INTERNATIONAL MARITIME ORGANIZATION

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MARITIME SAFETY COMMITTEE
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Agenda item 22

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REPORT OF THE MARITIME SAFETY COMMITTEE ON ITS 111TH SESSION

Attached are annexes 18 to 31 to the report of the Maritime Safety Committee on its 111th session (MSC 111/22).

(See documents MSC 111/22/Add.1 for annexes 1 to 17, and MSC 111/22/Add.3 for annexes 32 to 38)

LIST OF ANNEXES

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ANNEX 18

DRAFT MSC RESOLUTION

AMENDMENTS TO CHAPTER II-1 OF THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974

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 [112th] 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 January 2028], 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 July 2028] 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 ALSO REQUESTS the Secretary-General to transmit copies of this resolution and its annex to Members of the Organization which are not Contracting Governments to the Convention.

ANNEX

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

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

Part A
General

Regulation 2
Definitions

1 Paragraphs 28 and 29 are amended, as follows:

"28 *IGF Code* means the International Code of Safety for Ships using Gases or ~~other~~ Low-Flashpoint Fuels as adopted by the Maritime Safety Committee of the Organization by resolution MSC.391(95), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the annex other than chapter I.

29 *Low-flashpoint fuel* means ~~gaseous or~~ liquid fuel having a flashpoint lower than otherwise permitted under regulation II-2/4.2.1.1."

2 The following new paragraph is added after existing paragraph 33:

"34 *Gaseous fuel* means any fluid used as fuel which:

.1 has a vapour pressure exceeding 0.28 MPa absolute at a temperature of 37.8°C; or

.2 is completely gaseous at 20°C at a standard pressure of 101.3 kPa."

Part F
Alternative design and arrangements

Regulation 55
Alternative design and arrangements

3 Paragraph 1 is amended, as follows:

"**1 Purpose**

The purpose of this regulation is to provide a methodology for alternative design and arrangements for machinery, electrical installations and gaseous fuel or low-flashpoint fuel storage and distribution systems."

4 Paragraph 2.1 is amended, as follows:

"**2 General**

2.1 Machinery, electrical installation, ~~and~~ gaseous fuel or low-flashpoint fuel storage and distribution systems design and arrangements may deviate from the requirements set out in parts C, D, E or G, provided that the alternative design and arrangements meet the intent of the requirements concerned and provide an equivalent level of safety to this chapter."

5 Paragraphs 3.1, 3.2 and 3.4 are amended, as follows:

"**3 Engineering analysis**

The engineering analysis shall be prepared and submitted to the Administration, based on the guidelines developed by the Organization* and shall include, as a minimum, the following elements:

.1 determination of the ship type, machinery, electrical installations, gaseous fuel or low-flashpoint fuel storage and distribution systems and space(s) concerned;

.2 identification of the prescriptive requirement(s) with which the machinery, electrical installations, ~~and~~ gaseous fuel or low-flashpoint fuel storage and distribution systems will not comply;

.4 determination of the performance criteria for the ship, machinery, electrical installation, gaseous fuel or low-flashpoint fuel storage and distribution system or the space(s) concerned addressed by the relevant prescriptive requirement(s):

.1 performance criteria shall provide a level of safety not inferior to the relevant prescriptive requirements contained in parts C, D, E or G; and

.2 performance criteria shall be quantifiable and measurable;

* Refer to the *Guidelines on alternative design and arrangements for SOLAS chapters II-1 and III* (MSC.1/Circ.1212) and the *Guidelines for the approval of alternatives and equivalents as provided for in various IMO instruments* (MSC.1/Circ.1455)."

Part G
Ships using low-flashpoint fuels

6 The existing title of part G is amended, as follows:

"**Part G**
Ships using gaseous fuels or low-flashpoint fuels"

Regulation 56
Application

7 Paragraphs 1 to 4 are amended, as follows:

"1 Except as provided for in paragraphs 4 and 5, this part shall apply to ships using gaseous fuels or low-flashpoint fuels:

.1 for which the building contract is placed on or after 1 January 2017;

.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 2017; or

.3 the delivery of which is on or after 1 January 2021.

Such ships using gaseous fuels or low-flashpoint fuels shall comply with the requirements of this part in addition to any other applicable requirements of the present regulations.

2 Except as provided for in paragraphs 4 and 5, a ship, irrespective of the date of construction, including one constructed before 1 January 2009, which converts to using gaseous fuels or low-flashpoint fuels on or after 1 January 2017 shall be treated as a ship using gaseous fuels or low-flashpoint fuels on the date on which such conversion commenced.

3 Except as provided for in paragraphs 4 and 5, a ship using gaseous fuels or low-flashpoint fuels, irrespective of the date of construction, including one constructed before 1 January 2009, which, on or after 1 January 2017, undertakes to use gaseous fuels or low-flashpoint fuels different from those which it was originally approved to use before 1 January 2017 shall be treated as a ship using gaseous fuels or low-flashpoint fuels on the date on which such undertaking commenced.

4 This part shall not apply to gas carriers, as defined in regulation VII/11.2.~~:~~

~~.1 using their cargoes as fuel and complying with the requirements of the IGC Code, as defined in regulation VII/11.1; or~~

~~.2 using other low-flashpoint gaseous fuels provided that the fuel storage and distribution systems design and arrangements for such gaseous fuels comply with the requirements of the IGC Code for gas as a cargo.~~

Regulation 57
Requirements for ships using low-flashpoint fuels

8 Regulation 57 is amended, as follows:

"**Regulation 57 – Requirements for ships using gaseous fuels or low-flashpoint fuels**

Except as provided in regulations 56.4 and 56.5, ships using gaseous fuels or low-flashpoint fuels shall comply with the requirements of the IGF Code."

APPENDIX 1

CHECK/MONITORING SHEET FOR THE PROCESS OF AMENDING THE CONVENTION AND RELATED MANDATORY INSTRUMENTS (PROPOSAL/DEVELOPMENT)

Part III – Process monitoring to be completed during the work process at the sub-committee and checked as part of the final approval process by the Committee (refer to paragraph 3.2.1.3)

1	The sub-committee, at an initial engagement, has allocated sufficient time for technical research and discussion before the target completion date, especially on issues needing to be addressed by more than one sub-committee and for which the timing of relevant sub-committees' meetings and exchanges of the result of consideration needed to be carefully examined.	Yes
2	The scope of application agreed at the proposal stage was not changed without the approval of the Committee.	Yes
3	The technical base document/draft amendment addresses the proposal's issue(s) through the suggested instrument(s); where it does not, the sub-committee offers the Committee an alternative method of addressing the problem raised by the proposal.	N/A
4	Due attention has been paid to the *Interim guidelines for the systematic application of the grandfather clauses* (MSC/Circ.765-MEPC/Circ.315).	N/A
5	All references have been examined against the text that will be valid if the proposed amendment enters into force.	Yes
6	The location of the insertion or modified text is correct for the text that will be valid when the proposed text enters into force on a four-year cycle of entry into force, as other relevant amendments adopted might enter into force on the same date.	Yes
7	There are no inconsistencies in respect of scope of application between the technical regulation and the application statement contained in regulation 1 or 2 of the relevant chapter, and application is specifically addressed for existing and/or new ships, as necessary.	Yes
8	Where a new term has been introduced into a regulation and a clear definition is necessary, the definition is given in the article of the Convention or at the beginning of the chapter.	Yes
9	Where any of the terms "fitted", "provided", "installed" or "installation" are used, consideration has been given to clarifying the intended meaning of the term.	N/A
10	All necessary related and consequential amendments to other existing instruments, including non-mandatory instruments, in particular to the forms of certificates and records of equipment required in the instrument being amended, have been examined and included as part of the proposed amendment(s).	Yes
11	The forms of certificates and records of equipment have been harmonized, where appropriate, between the Convention and its Protocols.	N/A

Part III – Process monitoring to be completed during the work process at the sub-committee and checked as part of the final approval process by the Committee (refer to paragraph 3.2.1.3)

12	It is confirmed that the amendment is being made to a currently valid text and that no other bodies are concurrently proposing changes to the same text.	Yes
13	All entry-into-force criteria (building contract, keel laying and delivery) have been considered and addressed.	Yes
14	Other impacts of the implementation of the proposed/approved amendment have been fully analysed, including consequential amendments to the "application" and "definition" regulations of the chapter.	Yes
15	The amendments presented for adoption clearly indicate changes made with respect to the original text, so as to facilitate their consideration.	Yes
16	For amendments to mandatory instruments, the relationship between the Convention and the related instrument has been observed and addressed, as appropriate.	Yes
17	The related record format and the checklist for the identification of capacity-building implications (MSC-MEPC.1/Circ.5, as revised, annex 2, appendix 1) together with the form for capacity-building measures (MSC-MEPC.1/Circ.5, as revised, annex 2, appendix 2), have been completed or updated, as appropriate.	Yes

RECORD FORMAT

The following records should be created and kept updated for each regulatory development.

The records can be completed by providing references to paragraphs of related documents containing the relevant information, proposals, discussions and decisions.

