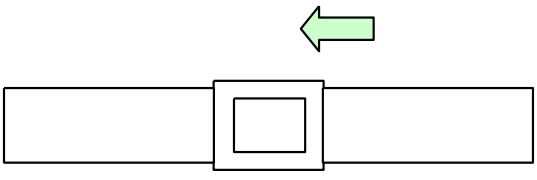
Seating positions of persons should be carefully selected to maintain a good trim of the lifeboat.

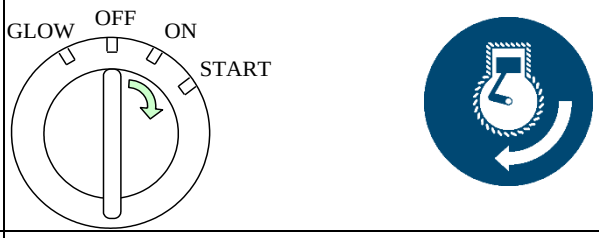
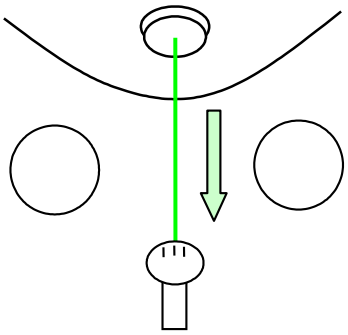


Warning

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

3.6 Launching procedure

No.	Operation Guide	Schematic Diagram
1	Confirm that all crew boarded in the lifeboat are seated and their seatbelts are fastened. <Activity in the lifeboat>	

No.	Operation Guide	Schematic Diagram
2	Start engine. <Activity in the lifeboat>	
3	Pull down the winch remote control wire. <Activity in the lifeboat>	

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.**

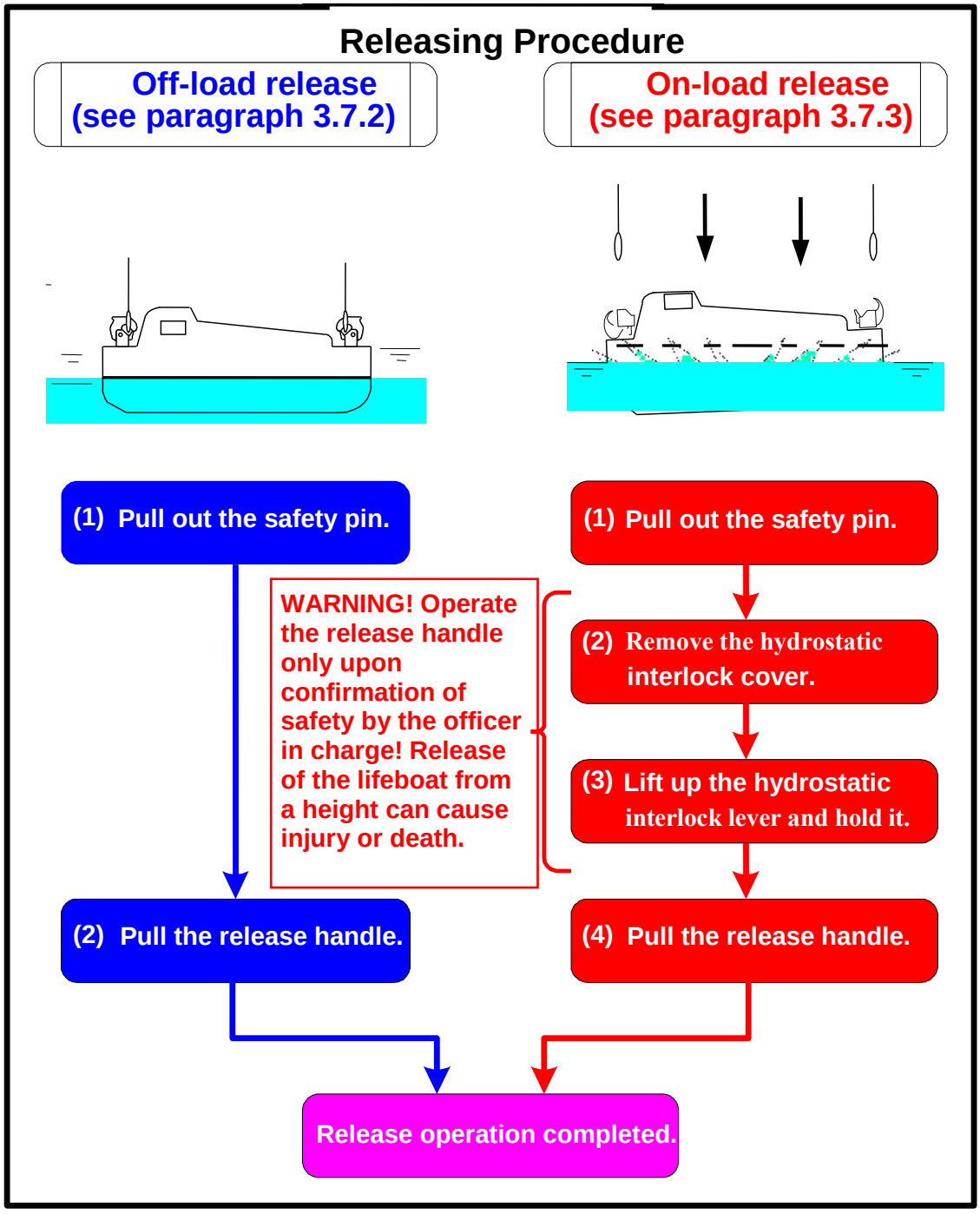
Note

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

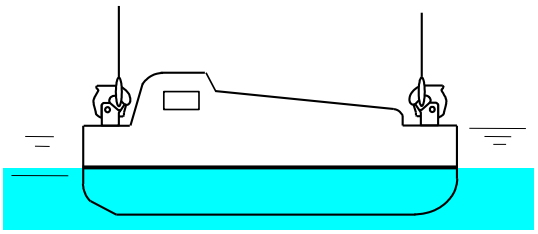
3.7.1 Releasing procedure

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



3.7.2 Off-load release

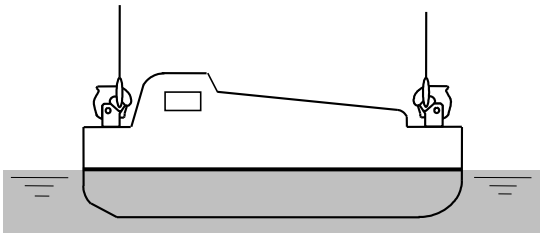
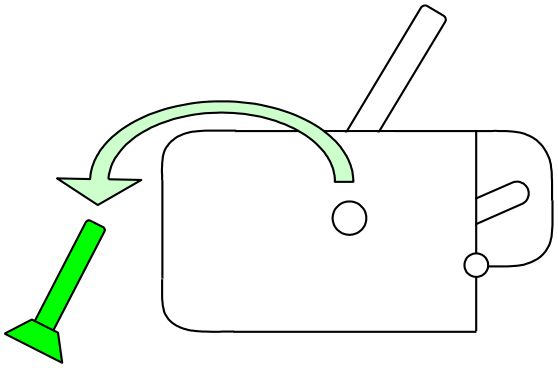
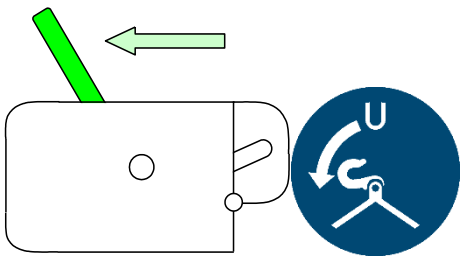
This operation is the normal method of launch and release and is conducted when the lifeboat is fully waterborne.