1 Title (number and title of regulation(s))
Draft amendments to the International Convention for the Safety of Life at Sea, 1974. chapter II-1 on Construction - Structure, Subdivision and Stability, Machinery and Electrical Installations, part A Definitions, regulation 56 Application and regulation 57 Requirements for ships using low-flashpoint fuels.
2 Origin of the requirement (original proposal document)
MSC 108 noted (MSC 108/20, paragraphs 5.30 to 5.33) that the title of the IGF Code stated that it should apply to fuels that were gases or had a low flashpoint, while, in SOLAS chapter II-1, part G, the IGF Code applies to ships using low-flashpoint fuels regardless of whether they are in liquid or gaseous form. MSC 108 also noted that the definition of low-flashpoint fuel in SOLAS regulation II-1/2 was *"Low-flashpoint fuel means gaseous or liquid fuel having a flashpoint lower than otherwise permitted under regulation II-2/4.2.1.1"*. MSC 108 further noted the need to clarify whether or not the IGF Code applied to ships using gas as fuel irrespective of flashpoint and referred this issue as an urgent matter to CCC 10 for consideration and advice to MSC 109 accordingly.

CCC 10 endorsed the principle that IGC Code ships using liquefied gases as fuel, including liquefied gases not carried as cargo, are subject to the requirements of the IGC Code in lieu of the IGF Code (CCC 10/4, paragraph 19).

3 Main reason for the development (extract from the proposal document)

Clarification needed considering that the title of the IGF Code stated that it should apply to fuels that were gases or had a low flashpoint, while, in SOLAS chapter II-1, part G, the IGF Code applies to ships using low-flashpoint fuels regardless of whether they are in liquid or gaseous form.

4 Related output

"Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels"

5 History of the discussion (approval of work programmes, sessions of sub-committees, including CG/DG/WG arrangements)

MSC 109 noted the discussions of the CCC Sub-Committee concerning unified interpretations, and that concerning document CCC 10/10/3 (IACS), the Sub-Committee recommended that SOLAS chapter II-1 would require an amendment in line with paragraph 20 of that document; and that concerning document CCC 10/10/4 (Republic of Korea), the CCC Sub-Committee recommended that the issues raised in that document could be further considered under the output on "Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels".

MSC 109 also considered the proposal to amend SOLAS to clarify the application of the IGF Code to gas fuels. The Working Group at MSC 109 noted that the current applicability of the IGF Code covered low-flashpoint fuels, as defined in SOLAS regulation II-1/2.29, and that ammonia did not present flammable vapour during the phase change from liquid to gas.

Therefore, ammonia seemed to fall outside the scope of the IGF Code. The proposal stated that, consequently, this could create uncertainty within the industry looking to invest in ammonia-fuelled ships, compliant with the Interim Guidelines (MSC.1/Circ.1687).

MSC 109 approved the draft amendments to the SOLAS Convention as prepared by the Working Group in relation to the application of the IGF Code, and agreed to the recommendation of the Working Group that these amendments be approved at that session with a view to adoption at MSC 110, and that the four-year amendment cycle (MSC.1/Circ.1481), should be relaxed, with a view for the entry into force in 2027.

MSC 110 considered the draft amendments to SOLAS chapter II-1 and the IGF Code, prepared by the Drafting Group (MSC 110/WP.7, annexes 16 and 17), related to the "one ship, one code" policy for gas carriers, as well as terminology, such as "gaseous fuel", "low-flashpoint fuel" and "IGF Code".

Having noted that there might be unintended consequences emanating from the draft amendments, particularly in relation to the "one ship, one code" policy for gas carriers, and that the draft amendments were expected to be adopted together with the draft amendments to the IGC Code at MSC 112, with a view to entering into force on 1 July 2028, MSC 110 agreed that the draft amendments to SOLAS chapter II-1 and the IGF Code should be further considered with a view to approval at MSC 111 (MSC 110/21, paragraph 3.64).

6	**Impact on other instruments (codes, performance standards, guidance circulars, certificates/records format, etc.)**
The IGC Code	
7	**Technical background**
7.1	***Scope and objective (to cross check with items 4 and 5 in part II of the checklist)***
The Working Group at MSC 109 noted that the current applicability of the IGF Code covered low-flashpoint fuels, as defined in SOLAS regulation II-1/2.29, and ammonia did not present flammable vapour during the phase change from liquid to gas.	
7.2	***Technical/operational background and rationale (e.g. summary of FSA study, if available, or engineering challenge posed)***
Not applicable	
7.3	***Source/derivation of requirement (non-mandatory instrument, industry standard, national/regional requirement)***
Not applicable	
7.4	***Short summary of requirement (what is the new requirement – in short and lay terms)***
Before introducing these amendments, ammonia seemed to fall outside the scope of the IGF Code. Consequently, this could create uncertainty within the industry looking to invest in ammonia-fuelled ships, compliant with the Interim Guidelines (MSC.1/Circ.1687). Draft amendments reflect the agreed "one ship, one code" policy.	
7.5	***Points of discussions (controversial points and conclusion)***
Not applicable	

APPENDIX 2

CHECKLIST FOR THE IDENTIFICATION OF CAPACITY-BUILDING IMPLICATIONS

1 For Administrations

☐ Is new legislation required? No

☐ Is there a requirement for new equipment and/or systems? No

- Does equipment manufacturing capacity exist internationally?
- Do equipment repair/servicing facilities exist internationally?
- Is there capacity to develop new systems?

☐ Will the implementation require additional financial resources? No

☐ Is there a need for additional human resources or new skills? No

☐ Will there be a need to upgrade current infrastructure? No

☐ Is there enough lead time towards implementation? Yes

☐ Will a rapid implementation procedure be adopted? No

☐ Is there a substantial modification of existing standards? No

☐ Will a guide to implementation be needed? No

2 For the industry

☐ Would the industry require new and/or enhancement of existing systems? No

- Does capacity exist internationally to develop new systems?

☐ Is there a need for additional training of seafarers? No

- Do related and validated training courses exist?
- Are sufficient simulation training courses available internationally?

☐ Will there be a requirement for new equipment? No

- Does manufacturing capacity exist internationally?

☐ Is there repair/servicing and/or retrofitting and does maintenance capacity exist internationally? N/A

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ANNEX 19

DRAFT AMENDMENTS TO THE IGF CODE

DRAFT MSC RESOLUTION

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

THE MARITIME SAFETY COMMITTEE,

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

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

NOTING ALSO article VIII(b) and regulation II-1/2.28 of the Convention concerning the procedure for amending the IGF Code,

HAVING CONSIDERED, at its [112th] 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 said amendments shall be deemed to have been accepted on [1 January 2028], 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 July 2028] 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 ALSO REQUESTS the Secretary-General to transmit copies of this resolution and its annex to Members of the Organization which are not Contracting Governments to the Convention.

ANNEX

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

1 The title of the IGF Code is amended, as follows:

"INTERNATIONAL CODE OF SAFETY FOR SHIPS USING GASES OR ~~OTHER~~ LOW-FLASHPOINT FUELS (IGF CODE)"

2 The preamble is amended, as follows:

"1 PREAMBLE

The purpose of this Code is to provide an international standard for ships, other than gas carriers, using gas or low-flashpoint fuel~~, other than ships covered by the IGC Code~~.

The basic philosophy of this Code is to provide mandatory provisions for the arrangement, installation, control and monitoring of machinery, equipment and systems using gas or low-flashpoint fuel to minimize the risk to the ship, its crew and the environment, having regard to the nature of the fuels involved.

Throughout the development of this Code it was recognized that it must be based upon sound naval architectural and engineering principles and the best understanding available of current operational experience, field data and research and development. Owing to the rapidly evolving new fuels technology, the Organization will periodically review this Code, taking into account both experience and technical developments.

This Code addresses all areas that need special consideration for the usage of the gas or low-flashpoint fuel. The basic philosophy of the IGF Code considers the goal-based approach (MSC.1/Circ.1394). Therefore, goals and functional requirements were specified for each section forming the basis for the design, construction and operation.

The current version of this Code includes regulations to meet the functional requirements for natural gas fuel. Regulations for other gases or low-flashpoint fuels will be added to this Code as, and when, they are developed by the Organization.

In the meantime, for other gases or low-flashpoint fuels, compliance with the functional requirements of this Code must be demonstrated through alternative design.

The terms "gas fuel" and "gaseous fuel" in the IGF Code are considered as having the same meaning as "gas" as defined in paragraph 2.2.18".

PART A

2 GENERAL

2.2 Definitions

3 Paragraph 2.2.18 is amended, as follows:

"2.2.18 *Gas* means any ~~a~~ fluid used as fuel which:

.1 ~~having~~ has a vapour pressure exceeding 0.28 MPa absolute at a temperature of 37.8°C; or

.2 is completely gaseous at 20°C at a standard pressure of 101.3 kPa."

4 Paragraph 2.2.28 is amended, as follows:

"2.2.28 *Low-flashpoint fuel* means ~~gaseous or~~ liquid fuel having a flashpoint lower than otherwise permitted under paragraph 2.1.1 of SOLAS regulation II-2/4."

2.3 Alternative design

5 Paragraph 2.3.1 and the chapeau of paragraph 2.3.2 are amended, as follows:

"2.3.1 This Code contains functional requirements for all appliances and arrangements related to the usage of gases or low-flashpoint fuels."

"2.3.2 Fuels, appliances and arrangements of gas or low-flashpoint fuel systems may either:"

4 GENERAL REQUIREMENTS

4.2 Risk assessment

6 Paragraph 4.2.1 is amended, as follows:

"4.2.1 A risk assessment shall be conducted to ensure that risks arising from the use of gases or low-flashpoint fuels affecting persons on board, the environment, the structural strength or the integrity of the ship are addressed. Consideration shall be given to the hazards associated with physical layout, operation and maintenance, following any reasonably foreseeable failure."

PART D

7 Paragraph 19.2 is amended, as follows:

"19.2 Functional requirements

Companies shall ensure that seafarers on board ships using gases or ~~other~~ low-flashpoint fuels shall have completed training to attain the abilities that are appropriate to the capacity to be filled and duties and responsibilities to be taken up, taking into account the provisions given in the STCW Convention and Code, as amended."

APPENDIX 1

CHECK/MONITORING SHEET FOR THE PROCESS OF AMENDING THE CONVENTION AND RELATED MANDATORY INSTRUMENTS (PROPOSAL/DEVELOPMENT)

Part III – Process monitoring to be completed during the work process at the sub-committee and checked as part of the final approval process by the Committee (refer to paragraph 3.2.1.3)

1	The sub-committee, at an initial engagement, has allocated sufficient time for technical research and discussion before the target completion date, especially on issues needing to be addressed by more than one sub-committee and for which the timing of relevant sub-committees' meetings and exchanges of the result of consideration needed to be carefully examined.	Yes
2	The scope of application agreed at the proposal stage was not changed without the approval of the Committee.	Yes
3	The technical base document/draft amendment addresses the proposal's issue(s) through the suggested instrument(s); where it does not, the sub-committee offers the Committee an alternative method of addressing the problem raised by the proposal.	N/A
4	Due attention has been paid to the *Interim guidelines for the systematic application of the grandfather clauses* (MSC/Circ.765-MEPC/Circ.315).	N/A
5	All references have been examined against the text that will be valid if the proposed amendment enters into force.	Yes
6	The location of the insertion or modified text is correct for the text that will be valid when the proposed text enters into force on a four-year cycle of entry into force, as other relevant amendments adopted might enter into force on the same date.	Yes
7	There are no inconsistencies in respect of scope of application between the technical regulation and the application statement contained in regulation 1 or 2 of the relevant chapter, and application is specifically addressed for existing and/or new ships, as necessary.	Yes
8	Where a new term has been introduced into a regulation and a clear definition is necessary, the definition is given in the article of the Convention or at the beginning of the chapter.	Yes
9	Where any of the terms "fitted", "provided", "installed" or "installation" are used, consideration has been given to clarifying the intended meaning of the term.	N/A
10	All necessary related and consequential amendments to other existing instruments, including non-mandatory instruments, in particular to the forms of certificates and records of equipment required in the instrument being amended, have been examined and included as part of the proposed amendment(s).	Yes
11	The forms of certificates and records of equipment have been harmonized, where appropriate, between the Convention and its Protocols.	N/A

Part III – Process monitoring to be completed during the work process at the sub-committee and checked as part of the final approval process by the Committee (refer to paragraph 3.2.1.3)

12	It is confirmed that the amendment is being made to a currently valid text and that no other bodies are concurrently proposing changes to the same text.	Yes
13	All entry-into-force criteria (building contract, keel laying and delivery) have been considered and addressed.	Yes
14	Other impacts of the implementation of the proposed/approved amendment have been fully analysed, including consequential amendments to the "application" and "definition" regulations of the chapter.	Yes
15	The amendments presented for adoption clearly indicate changes made with respect to the original text, so as to facilitate their consideration.	Yes
16	For amendments to mandatory instruments, the relationship between the Convention and the related instrument has been observed and addressed, as appropriate.	Yes
17	The related record format and the checklist for the identification of capacity-building implications (MSC-MEPC.1/Circ.5, as revised, annex 2, appendix 1) together with the form for capacity-building measures (MSC-MEPC.1/Circ.5, as revised, annex 2, appendix 2), have been completed or updated, as appropriate.	Yes

RECORD FORMAT

The following records should be created and kept updated for each regulatory development.

The records can be completed by providing references to paragraphs of related documents containing the relevant information, proposals, discussions and decisions.

1 Title (number and title of regulation(s))
Draft amendments to the International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels (IGF Code)
2 Origin of the requirement (original proposal document)
MSC 108 noted (MSC 108/20, paragraphs 5.30 to 5.33) that the title of the IGF Code stated that it should apply to fuels that were gases or had a low flashpoint, while, in SOLAS chapter II-1, part G, the IGF Code applies to ships using low-flashpoint fuels regardless of whether they are in liquid or gaseous form. MSC 108 also noted that the definition of low-flashpoint fuel in SOLAS regulation II-1/2 was *"Low-flashpoint fuel means gaseous or liquid fuel having a flashpoint lower than otherwise permitted under regulation II-2/4.2.1.1"*. MSC 108 further noted the need to clarify whether or not the IGF Code applied to ships using gas as fuel irrespective of flashpoint and referred this issue as an urgent matter to CCC 10 for consideration and advice to MSC 109 accordingly.

CCC 10 endorsed the principle that IGC Code ships using liquefied gases as fuel, including liquefied gases not carried as cargo, are subject to the requirements of the IGC Code in lieu of the IGF Code (CCC 10/4, paragraph 19).

3 Main reason for the development (extract from the proposal document)

Clarification needed considering that the title of the IGF Code stated that it should apply to fuels that were gases or had a low flashpoint, while, in SOLAS chapter II-1, part G, the IGF Code applies to ships using low-flashpoint fuels regardless of whether they are in liquid or gaseous form.

4 Related output

"Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels"

5 History of the discussion (approval of work programmes, sessions of sub-committees, including CG/DG/WG arrangements)

MSC 109 noted the discussions of the CCC Sub-Committee concerning unified interpretations, and that concerning document CCC 10/10/3 (IACS), the Sub-Committee recommended that SOLAS chapter II-1 would require an amendment in line with paragraph 20 of that document; and that concerning document CCC 10/10/4 (Republic of Korea), CCC the Sub-Committee recommended that the issues raised in that document could be further considered under the output on "Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels".

MSC 109 also considered the proposal to amend SOLAS to clarify the application of the IGF Code to gas fuels. The Working Group at MSC 109 noted that the current applicability of the IGF Code covered low-flashpoint fuels, as defined in SOLAS regulation II-1/2.29, and that ammonia did not present flammable vapour during the phase change from liquid to gas. Therefore, ammonia seemed to fall outside the scope of the IGF Code. The proposal stated that, consequently, this could create uncertainty within the industry looking to invest in ammonia-fuelled ships, compliant with the Interim Guidelines (MSC.1/Circ.1687).

MSC 109 approved the draft amendments to the SOLAS Convention as prepared by the Working Group in relation to the application of the IGF Code, and agreed to the recommendation of the Working Group that these amendments be approved at that session with a view to adoption at MSC 110, and that the four-year amendment cycle (MSC.1/Circ.1481), should be relaxed, with a view for the entry into force in 2027.

MSC 110 considered the draft amendments to SOLAS chapter II-1 and the IGF Code, prepared by the Drafting Group (MSC 110/WP.7, annexes 16 and 17), related to the "one ship, one code" policy for gas carriers, as well as terminology, such as "gaseous fuel", "low-flashpoint fuel" and" IGF Code".

Having noted that there might be unintended consequences emanating from the draft amendments, particularly in relation to the "one ship, one code" policy for gas carriers, and that the draft amendments were expected to be adopted together with the draft amendments to the IGC Code at MSC 112, with a view to entering into force on 1 July 2028, MSC 110 agreed that the draft amendments to SOLAS

	chapter II-1 and the IGF Code should be further considered with a view to approval at MSC 111 (MSC 110/21, paragraph 3.64).
6	**Impact on other instruments (codes, performance standards, guidance circulars, certificates/records format, etc.)**
The IGC Code	
7	**Technical background**
7.1	***Scope and objective (to cross check with items 4 and 5 in part II of the checklist)***
The Working Group at MSC 109 noted that the current applicability of the IGF Code covered low-flashpoint fuels, as defined in SOLAS regulation II-1/2.29, and ammonia did not present flammable vapour during the phase change from liquid to gas.	
7.2	***Technical/operational background and rationale (e.g. summary of FSA study, if available, or engineering challenge posed)***
Not applicable	
7.3	***Source/derivation of requirement (non-mandatory instrument, industry standard, national/regional requirement)***
Not applicable	
7.4	***Short summary of requirement (what is the new requirement – in short and lay terms)***
Before introducing these amendments, ammonia seemed to fall outside the scope of the IGF Code. Consequently, this could create uncertainty within the industry looking to invest in Ammonia-fuelled ships, compliant with the Interim Guidelines (MSC.1/Circ.1687). Draft amendments reflect the agreed "one ship, one code" policy.	
7.5	***Points of discussions (controversial points and conclusion)***
Not applicable	

APPENDIX 2

CHECKLIST FOR THE IDENTIFICATION OF CAPACITY-BUILDING IMPLICATIONS

1 For Administrations

☐ Is new legislation required? No

☐ Is there a requirement for new equipment and/or systems? No

- Does equipment manufacturing capacity exist internationally?
- Do equipment repair/servicing facilities exist internationally?
- Is there capacity to develop new systems?