Caution

Confirm the following before the operation:

- **The lifeboat is fully waterborne.**
- **The engine is started.**
- **All crew are in their seats with their seatbelts fastened.**

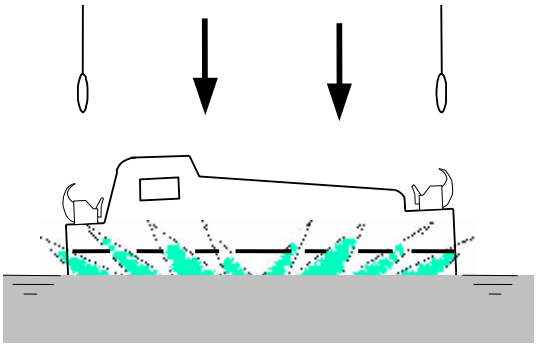
No.	Operation Guide	Schematic Diagram
1	Confirm that the lifeboat is waterborne. <Activity in the lifeboat>	
2	Pull out the release handle safety pin. <Activity in the lifeboat>	
3	Pull the release handle to the fully open position by one action. <Activity in the lifeboat>	

No.	Operation Guide	Schematic Diagram
Note	**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**	

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

3.7.3 On-load release

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



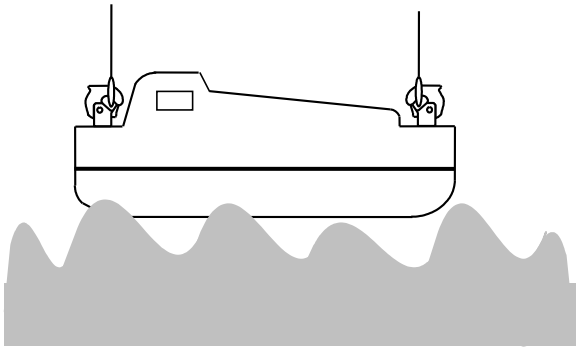
Warning

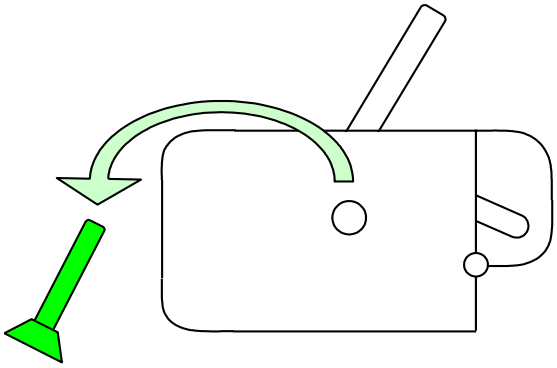
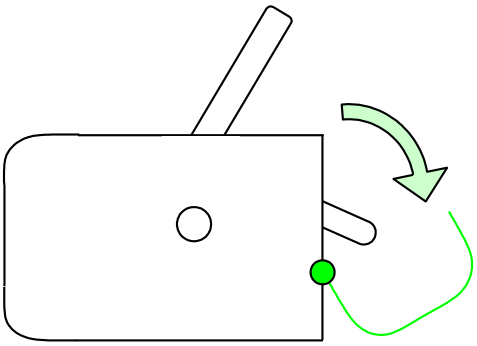
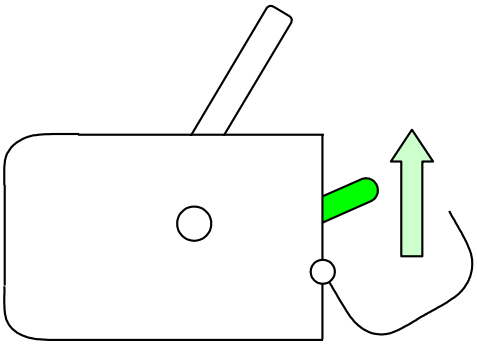
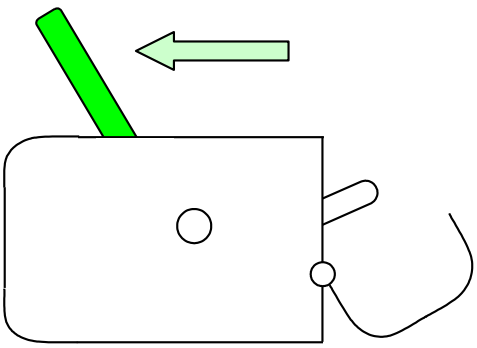
- **Pay due precautions and conduct the on-load release operation in accordance with orders of the officer in charge.**
- **Operation of the release handle upon insufficient confirmation of safety may result in death or injury due to dropping the lifeboat in the water from a height.**

Caution

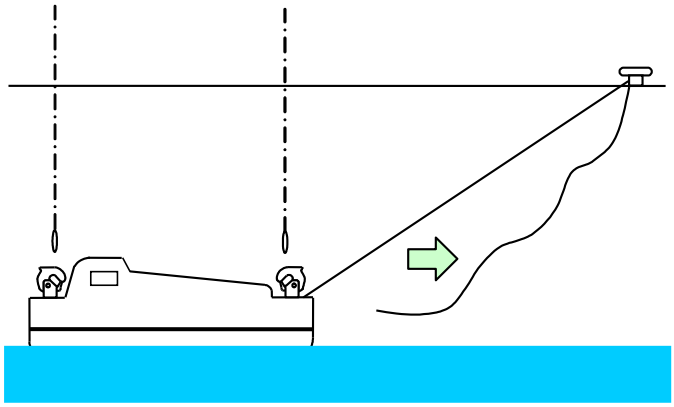
Confirm the following before the operation.

- **The lifeboat is as close as possible to the water surface.**
- **The engine is started.**
- **All crew are in their seats with their seatbelts fastened.**

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

No.	Operation Guide	Schematic Diagram
2	Pull out the release handle safety pin. <Activity in the lifeboat>	
3	Open the hydrostatic interlock cover. ✓ Unlock the latch of the interlock cover. <Activity in the lifeboat>	
4	Lift the hydrostatic interlock lever fully and hold it. <Activity in the lifeboat>	
5	Pull the release handle to the fully open position by one action. <Activity in the lifeboat>	

3.8 Painter release and lifeboat operation

No.	Operation Guide	Schematic Diagram
1	Release the painter. <Activity in the lifeboat>	
2	**Lifeboat operation** Ahead, astern, turning, spray, lighting of interior light and canopy light, and other performances. <Activity in the lifeboat>	

Caution

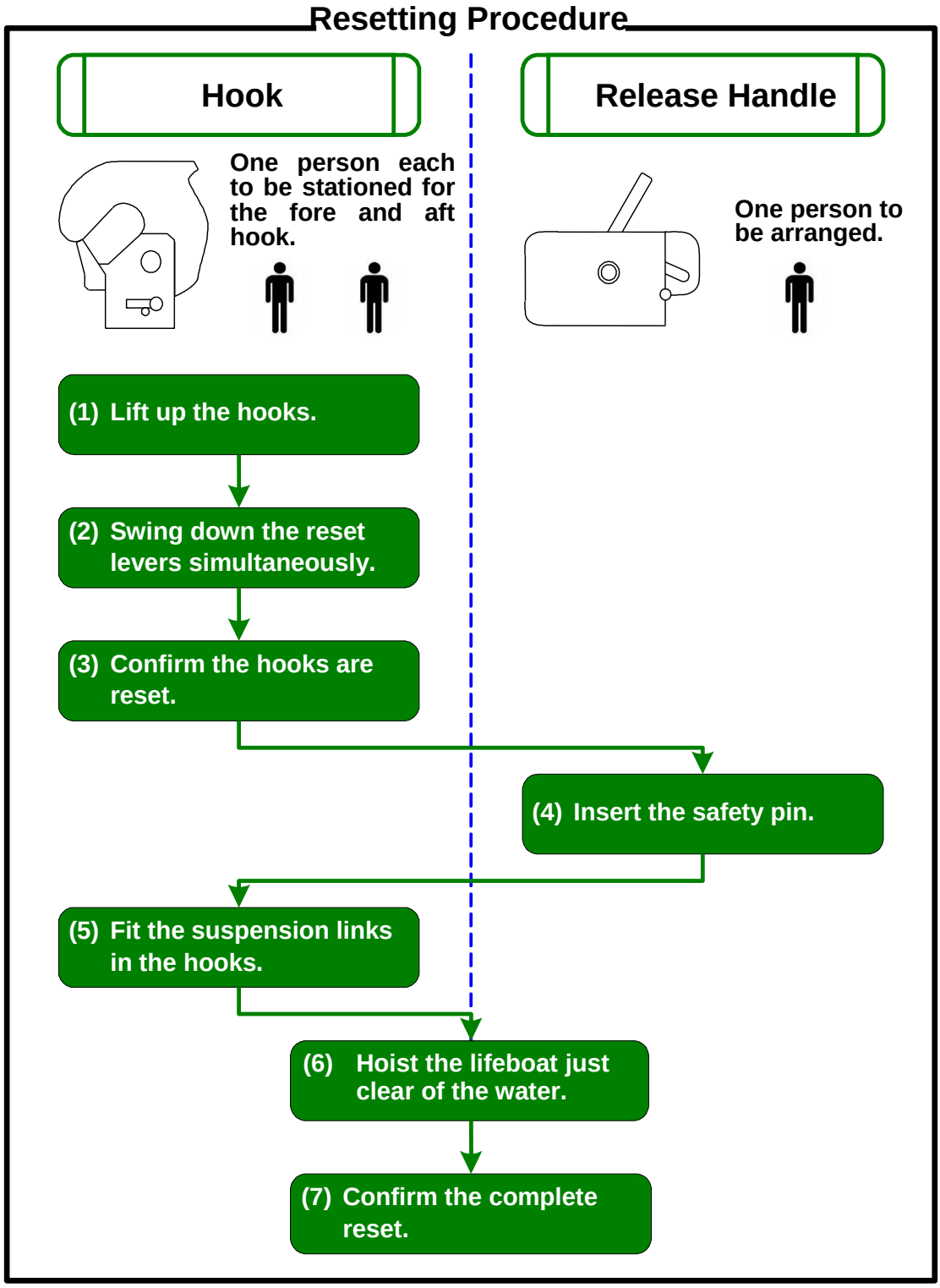
- **Do not operate the steering gear to turn the lifeboat while the painter is connected.**
- **The lifeboat should get clear of the ship promptly when the painter has been released.**

4 Recovery operation

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

Warning

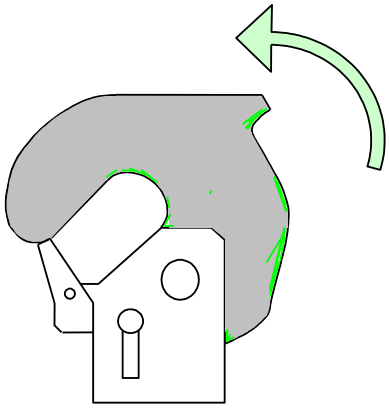
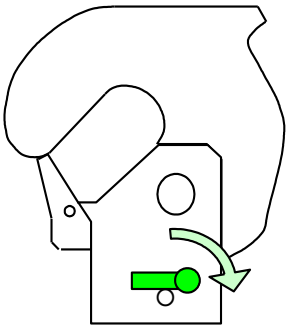
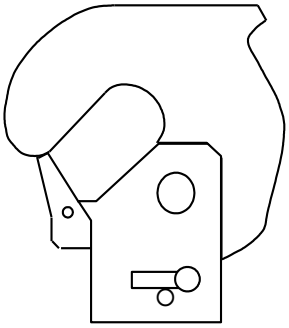
- **Incomplete resetting may result in death or serious injury due to dropping of the lifeboat in the water from a height.**

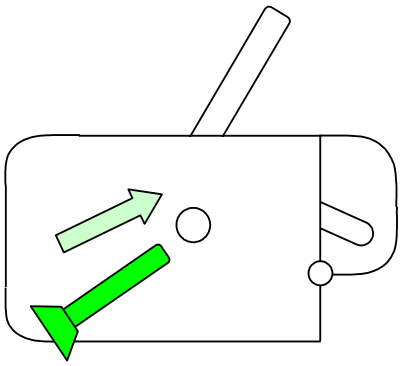

Resetting Procedure
Hook
Release Handle
One person each to be stationed for the fore and aft hook.
One person to be arranged.
(1) Lift up the hooks.
(2) Swing down the reset levers simultaneously.
(3) Confirm the hooks are reset.
(4) Insert the safety pin.
(5) Fit the suspension links in the hooks.
(6) Hoist the lifeboat just clear of the water.
(7) Confirm the complete reset.

4.1 Resetting procedure of release hook

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

Note **At least three people are required for the resetting of the hooks.**

No.	Operation Guide	Schematic Diagram
1	Lift the fore and aft hooks and hold them closed. ✓ A strong effort may be required to lift the hook and force the internal lock piece to engage. <Activity in the lifeboat>	
2	Simultaneously swing down the reset levers on both fore and aft hooks in one continuous action to contact with the stop. ✓ The release handle returns to its closed (locked) position automatically when the reset levers are swung down. <Activity in the lifeboat>	
3	Confirm the fore and aft hooks are in the normal reset positions. ✓ Make sure that the reset lever is in contact with the stop. <Activity in the lifeboat>	

No.	Operation Guide	Schematic Diagram
4	Make sure that the release handle is in the closed (locked) position and insert the safety pin. ✓ If the release handle is not in its closed (locked) position, it is not possible to insert the safety pin. <Activity in the lifeboat>	