☐ Will the implementation require additional financial resources? No

☐ Is there a need for additional human resources or new skills? No

☐ Will there be a need to upgrade current infrastructure? No

☐ Is there enough lead time towards implementation? Yes

☐ Will a rapid implementation procedure be adopted? No

☐ Is there a substantial modification of existing standards? No

☐ Will a guide to implementation be needed? No

2 For the industry

☐ Would the industry require new and/or enhancement of existing systems? No

- Does capacity exist internationally to develop new systems?

☐ Is there a need for additional training of seafarers? No

- Do related and validated training courses exist?
- Are sufficient simulation training courses available internationally?

☐ Will there be a requirement for new equipment? No

- Does manufacturing capacity exist internationally?

☐ Is there repair/servicing and/or retrofitting and does maintenance capacity exist internationally? N/A

***

ANNEX 20

DRAFT AMENDMENTS TO THE IGC CODE

DRAFT MSC RESOLUTION

AMENDMENTS TO THE INTERNATIONAL CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING LIQUEFIED GASES IN BULK (IGC CODE)

THE MARITIME SAFETY COMMITTEE,

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

NOTING resolution MSC.5(48), by which it adopted the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk ("the IGC Code"), which has become mandatory under chapter VII of the International Convention for the Safety of Life at Sea, 1974 ("the Convention"),

NOTING ALSO resolution MSC.370(93), by which it adopted the comprehensive revision of the IGC Code, and subsequent amendments adopted to the IGC Code,

NOTING FURTHER article VIII(b) and regulation VII/11.1 of the Convention concerning the procedure for amending the IGC Code,

HAVING CONSIDERED, at its [112th] session, amendments to the IGC 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 IGC 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 said amendments shall be deemed to have been accepted on [1 January 2028], 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 July 2028] 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 ALSO REQUESTS the Secretary-General to transmit copies of this resolution and its annex to Members of the Organization which are not Contracting Governments to the Convention.

ANNEX

DRAFT AMENDMENTS TO THE INTERNATIONAL CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING LIQUEFIED GASES IN BULK (IGC CODE)

CHAPTER 1
GENERAL

1.1 Application and implementation

1 The following new paragraphs 1.1.1.1 to 1.1.1.3 are added after existing paragraph 1.1.1:

"1.1.1.1 Ships subject to this Code may use products listed in chapter 19 as fuel, subject to the requirements of chapter 16. If the product is not carried as cargo and only used as fuel, the ship shall comply with the most stringent requirements for the cargo or fuel, as appropriate.

1.1.1.2 Ships subject to this Code using gaseous fuels or low-flashpoint fuels, other than the products listed in chapter 19, shall be approved by the Administration, taking into account the guidelines developed by the Organization specifically for ships subject to this Code.

1.1.1.3 The products shall be listed on the ship's International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk and identified as cargo and/or fuel, as appropriate."

2 Paragraph 1.1.2.2 is amended, as follows:

"1.1.2.2 For the purpose of the Code, the expression "ships constructed" means ships the keels of which are laid or which are at a similar stage of construction, unless otherwise specified in the Code."

3 The following new paragraph is added after the existing paragraph 1.1.2.2:

"1.1.2.2.1 The expression "ships constructed on or after [1 July 2028]" means ships:

.1 for which the building contract is placed on or after [1 July 2028]; 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 January 2029]; or

.3 the delivery of which is on or after [1 July 2032]."

1.2 Definitions

4 The following new definitions are inserted in the respective alphabetical order, together with the associated footnote, and subsequent paragraphs are renumbered accordingly:

"1.2.18 *Essential safety functions* are safety functions required by the Code, which include a system that initiates required actions to prevent escalation of potential hazards."

"1.2.25 *Gastight* means a physical barrier which prevents any significant quantity of flammable gas from entering an adjoining area in accordance with specifications at least equivalent to standards acceptable to the Organization.*

* Refer to the recommendations published by the International Electrotechnical Commission, IEC 60092-502:1999."

"1.2.32 *Integrated system* is a combination of computer-based systems which are interconnected in order to allow centralized access to sensor information and/or command and control. Integration of systems shall ensure that no failure of any component of the system will result in an unacceptable loss of control, alarm or safety functions."

"1.2.49 *Reversionary control* is an alternative means of control that may be local manual or local automatic."

CHAPTER 2
SHIP SURVIVAL CAPABILITY AND LOCATION OF CARGO TANKS

2.1 General

5 Paragraph 2.1.4 is amended, as follows:

"2.1.4 If a ship is intended to carry more than one of the products listed in chapter 19, the standard of damage shall correspond to the product having the most stringent ship type requirements. If a product listed in chapter 19 is only used as fuel, not carried as a cargo, and bunkered in dedicated deck tanks, the standard of damage shall correspond to the ship type requirements of the ship's cargo. The requirements for the location of individual cargo and gas fuel tanks, however, shall be those for ship types related to the respective products intended to be carried."

2.7 Survival requirements

2.7.2 At final equilibrium after flooding

6 Paragraph 2.7.2.1 is amended, as follows:

".1 the righting lever curve shall have a minimum range of 20° beyond the position of equilibrium in association with a maximum residual righting lever of at least 0.1 m within the 20° range; the area under the curve within this range shall not be less than 0.0175 m-radians. The 20° range may be measured from any angle commencing between the position of equilibrium and the angle of 25° (or 30° if no deck immersion occurs). Unprotected openings shall not be immersed within this range unless the space concerned is assumed to be flooded. Within this range, the immersion of any of the openings listed in 2.7.1.1 and other openings capable of being closed weathertight may be permitted, except for those ventilators (in compliance with regulation 19(4) of the International Convention on Load Lines, 1966/88) which have to remain open to supply air to the engine-room or emergency generator room (if the same is considered buoyant in the stability

calculation or protecting openings leading below) for the effective operation of the ship; and"

CHAPTER 3
SHIP ARRANGEMENTS

3.2 Accommodation, service and machinery spaces and control stations

7 Paragraph 3.2.6 is renumbered as 3.2.6.1 and the following new paragraphs are added after the renumbered paragraph 3.2.6.1:

"3.2.6.2 Engine-room casings, cargo machinery spaces, electric motor rooms and steering gear compartments are generally considered as spaces not covered by paragraph 3.2.6.1 and, therefore, the requirement for closing devices need not be applied to these spaces.

3.2.6.3 The closing devices shall be gastight. For ships constructed on or after [1 July 2028], ordinary steel fire-flaps without gaskets/seals shall not be considered to be satisfactory.

3.2.6.4 Regardless of paragraphs 3.2.6.2 and 3.2.6.3, the closing devices for main inlets and outlets of all ventilation systems shall be operable from outside of the protected space in accordance with SOLAS regulation II-2/5.2.1.1."

3.3 Cargo machinery spaces and turret compartments

8 Paragraph 3.3.1 is amended, as follows:

"3.3.1 Cargo machinery spaces shall be situated above the weather deck and located within the cargo area. Cargo machinery spaces and turret compartments shall be treated as cargo pump-rooms for the purpose of fire protection according to SOLAS regulation II-2/9.2.4~~, and for the purpose of prevention of potential explosion according to SOLAS regulation II-2/4.5.10~~."

3.5 Access to spaces in the cargo area

9 Paragraph 3.5.3.1.2 is amended, as follows:

".2 access through horizontal openings, hatches or manholes. The dimensions shall be sufficient to allow a person wearing a breathing apparatus to ascend or descend any ladder without obstruction, and also to provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space. The minimum clear opening shall be not less than 600 mm x 600 mm. For ships constructed on or after [1 July 2028], the minimum clear opening of 600 mm x 600 mm may have corner radii up to 100 mm. In a case where the stress needs to be reduced around the opening as a consequence of structural analysis of a given design, appropriate measures shall be taken to reduce the stress such as making the opening larger with increased radii, e.g. 600 x 800 with 300 mm radii, in which a clear opening of 600 mm x 600 mm with corner radii up to 100 mm maximum fits;"

10 Paragraph 3.5.3.1.3 is amended, as follows, and the subsequent figures in this chapter are renumbered accordingly:

".3 access through vertical openings or manholes providing passage through the length and breadth of the space. The minimum clear opening shall be not less than 600 mm x 800 mm at a height of not more than 600 mm from the bottom plating unless gratings or other footholds are provided. For ships constructed on or after [1 July 2028], the minimum clear opening of not less than 600 mm x 800 mm may also include an opening with corner radii of 300 mm (see figure 3.1). An opening of 600 mm in height x 800 mm in width may be accepted as access openings in vertical structures where it is not desirable to make a large opening in the structural strength aspects, i.e. girders and floors in double bottom tanks.