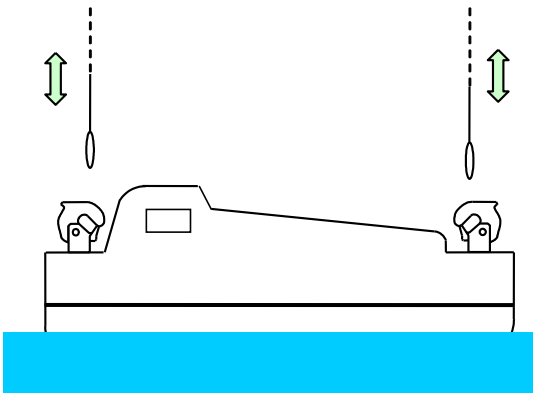
4.2 Recovery procedure

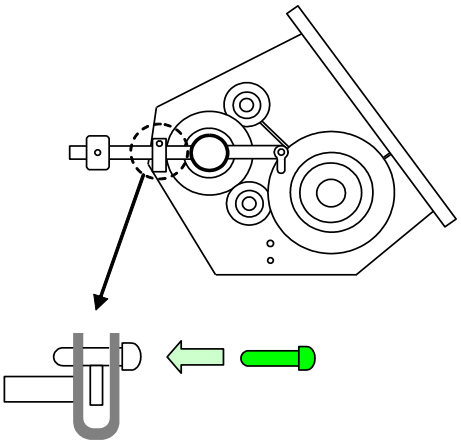
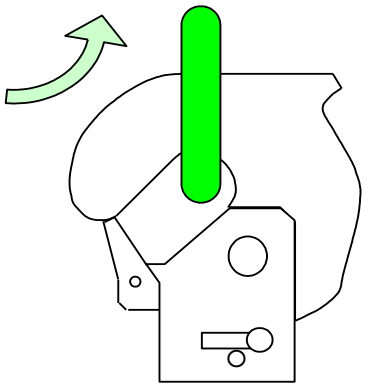
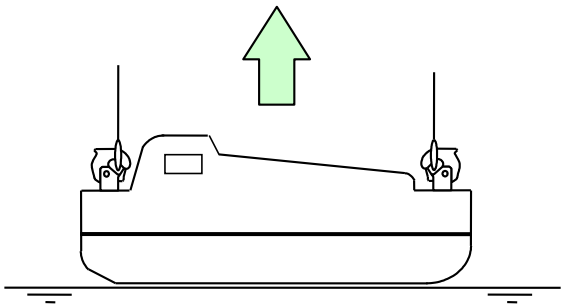
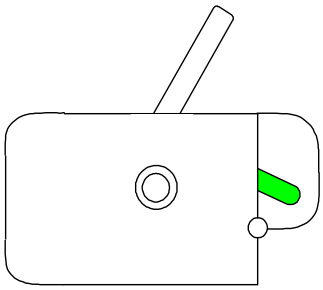
The recovery procedure is to be in accordance with the following steps only after completing the release gear resetting.

Warning

- **Great care must be exercised in reconnecting the hooks that hands and fingers are kept clear.**
- **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.**

4.2.1 Connection of the suspension link

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

No.	Operation Guide	Schematic Diagram
3	Insert the safety pin of the boat winch handbrake. <Activity on the ship>	
4	Connect the suspension links of the davit simultaneously to both, fore and aft hooks. <Activity in the lifeboat>	
5	Hoist the lifeboat just clear of the water and stop hoisting. ✓ Confirm that the fore and aft hooks are properly connected. <Activity on the ship> and <Activity in the lifeboat>	
6	Confirm that the hydrostatic interlock lever has moved to the "locked" position for the lifeboat not being waterborne. <Activity in the lifeboat>	
7	Where the resetting is incomplete, return to the first step.	

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

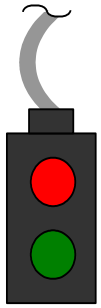
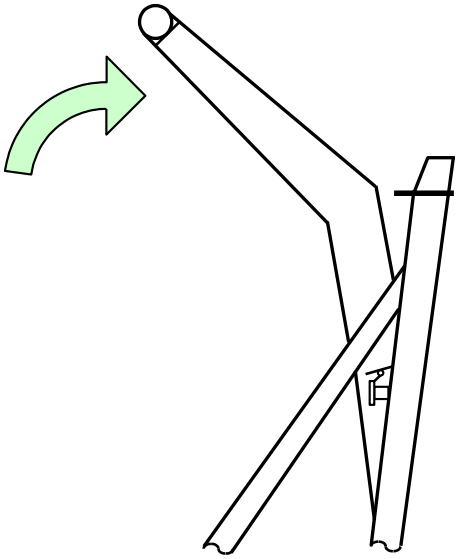
Caution

- ✓ **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.**
- ✓ **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.**

Warning

- ✓ **Both hooks should be connected simultaneously to prevent damage due to excessive load on one hook.**
- ✓ **If only one hook is connected, the lifeboat may be suspended by the single hook due to wave action resulting in injury or death.**

4.2.2 Hoisting the lifeboat

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

Caution

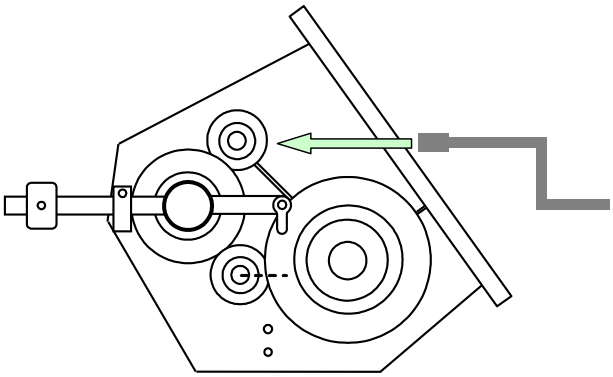
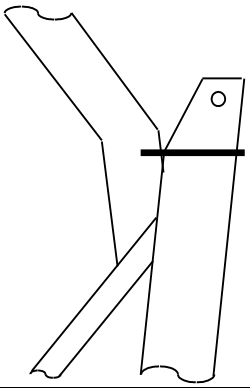
- **The boat winch stops automatically when the davit arm strikes the limit switch.**
- **Where the limit switch of boat winch does not work correctly, the winch operator should manually stop the hoisting operation immediately.**

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

4.3 Stowage procedure

Note

Position two persons on davit platform to watch for proper stowage.

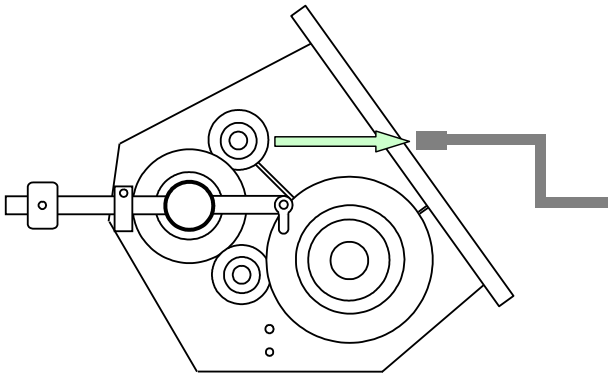
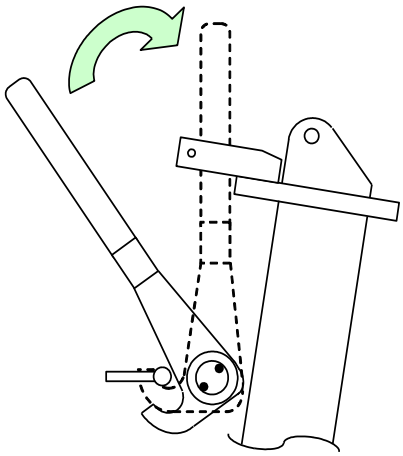
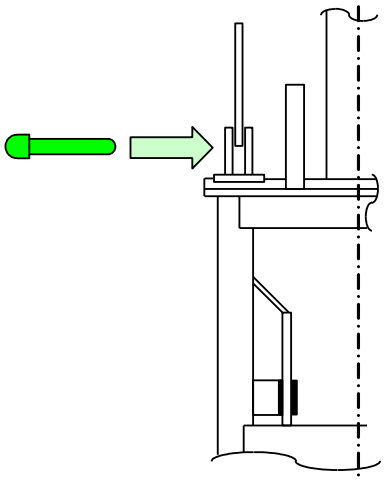
No.	Operation Guide	Schematic Diagram
1	Hoist the davit arm manually. <Activity on the ship>	
2	Confirm that the davit arm is in contact with the stop on platform. <Activity on the ship>	

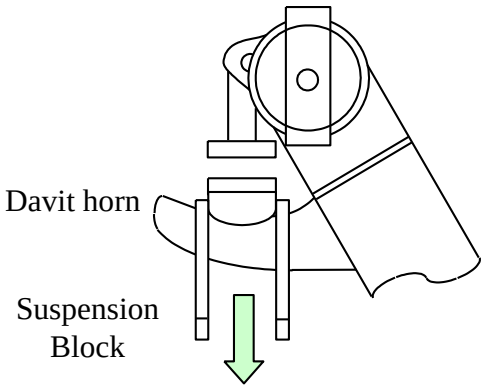
Caution

- **Each person on the platform should signal to the winch operator just when the davit arm reaches the stop on the frame.**
- **Confirm that the davit arm and the stops are in contact fore and aft.**

Warning

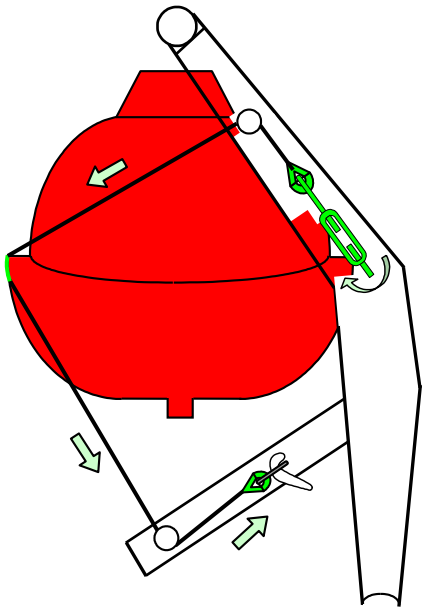
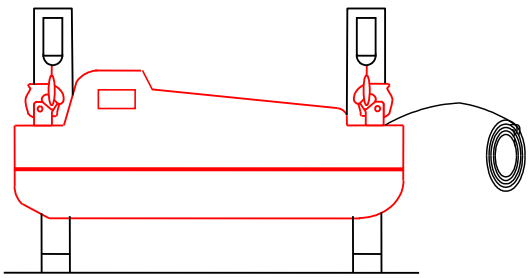
- **Stop the hoisting operation immediately when the signal from the watchman is received.**
- **Over hoisting by manual operation may have serious consequences due to damage of the boat fall and the davit.**

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

No.	Operation Guide	Schematic Diagram
6	Lower the suspension block on the davit horn by releasing the handbrake of the winch. <Activity on the ship>	

Warning

- **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.**

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

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.

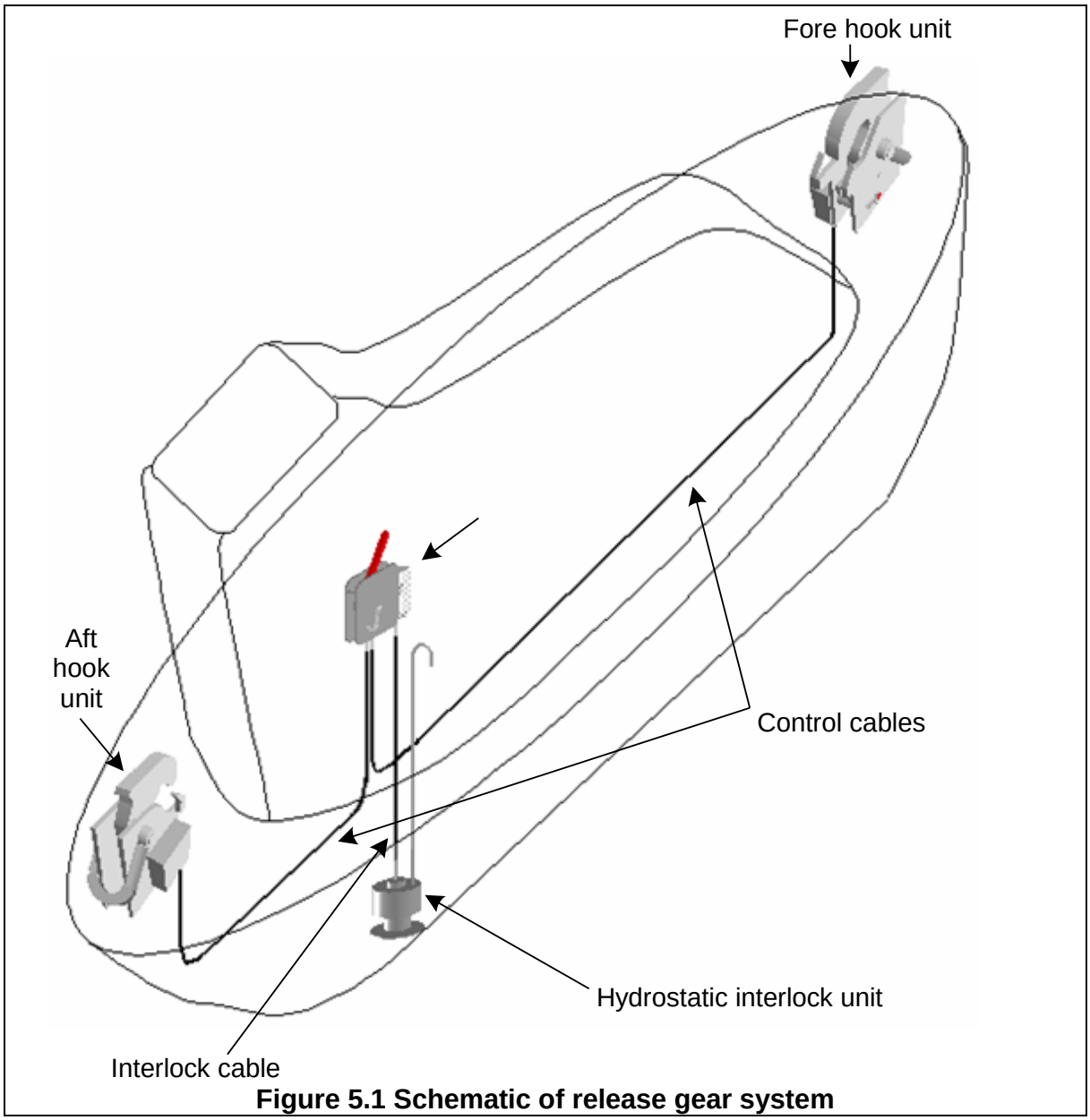


Figure 5.1 Schematic of release gear system

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.

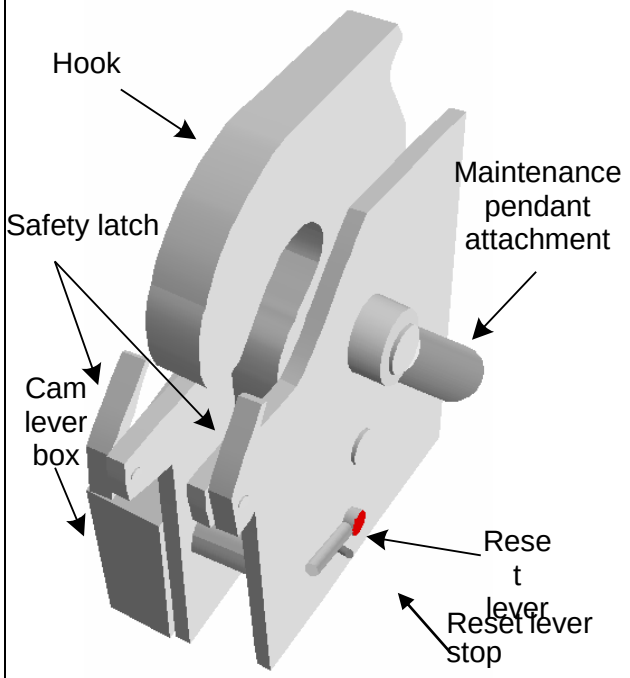


Figure 5.2.1.1 Perspective of the hook unit

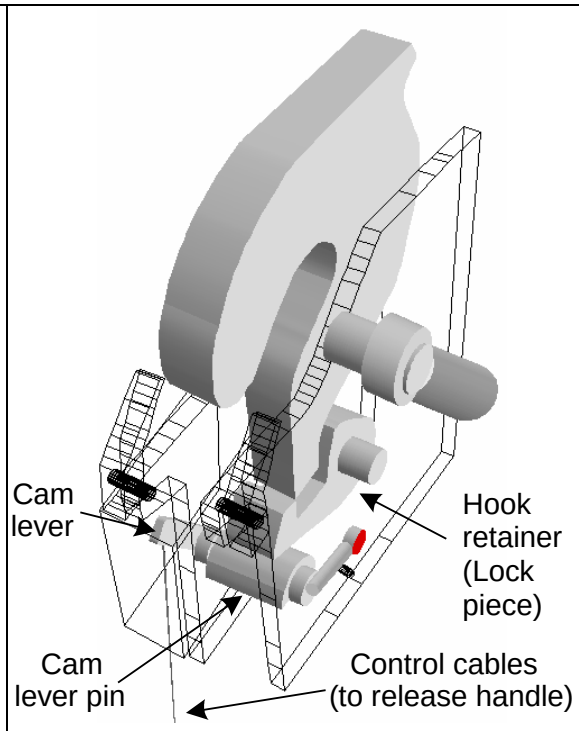


Figure 5.2.1.2 Internal view of the hook unit

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).