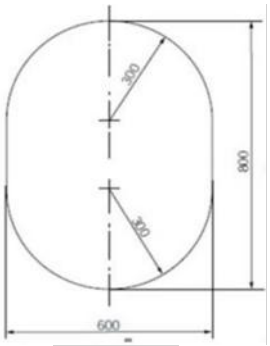

Figure 3.1

Subject to verification of easy evacuation of an injured person on a stretcher the vertical opening 850 mm x 620 mm with wider upper half than 600 mm, while the lower half may be less than 600 mm with the overall height not less than 850 mm is considered an acceptable alternative to the traditional opening of 600 mm x 800 mm with corner radii of 300 mm (see figure 3.2).

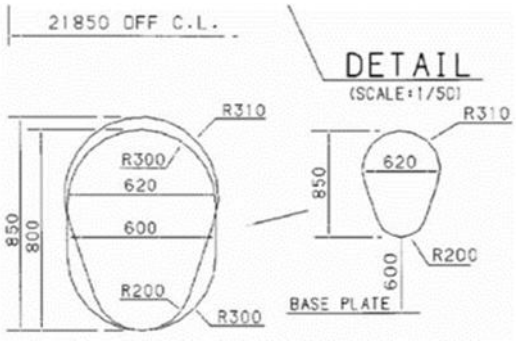

Figure 3.2

If a vertical opening is at a height of more than 600 mm, steps and handgrips shall be provided. In such arrangements it shall be demonstrated that an injured person can be easily evacuated; and"

3.7 Bilge, ballast and oil fuel arrangements

11 Paragraph 3.7.5 is amended, as follows:

"3.7.5 Ballast spaces, including wet duct keels used as ballast piping, oil fuel tanks and non-hazardous spaces, may be connected to pumps in the machinery spaces. Dry duct keels with ballast piping passing through may be connected to pumps in the machinery spaces, provided the connections are led directly to the pumps, and the discharge from the pumps is led directly overboard with no valves or manifolds in

either line that could connect the line from the duct keel to lines serving non-hazardous spaces. For pumps in the machinery spaces serving dry duct keels through which ballast piping passes, ~~P~~pump vents shall not be open to machinery spaces."

CHAPTER 4
CARGO CONTAINMENT

4.19 Materials

4.19.1 Materials forming ship structure

12 Paragraph 4.19.1.6.2 is amended, as follows:

".2 the heating system shall be considered as an essential auxiliary. All electrical components of at least one of the systems provided in accordance with paragraph ~~4.19.1.5.1~~ 4.19.1.6.1 shall be supplied from the emergency source of electrical power; and"

13 The following new paragraph is added after the existing paragraph 4.19.1.6:

"4.19.1.7 For ships constructed on or after [1 July 2028], the heating system referred to in paragraph 4.19.1.6.1 shall also comply with the following requirements:

.1 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.

.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 shall be supplied from the emergency source of electrical power.

.3 Where duplication of the primary source of heat, e.g. an oil-fired boiler, is not feasible, alternative means may 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 means may be accepted as satisfying the requirements of paragraph 4.19.1.6.1, provided a suitable risk assessment is conducted to the satisfaction of the Administration. In such cases, essential electrical components of at least one of the systems shall be supplied from the emergency source of electrical power."

4.20 Construction processes

4.20.1 Weld joint design

14 The following new paragraph is added after the existing paragraph 4.20.1.1:

"4.20.1.1.1 For ships constructed on or after [1 July 2028], all welded joints of the shells of type A independent tanks and type B independent tanks, primarily constructed of plane surfaces, shall be of the in-plane butt weld full penetration type. Welded corners (i.e. corners made of weld metal) shall not be used in the main tank shell construction, i.e. corners between shell side (sloped plane surfaces parallel

to hopper or top side inclusive if any) and bottom or top of the tank, and between tank end transverse bulkheads and bottom, top or shell sides (sloped plane surfaces inclusive if any) of the tank. Instead, tank corners which are constructed using bent plating aligned with the tank surfaces and connected with in-plane welds shall be used. For localized constructions of the shell, such as suction well, sump, dome, and their connections to shell, however, tee welds of the full penetration type may be used depending on the results of the tests carried out at the approval of the welding procedure. Except for small penetrations on domes, nozzle welds shall also be designed with full penetration."

15 Paragraph 4.20.1.2 is amended as follows, and the subsequent figures in this chapter are renumbered accordingly:

"4.20.1.2 Welding joint details for type C independent tanks and for the liquid-tight primary barriers of type B independent tanks primarily constructed of curved surfaces, shall be as follows:

.1 all longitudinal and circumferential joints shall be of butt welded, full penetration, double vee or single vee type. Full penetration butt welds shall be obtained by double welding or by the use of backing rings. If used, backing rings shall be removed except from very small process pressure vessels. Other edge preparations may be permitted, depending on the results of the tests carried out at the approval of the welding procedure; ~~and~~

.2 the bevel preparation of the joints between the tank body and domes and between domes and relevant fittings shall be designed according to a standard acceptable to the Administration or recognized organization acting on its behalf. All welds connecting nozzles, domes or other penetrations of the vessel and all welds connecting flanges to the vessel or nozzles shall be full penetration welds~~.~~; and

.3 for welding joint details of type C independent tanks installed for ships constructed on or after 1 July 2028, cruciform full penetration welded joints in a bi-lobe tank with centreline bulkhead may be accepted for the tank structure construction at tank centreline welds with bevel preparation subject to the approval of the Administration or recognized organization acting on its behalf, depending on the results of the tests carried out at the approval of the welding procedure (see figure 4.1).

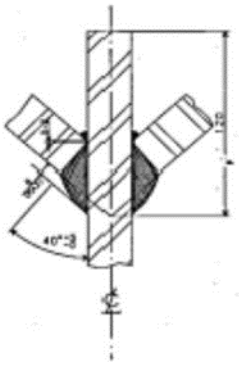

Figure 4.1"

4.23 Type C independent tanks

4.23.1 Design basis

16 Paragraph 4.23.1.1 is amended, as follows:

"4.23.1.1 The design basis for type C independent tanks is based on pressure vessel criteria modified to include fracture mechanics and crack propagation criteria. The minimum design vapour pressure defined in 4.23.1.2 is intended to ensure that the dynamic stress range ~~is~~ shall be sufficiently ~~low~~ small so that an initial surface flaw will not ~~propagate more than half the thickness of the shell during the lifetime of the tank~~ have significant propagation."

4.23.3 Ultimate design condition

17 The following new paragraph 4.23.3.3 is added after existing paragraph 4.23.3.2:

"4.23.3.3 For ships constructed on or after [1 July 2028], guidance is given in 4.28.4 and 4.28.5 for finite element analysis and buckling assessment respectively."

4.23.4 Fatigue design condition

18 Paragraph 4.23.4 is amended, as follows:

"**4.23.4 Fatigue design condition**

For large type C independent tanks, ~~where the cargo at atmospheric pressure is below -55°C,~~ the Administration or recognized organization acting on its behalf may require additional fatigue verification ~~to check their compliance with 4.23.1.1 regarding static and dynamic stress~~ as follows:

.1 C_w shall be less than or equal to 0.1; or

.2 predicted failure development time, from the assumed initial defect until reaching a critical state, shall not be less than three times the lifetime of the tank."

4.28 Guidance notes for chapter 4

19 The following new paragraphs 4.28.4 and 4.28.5 are added after existing paragraph 4.28.3 (Stress categories):

"**4.28.4 Guidance to finite element analysis of type C tanks for ships constructed on or after [1 July 2028]**

4.28.4.1 General

4.28.4.1.1 The allowable stresses described in 4.23.3.1 are applicable for the finite element analysis of the type C tanks.

4.28.4.1.2 As a supplement to the prescriptive requirements, the finite element analysis of the type C cargo tanks may be carried out for the following cases:

.1 Locations where a structural strength cannot be assessed by the prescriptive requirements, e.g. structural discontinuities in way of tank support, Y connection of bi-lobe and multi-lobe tank, etc.

.2 Tanks of novel design or configuration.

4.28.4.1.3 The procedure for finite element analysis should be in accordance with the recognized standards, such as ASME Boiler and Pressure Vessel Code, section VIII, Division 2, or other equivalent which is acceptable to the Administration, provided the maximum strength utilizations in 4.23.3.1 are complied with.

4.28.4.1.4 The scantling defined by the prescriptive requirements on the type C tank of the Code should not be reduced by any form of alternative calculations using finite element analysis.

4.28.4.1.5 For calculation of reaction forces at the tank supports, the following factors should be taken into account:

.1 elasticity of support material (intermediate layer of wood or similar material); and

.2 change in contact surface between tank and support, and of the relevant reactions, due to thermal shrinkage of tank and elastic deformations of tank and support material.

4.28.4.1.6 The final distribution of the reaction forces at the supports should not show any tensile forces.

4.28.4.2 Allowable stresses for finite element analysis

4.28.4.2.1 In general, finite element models composed of 2D shell element or 3D solid element are considered acceptable for stress calculation. The mesh size of the finite element model should be to the satisfaction of the Administration or recognized organization acting on its behalf.

4.28.4.2.2 The application of allowable stresses for linear finite element analysis of the type C tank body using 2D shell element or 3D solid element is given in the following table.

4.28.4.2.3 The strength of stiffening rings of type C tanks should be checked. The calculated stresses of the stiffening ring of type C tanks using finite element method should be performed according to 4.28.4, and the permissible stresses of the stiffening rings shall not exceed that of the tank body defined in 4.28.4.

Application of allowable stresses for finite element analysis of the type C tank body using the finite element analysis of 2D shell element or 3D solid element for ships constructed on or after [1 July 2028]

Code criterion given in 4.23.3.1	Application for 2D shell element or 3D solid element	
	Finite element results check	Locations where check should be applied
$\sigma_m \leq f$	$\sigma_{e\_membrane} \leq f$ [1)]	(A) Areas remote from structural discontinuities
$\sigma_L \leq 1.5f$	$\sigma_{e\_membrane} \leq 1.5f$ [1)]	(B) Area in way of structural discontinuities
$\sigma_b \leq 1.5f$	$\sigma_{e\_surface} \leq 1.5f$ [1)]	(C) Any area ((A) or (B) where bending stresses exist)
$\sigma_L + \sigma_b \leq 1.5f$	$\sigma_{e\_surface} \leq 1.5f$ [1)]	See (B) and (C)
$\sigma_m + \sigma_b \leq 1.5f$	$\sigma_{e\_surface} \leq 1.5f$ [1)]	See (A) and (C)
$\sigma_m + \sigma_b + \sigma_g \leq 3.0f$	$\sigma_{e\_surface} \leq 3.0f$ [1), 2), 3)]	See (A) and (C)
$\sigma_L + \sigma_b + \sigma_g \leq 3.0f$	$\sigma_{e\_surface} \leq 3.0f$ [1), 2), 3)]	See (B) and (C)

where:

$\sigma_{e\_membrane}$ is element equivalent stress derived from the stress components at the mid layer/thickness of the element.

$\sigma_{e\_surface}$ is element equivalent stress derived from the stress components at the top and bottom layer/surface of the element, whichever is greater.

Note:

1) For accident and testing load conditions, the allowable stresses can be modified according to 4.23.5.2 and 4.23.6.1 of the Code.

2) The factor f is defined in 4.23.3 of the Code.

3) For the criterion $\leq 3.0f$, it should be carefully evaluated especially for materials with under matched weld properties. In such cases, the transverse weld tensile strength should not be less than the actual yield strength of the parent metal, the respective R_e and R_m of the weld, after any applied heat treatment, should be used.

4.28.5 Buckling assessment of type C cargo tanks for ships constructed on or after [1 July 2028]

4.28.5.1 General

4.28.5.1.1 The buckling assessment of type C cargo tanks should be carried out in accordance with a recognized pressure vessel standard acceptable to the Administration or recognized organization acting on its behalf. The selected standard should be used for design and fabrication. The scantlings of a type C tank subject to external pressure should not be less than the value required by the formulas in 4.28.5.2.

4.28.5.1.2 The lateral buckling of stiffening ring should be considered additionally in accordance with international standards (e.g. PD 5500) or equivalent regulations.

4.28.5.1.3 For novel configurations where the requirements given in this subsection or recognized standards are not applicable, more advanced buckling assessment methods may be used, as deemed appropriate by the Administration.

4.28.5.1.4 Non-linear finite element analysis, considering geometrical and material non-linearity, may be accepted as an advanced method, provided that the buckling capacity reflects the plate edge misalignment, ovality and deviation from true circular form over a specified arc or chord length.

4.28.5.2 Scantling of shells and stiffening rings under external pressure

4.28.5.2.1 For cylindrical shell, the critical buckling pressure P_c, in MPa, may be taken as:

$$P_c = \frac{1}{3}\cdot\left[n^2 - 1 + \frac{2n^2 - 1 - \nu}{n^2\cdot\left(\frac{2L}{\pi D}\right)^2 - 1}\right]\cdot\frac{2E}{(1-\nu^2)}\cdot\left(\frac{t}{D}\right)^3 + \frac{2E\cdot\frac{t}{D}}{(n^2-1)\cdot\left[n^2\cdot\left(\frac{2L}{\pi D}\right)^2 + 1\right]^2}$$

where:

D = outside diameter of the cylindrical shell, in mm, based on gross scantling

t = net thickness of the cylindrical shell, in mm, exclusive of corrosion allowance

E = Young's modulus, in N/mm^2

v = Poisson's ratio

n = number of circumferential buckling waves. It is to be taken as the integral value to minimize the critical pressure P_c with $n \geq Max\left(2, \frac{\pi D}{2L}\right)$.

L = effective distance between stiffening rings, in mm

4.28.5.2.2 For spherical shells, such as hemispherical, torispherical and ellipsoidal ends, the critical buckling pressure P_c, in MPa, may be taken as:

$$P_c = 1.21 \cdot \mathrm{E} \cdot \left(\frac{t}{R}\right)^2$$

where:

R = outside radius of the sphere shell, in mm, based on gross scantling
E = Young's modulus, in N/mm^2

t = net thickness of the spherical shell, in mm, exclusive of corrosion allowance

The critical buckling pressure formula for the spherical shell above should be used for hemispherical, torispherical and ellipsoidal tank ends, where R is taken as the outside radius of the corresponding spherical shell for hemispherical and tori spherical tank ends, and the maximum outside radius of the crown for an ellipsoidal tank end, i.e. D2/(4h), where h is the external height of the tank end measured based on gross scantling from the connection plane between the cylindrical shell and tank end.

4.28.5.2.3 For stiffening ring, the moment of inertia I, in mm^4, should not be less than

$$I = \frac{0.18 \cdot D^3 \cdot L \cdot P_e}{E}$$

where:

D = outside diameter of the cylindrical shell, in mm, based on gross scantling

E = Young's modulus, in N/mm^2

L = effective distance between stiffening rings, in mm

P_e = external design pressure, in MPa

The width of shell, in mm, contributing to the moment of inertia should not be greater than $0.75\sqrt{Dt}$, where t=net thickness of the cylindrical shell, in mm, exclusive of corrosion allowance.

4.28.5.2.4 Cylindrical and spherical shells should satisfy the following criteria:

$\frac{P_c}{P_e} \geq 4$ for cylindrical shell

$\frac{P_c}{P_e} \geq 15$ for spherical shell

where:

P_c = critical buckling pressure, in MPa

P_e = external design pressure, in MPa."

CHAPTER 5
PROCESS PRESSURE VESSELS AND LIQUID, VAPOUR AND PRESSURE PIPING SYSTEMS

5.2 System requirements

5.2.2 Arrangements: general

20 Paragraph 5.2.2.1 and sub-paragraph .1 are amended, as follows:

"5.2.2.1 Any piping system addressed in 5.1.1 that may contain cargo liquid or vapour shall:

.1 be segregated from other piping systems, except where interconnections are required for cargo-related operations such as purging, gas freeing or inerting. The requirements of 9.4.4 and 16.4.1.5 shall be taken into account with regard to preventing back-flow of cargo. In such cases, precautions shall be taken to ensure that cargo or cargo vapour cannot enter other piping systems through the interconnections;"

21 The following new sub-paragraph 5.2.2.1.2 is inserted after sub-paragraph 5.2.2.1.1 and subsequent sub-paragraphs are renumbered accordingly.

".2 notwithstanding .1 above, ships operating in fixed locations, in a re-gasification and gas discharge mode or a gas receiving, processing, liquefaction and storage mode are not considered as vessels "at sea" with regard to sub-paragraph .6 of this paragraph. Cargo piping only operated in fixed locations (example: re-gasification systems and its piping) and kept depressurized inerted and isolated at sea, other than athwartship shore connection piping or emergency cargo jettisoning piping systems, may also be located outboard of the transverse tank location requirements of 2.4.1, but not closer than a minimum distance of 0.8 metre from the ship outer shell;"

5.4 Design pressure

22 Paragraph 5.4.4 is amended, as follows:

"5.4.4 The design pressure of the outer pipe or duct of gas fuel systems shall not be less than the maximum ~~working~~ built-up pressure ~~of the inner gas pipe. Alternatively, for gas fuel piping systems with a working pressure greater than 1 MPa, the design pressure of the outer duct shall not be less than the maximum built-up pressure arising in the annular space considering the local instantaneous peak pressure in way of any rupture and the ventilation arrangements.~~ arising in the annular space considering the local instantaneous peak pressure in way of any rupture and a suitable pressure relief system shall be considered in the design:

.1 for gas fuel systems with inner pipe working pressures not greater than 1 MPa, the maximum built-up pressure arising in the annular space, after the inner pipe rupture shall not be less than the maximum working pressure of inner gas pipe; and

.2 for ships constructed on or after [1 July 2028], for gas fuel systems with inner pipe having a working pressure greater than 1 MPa, the maximum built-up pressure arising in the annular space, after the inner pipe rupture, shall be calculated in accordance with paragraph 5.11.4.2."

5.5 Cargo system valve requirements

23 The following new paragraph 5.5.1.3 is added after existing paragraph 5.5.1.2:

"5.5.1.3 For ships constructed on or after [1 July 2028], in addition, remotely operated valves shall be fitted, as appropriate, as part of the emergency shutdown (ESD) system (see paragraph 18.10)."