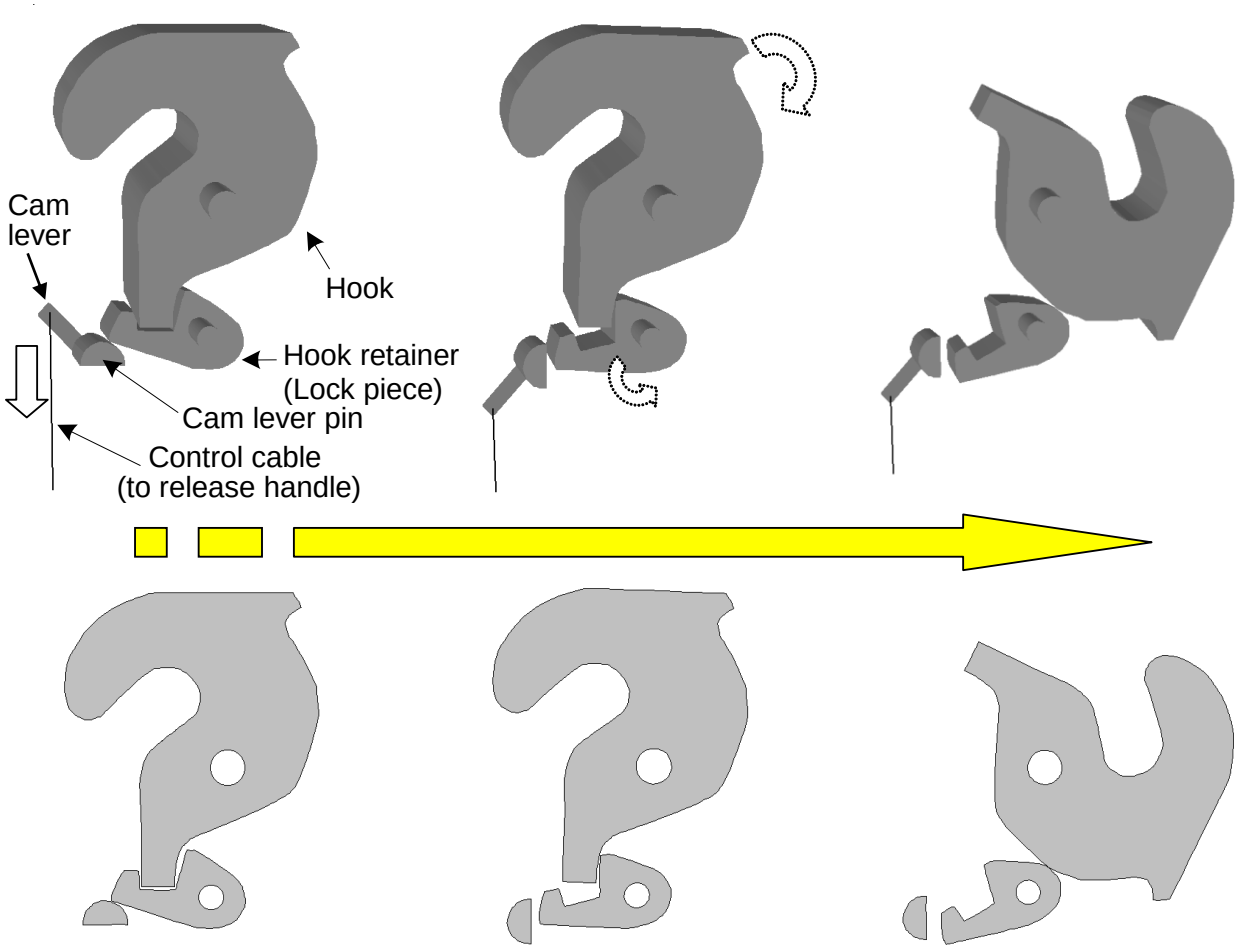


Figure 5.2.2 Release principle of the hook unit

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 pin 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).

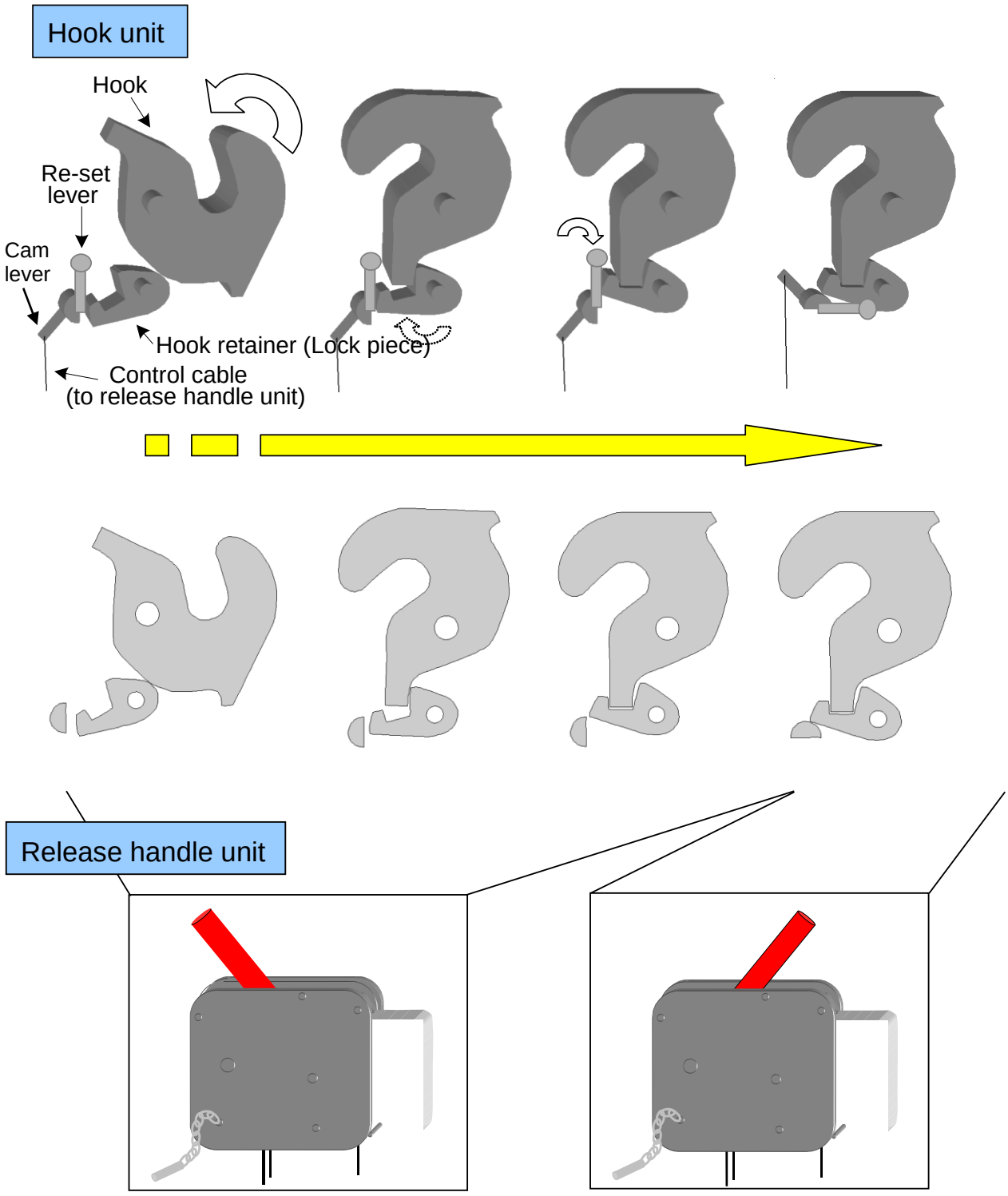


Figure 5.2.3 Reset principle of the hook unit

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.

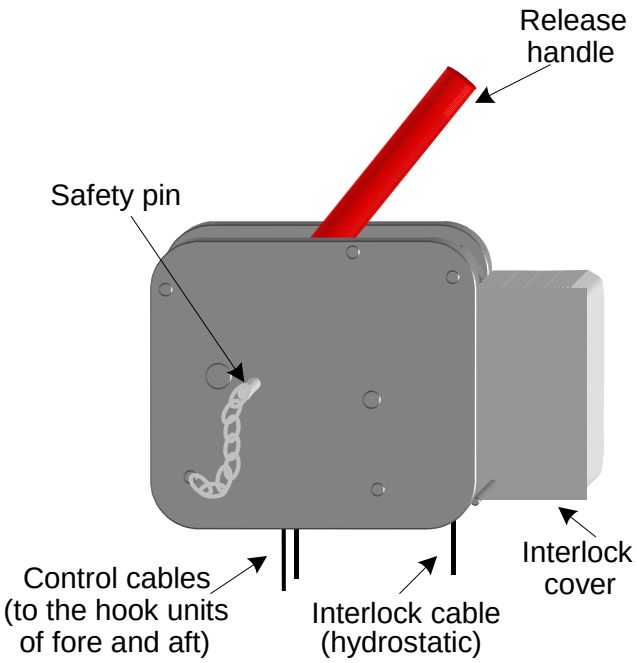


Figure 5.3.1.1 Perspective of the release handle unit

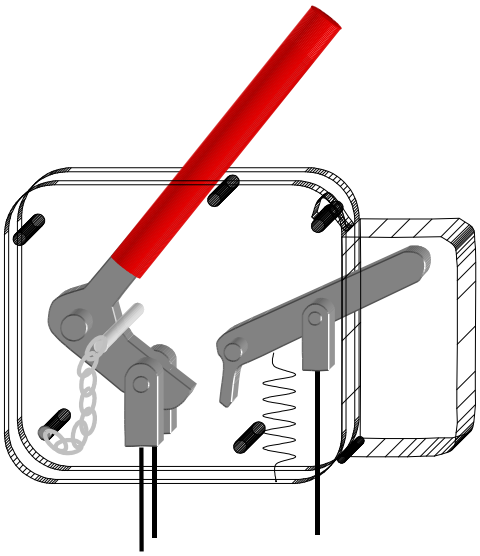


Figure 5.3.1.2 Internal view of the release handle unit

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).

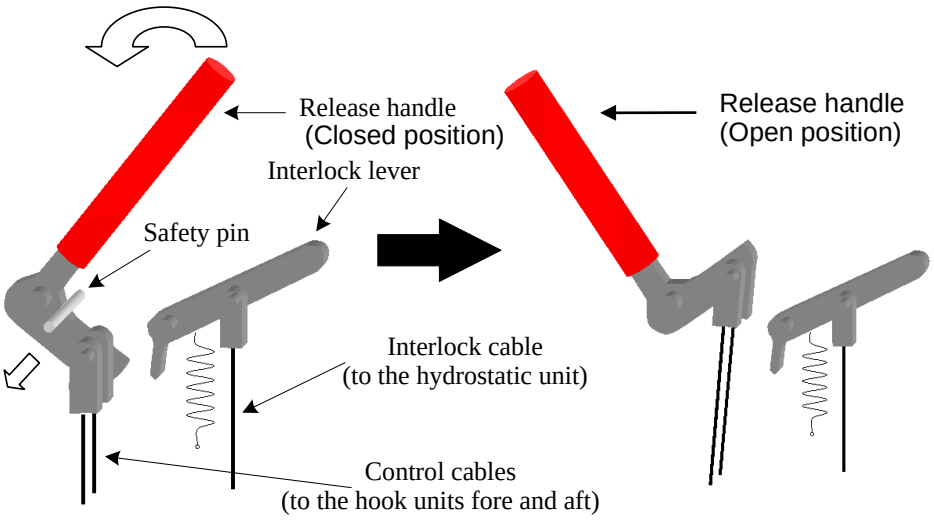


Figure 5.3.2 Operation procedure of the release handle

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.

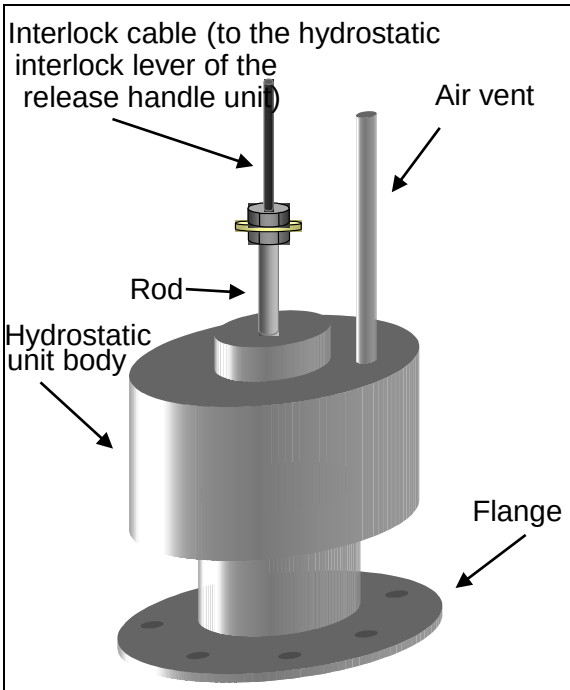


Figure 5.4.1.1 Perspective of the hydrostatic interlock unit

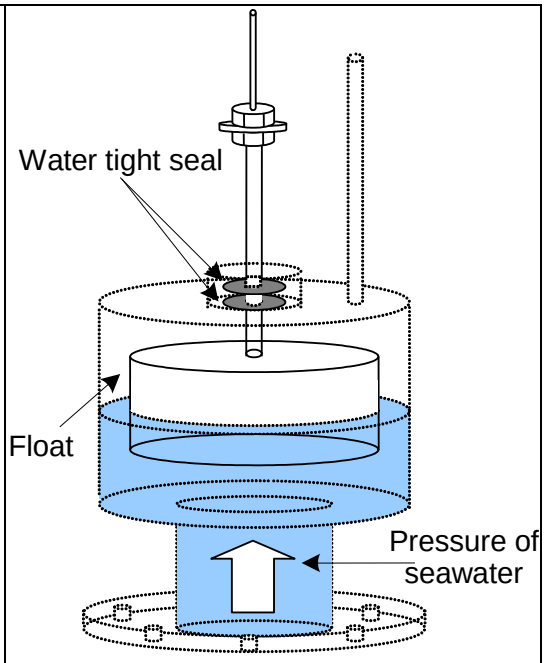


Figure 5.4.1.2 Internal view of the hydrostatic interlock unit

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.