5.5.2 Cargo tank connections

24 Paragraph 5.5.2.1 is amended, as follows:

"5.5.2.1 All liquid and vapour connections, except for safety relief valves inlet and discharge lines, and liquid level gauging devices, shall have shut-off valves located as close to the tank as practicable. These valves shall provide full closure and shall be capable of local manual operation. ~~They may also be capable of remote operation.~~

25 The following new paragraph is added after the existing paragraph 5.5.2.2, as follows:

"5.5.2.3 For ships constructed on or after [1 July 2028], all liquid and vapour connections, except for safety relief valve inlet and discharge lines and liquid level gauging devices, shall be equipped with remotely controlled ESD valves, located as close to the tank as practicable. Such ESD valves shall comply with the requirements of 18.10.2 and provide full closure of the line. A single valve may be substituted for the two separate valves, provided the valve complies with the requirements of 18.10.2 and provides full closure of the line."

5.5.3 Cargo manifold connections

26 Paragraph 5.5.3 is amended, as follows:

"5.5.3.1 One remotely controlled ESD valve shall be provided at each cargo transfer connection ~~in use~~ to stop liquid and vapour transfer to or from the ship. Transfer connections not in use shall be isolated with suitable blank flanges.

5.5.3.2 If the cargo tank MARVS exceeds 0.07 MPa, an additional manual valve shall be provided for each transfer connection ~~in use~~, and may be inboard or outboard of the ESD valve to suit the ship's design.

5.5.3.3 For ships constructed on or after [1 July 2028], in addition to the ESD valve, a manual valve shall be provided for each liquid connection. A manual valve shall also be provided for vapour connections where cargo tank MARVS exceeds 0.07 MPa. The manual valves may be located inboard or outboard of the ESD valve to suit the ship's design."

5.6 Cargo transfer arrangements

5.6.5 Cargo sampling connections

27 Paragraph 5.6.5.1 is amended, as follows:

"5.6.5.1 Connections to cargo piping systems for taking cargo liquid samples, if fitted on board, shall be clearly marked and shall be designed to minimize the release of cargo vapours. For vessels permitted to carry toxic products, the sampling system, if

fitted on board, shall be of a closed loop design to ensure that cargo liquid and vapour are not vented to atmosphere. Connections used for control of atmosphere in cargo tanks during inerting or gassing up are not considered as cargo sampling connections."

5.6.6 Cargo filters

28 Paragraph 5.6.6 is amended, as follows:

"**5.6.6 Cargo filters**

5.6.6.1 The cargo liquid and vapour systems shall be capable of being fitted with filters to protect against damage by extraneous objects. Such filters may be permanent or temporary, and the standards of filtration shall be appropriate to the risk of debris, etc., entering the cargo system. Means shall be provided to indicate that filters are becoming blocked, and to isolate, depressurize and clean the filters safely.

5.6.6.2 Means to indicate that filters are becoming blocked and filter maintenance is required shall be provided for fixed in-line filter arrangement and portable filter installations where dedicated filter housing piping is provided. Where portable filters for fitting to manifold presentation flanges are used without dedicated filter housing, and these can be visually inspected after each loading and discharging operation, no additional arrangements for indicating blockage or facilitating drainage are required."

5.11 Piping system component requirements

29 Paragraph 5.11.2.2 is amended, as follows:

"5.11.2.2 The minimum wall thickness ~~of pipes~~ shall ~~not be less than~~ be calculated as follows:

$$t = \frac{t_0 + b + c}{1 - \frac{|a|\ \cancel{a}}{100}} \ (mm)$$

where:

t_0 = theoretical thickness, determined by the following formula

$$t_0 = \frac{P \cdot D}{2 \cdot K \cdot e + P} \ (mm)$$

with:

P = design pressure (MPa) referred to in 5.4;

D = outside diameter (mm);

K = allowable stress (N/mm²) referred to in 5.11.3; and

e = efficiency factor equal to 1.0 for seamless pipes and for longitudinally or spirally welded pipes, delivered by approved manufacturers of welded

pipes, that are considered equivalent to seamless pipes when non-destructive testing on welds is carried out in accordance with recognized standards. In other cases, an efficiency factor of less than 1.0, in accordance with recognized standards, may be required depending on the manufacturing process;

b = allowance for bending (mm). The value of b shall be chosen so that the calculated stress in the bend, due to internal pressure only, does not exceed the allowable stress. Where such justification is not given, b shall be:

$$b = \frac{D \cdot t_0}{2.5 \cdot r}$$

with:

r = mean radius of the bend (mm);

c = corrosion allowance (mm). If corrosion or erosion is expected, the wall thickness of the piping shall be increased over that required by other design requirements. This allowance shall be consistent with the expected life of the piping; and

a = negative manufacturing tolerance for thickness (%), i.e. where a is the manufacturing tolerance of –5%, |a| is equal to 5 and shall be entered into the formula as 1– (5/100)."

5.11.4 High-pressure gas fuel outer pipes or ducting scantlings

30 Paragraph 5.11.4 is amended, as follows:

"**5.11.4 High-pressure gas fuel outer pipes or ducting scantlings**

5.11.4.1 In fuel gas piping systems of design pressure greater than the ~~critical~~ peak pressure, the tangential membrane stress of a straight section of pipe or ducting shall not exceed the tensile strength divided by 1.5 (R_m /1.5) when subjected to the design pressure specified in 5.4. The pressure ratings of all other piping components shall reflect the same level of strength as straight pipes. For ships constructed on or after [1 July 2028], the peak pressure shall be calculated in accordance with 5.11.4.2.

5.11.4.2 For ships constructed on or after [1 July 2028], for inner pipes having a working pressure greater than 1 MPa, the design pressure of the outer pipe or the duct shall be taken as the higher of the following:

.1 The maximum built-up pressure: static pressure in way of the rupture resulting from the gas flowing in the annular space;

.2 the local instantaneous peak pressure in way of the rupture is given by the following expression:

$$p = p_0 \cdot \left(\frac{2}{k+1}\right)^{\frac{k}{k-1}}$$

where:

p_0 = maximum working pressure of the inner pipe (absolute pressure)

k = C_p/C_v constant pressure specific heat divided by the constant volume specific heat

As an alternative to the above formula, the peak pressure found from representative tests can be used. Tests reports shall then be submitted."

5.11.6 Flanges, valves and fittings

31 Paragraph 5.11.6.1 is amended, as follows:

"5.11.6.1 Flanges, valves, bellows expansion joints and other fittings shall comply with recognized standards, taking into account the material selected and the design pressure defined in 5.4. For ships constructed before [1 July 2028], bellows expansion joints used in vapour service, a lower minimum design pressure may be accepted, except for any new installation or replacement."

5.12 Materials

32 Paragraph 5.12.4 is amended, as follows:

"~~5.12.4~~ 5.12.3 Where the cargo piping system is ~~of a material susceptible to stress corrosion cracking in the presence of~~ located in a salt-laden atmosphere, including on the exposed deck, adequate measures to avoid ~~this~~ corrosion and stress corrosion cracking occurring shall be taken by ~~considering~~ material selection~~,~~ and protection ~~of~~ against exposure to salt~~y~~ water ~~and/or readiness for inspection~~. For ships constructed on or after [1 July 2028], the following shall apply:

.1 use of stainless steel having a pitting resistance equivalent number (PREN = 1 • %Cr + 3.3 (%Mo + 0.5 • %W) + 16 • %N) more than 22, such as 316/316L; or

.2 use of stainless steel not meeting the above requirements, such as 304/304L provided the piping is protected by a coating system suitable for the intended service conditions, including cryogenic temperature–ultraviolet solar radiation; or

.3 use of other materials permitted by table 6.4 of the IGC Code, protected by a coating system suitable for the intended service conditions, including cryogenic temperature–ultraviolet solar radiation."

5.12.3 Cargo piping insulation system

33 Section 5.12.3, and paragraphs 5.12.3.1 and 5.12.3.2 therein are amended, as follows:

"**~~5.12.3~~ 5.12.4 Cargo piping insulation system**

~~5.12.3.1~~ 5.12.4.1 Cargo piping systems shall be provided with a thermal insulation system as ~~required~~ necessary to minimize heat leak into the cargo during transfer operations and to protect personnel from direct contact with cold surfaces.

For ships constructed on or after [1 July 2028], the requirements in sub-paragraphs .1 and .2 below shall be complied with to address cold or hot surfaces:

.1 The properties of the piping insulation shall be considered when calculating the heat balance of the containment system and capacity of the pressure/temperature control system.

.2 Surfaces of cargo piping, process pressure vessels, and equipment with which personnel are likely to contact under normal conditions shall be protected by thermal insulation, except for the following:

.1 surfaces which are protected by physical screening measures to prevent direct contact;

.2 surfaces of manual valves having extended spindles that protect the operator from the cargo temperature;

.3 surfaces whose design temperature, based on inner fluid temperature, is above –10°C and below 60°C; and

.4 surfaces located where contact by personnel is unlikely under normal conditions based on recognized standards, preferably more than 2.0 m vertically and/or 0.6 m horizontally away from walkways or floors of working areas.