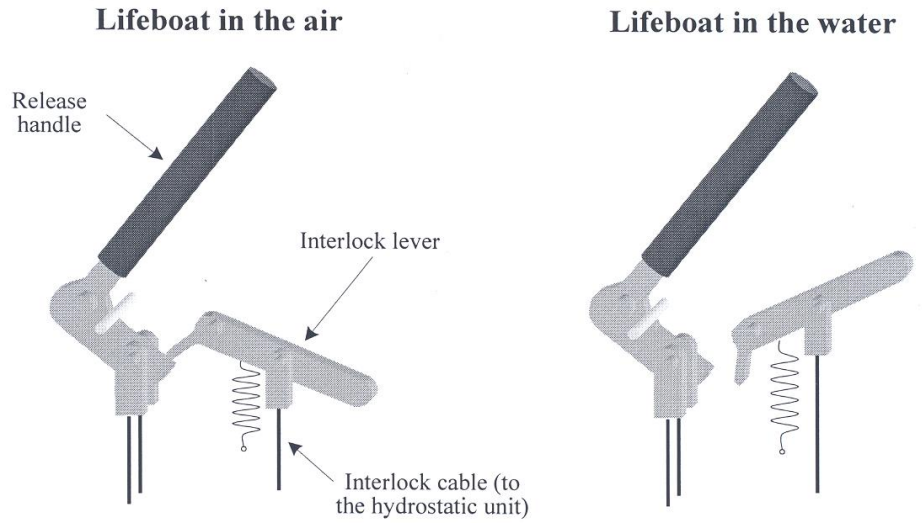


Fig. 5.4.2 Schematic diagram of the interlock

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 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*1		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.

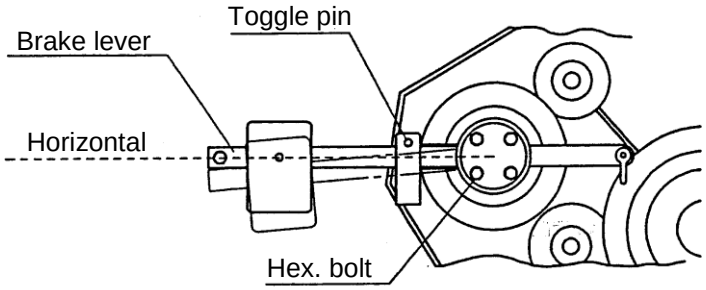
6.3.2.3 Boat winch

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.

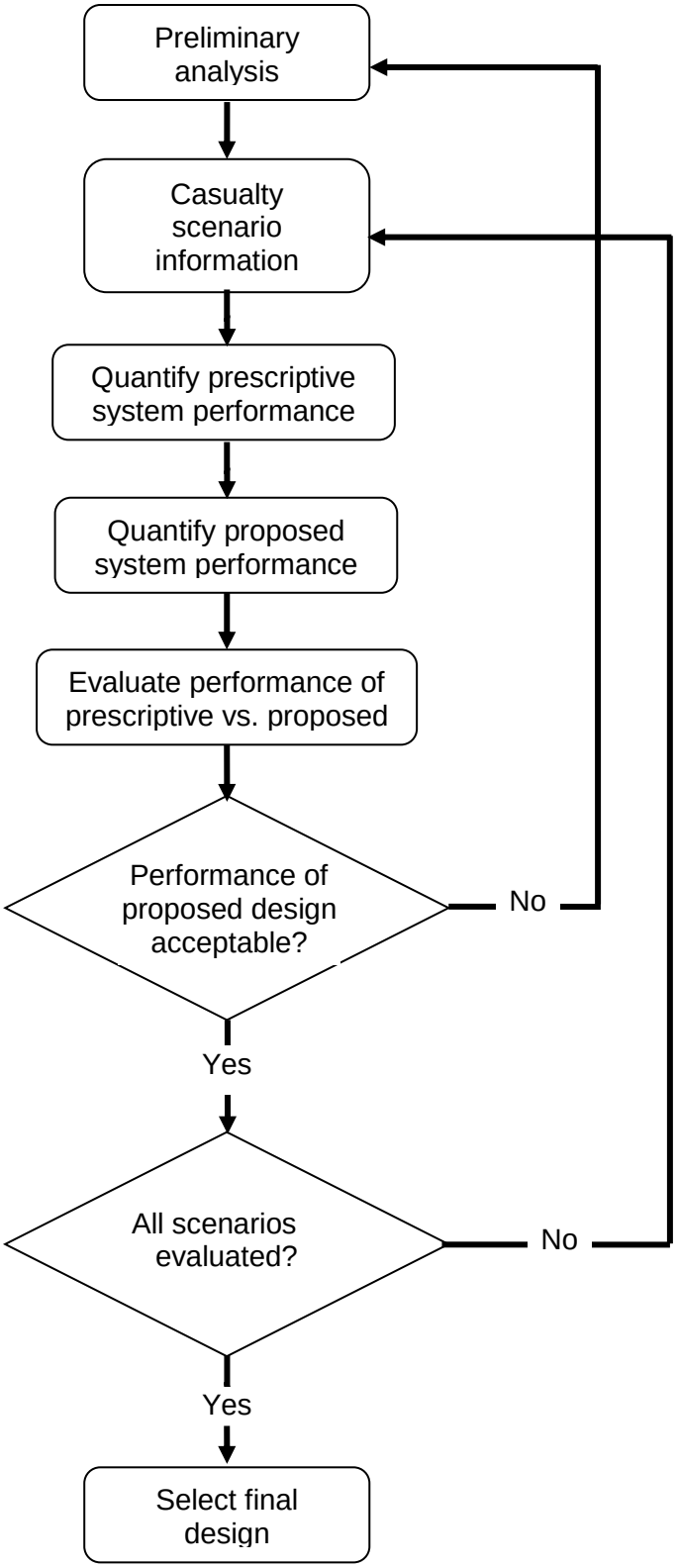

Figure 6.4.1 Alternative design and arrangements process flowchart

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

* 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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MSC.1/Circ.1535/Rev.1
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.

* "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_2, dry chemical powder, foam concentrate, etc.) should be included in the lightweight and lightship condition.

Part A – Mandatory criteria

2.3 Severe wind and rolling criterion (weather criterion)

2 In applying Φ_f, openings which cannot be or are incapable of being closed weathertight include ventilators (complying with regulation 19(4) of the International Convention on Load Lines, 1966) that for operational reasons have to remain open to supply air to the engine-room, 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^3.

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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_2, dry chemical powder, foam concentrate, etc.) should be included in the lightweight and lightship condition.

Regulation 3-2 – Protective coatings of dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers

2 The following tanks should not be considered to be dedicated seawater ballast tanks and should, therefore, be exempted from the application and requirements of the *Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers* (resolution MSC.215(82)), provided the coatings applied in the tanks described in 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 θ_v, openings which cannot be or are incapable of being closed weathertight include ventilators (complying with regulation 19(4) of the *International Convention on Load Lines, 1966)* that for operational reasons have to remain open to supply air to the engine-room, 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[i]

"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)."

[i] 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 (...)

* *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
14 June 2019

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.

***

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.

[*] 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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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.

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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 G*uidance 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^3)	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)

* 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)).

* 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/m² (around 30 mm) on horizontal parts or 7.5 kg/m² (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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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_2 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^2 on exposed horizontal surfaces and 7.5 kg/m^2 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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MSC.1/Circ.1615
26 June 2019

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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26 June 2019

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_2 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.