~~5.12.3.2~~ 5.12.4.2 Where applicable, owing to location or environmental conditions, insulation materials shall have suitable properties of resistance to fire and flame spread and shall be adequately protected against penetration of water vapour and mechanical damage."

5.13 Testing requirements

5.13.1 Type testing of piping components

34 Paragraph 5.13.1.1 is amended, as follows:

"5.13.1.1 *Valves**

Each type of valve intended to be used at a working temperature below -55°C shall be subject to the following type tests:

.1 each size and type of valve shall be subjected to seat tightness testing over the full range of operating pressures for bi-directional flow and temperatures, at intervals, up to the rated design pressure of the valve. Allowable leakage rates shall be to the requirements of the Administration or recognized organization acting on its behalf. During the testing, satisfactory operation of the valve shall be verified;

.2 the flow or capacity shall be certified to a recognized standard for each size and type of valve~~;~~, which annotates that:

.1 for pressure relief valves (PRVs) that are subject to paragraph 8.2.6, the flow or capacity shall be certified by the Administration or recognized organization acting on its behalf; and

.2 for other types of valves, the manufacturer shall certify the flow properties of the valves based on tests carried out according to recognized standards;

.3 pressurized components shall be pressure tested to at least 1.5 times the rated pressure; and

.4 for emergency shutdown valves, with materials contributing to shell or seat tightness of the valve having melting temperatures lower than 925°C, the type testing shall include a fire test to a standard acceptable to the Administration.

* Refer to SIGTTO Publication on "*The Selection and Testing of Valves for LNG Applications*"."

5.13.2 System testing requirements

35 Paragraph 5.13.2.1 is amended, as follows:

"5.13.2.1 The requirements of this section shall apply to piping inside and outside the cargo tanks. However, the Administration may accept relaxations from these requirements for open-ended piping and piping inside cargo tanks, except pumps discharge lines."

36 Paragraph 5.13.2.4 is amended, as follows:

"15.13.2.4 In double-wall gas-fuel piping systems, the outer pipe or duct shall also be pressure tested to show that it can withstand the expected maximum pressure at gas pipe rupture. The maximum pressure at gas pipe rupture is the maximum pressure to which the outer pipe or duct is subjected after the inner pipe rupture and for testing purposes it is the same as the design pressure used in paragraph 5.4.4."

CHAPTER 8
VENT SYSTEMS FOR CARGO CONTAINMENT

8.1 General

37 Section 8.1 is amended, as follows:

"**8.1 General**

8.1.1 All cargo tanks shall be provided with a pressure relief system appropriate to the design of the cargo containment system and the cargo being carried. Hold spaces and inter-barrier spaces, 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 chapter 7 shall be independent of the pressure relief systems.

8.1.2 For ships constructed on or after [1 July 2028], inter-barrier spaces which may be subject to pressures beyond their design capabilities, shall also be provided with a suitable pressure relief system, as defined below:

.1 The formula for determining the relieving capacity given in 8.2.5 is for inter-barrier spaces surrounding independent type A cargo tanks, where the thermal insulation is fitted to the cargo tanks.

.2 The relieving capacity of pressure relief devices of inter-barrier spaces surrounding independent type B cargo tanks may be determined on the basis of the method given in 8.2.5. However, the leakage rate shall be determined in accordance with paragraph 4.7.2.

.3 The relieving capacity of pressure relief devices for inter-barrier spaces of membrane and semi-membrane tanks shall be evaluated on the basis of specific membrane/semi-membrane tank design.

.4 The relieving capacity of pressure relief devices for inter-barrier spaces adjacent to integral type cargo tanks may, if applicable, be determined as for type A independent cargo tanks."

8.2 Pressure relief systems

38 The following new paragraph is inserted after existing paragraph 8.2.4 and the subsequent paragraphs, figures and cross references to those figures in this chapter are renumbered accordingly:

"8.2.5 For ships constructed on or after [1 July 2028], the combined relieving capacity of the pressure relief devices for inter-barrier spaces surrounding type A independent cargo tanks where the insulation is fitted to the cargo tanks may be determined by the following formula:

$$Q_{sa} = 3.4 \cdot A_c \cdot \frac{\rho}{\rho_v} \cdot \sqrt{h}$$

where:

Q_{sa} = minimum required discharge rate of air (m^3/s) at standard conditions of 273 K and 1.013 bar

A_c = design crack opening area (m^2)

$$A_c = \pi/4 \cdot \delta \cdot l$$

δ = max, crack opening width (m)

δ = 0.2 t (m)

t = thickness of tank bottom plating (m)

l = design crack length (m) equal to the diagonal of the largest plate panel of the tank bottom, see figure 8.1.

h = max liquid height above tank bottom plus 10.MARVS (m)

ρ = density of product liquid phase (kg/m^3) at the set pressure of the inter-barrier space relief device

ρ_V = density of product vapour phase (kg/m^3) at the set pressure of the inter-barrier space relief device and a temperature of 273 K

MARVS = max allowable relief valve setting of the cargo tank (bar).

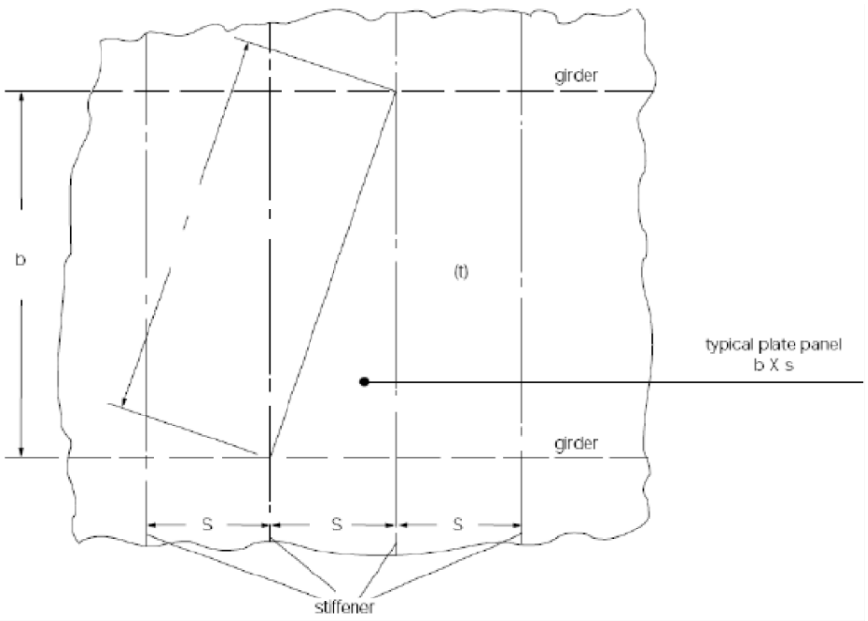

Figure 8.1"

39 Renumbered paragraph 8.2.10 is amended, as follows:

"8.2.~~9~~10 In the event of a failure of a cargo tank-installed PRV, a safe means of emergency isolation shall be available:

.1 Procedures shall be provided and included in the cargo operations manual (see 18.2).

.2 The procedures shall allow only one of the cargo tank installed PRVs to be isolated. For ships constructed on or after [1 July 2028], if an isolation valve is installed, a mechanical locking system shall be used to prevent full or partial isolation so that only one of the cargo tank-installed PRVs can be isolated. If the PRVs are fitted with a remotely sensed pilot line, an isolation valve shall also be fitted with a locking system synchronized with the locking system of the isolation of the main PRV.

.3 For ships constructed on or after [1 July 2028], if an isolation valve is installed, safe means to depressurize the trapped cargo between that isolation valve and PRV shall be provided.

.~~3~~ .4 Isolation of the PRV shall be carried out under the supervision of the master. This action shall be recorded in the ship's log and a sign posted in the cargo control room, if provided, and at the PRV.

.~~4~~ .5 The tank shall not be loaded until the full relieving capacity is restored."

40 Renumbered paragraph 8.2.19 is amended, as follows:

"8.2.~~18~~19 The adequacy of the vent system ~~fitted on tanks loaded in accordance with 15.5.2~~ designed for two phase flow for tanks having a MARVS above 0.07 MPa shall be demonstrated, taking into account the recommendations developed by the Organization.* A relevant certificate shall be permanently kept on the ship. For the purpose~~s~~ of this paragraph, vent system means:

.1 the tank outlet and the piping to the PRV;

.2 the PRV; and

.3 the piping from the PRV~~s~~ downstream to the location of the discharge to the atmosphere, including any interconnections and piping that joins other tanks.

This paragraph need not apply when the reference temperature is defined in accordance with 15.1.3.1.

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* Refer to the *Guidelines for the evaluation of the adequacy of type C tank vent systems* (resolution A.829(19))."

8.4 Sizing of pressure relieving system

8.4.1 Sizing of pressure relief valves

41 The following new paragraph is added after existing paragraph 8.4.1.3:

"8.4.1.4 For ships constructed on or after [1 July 2028], for prismatic tanks, vapours generated under fire exposure shall be computed using the formula given in paragraph 8.4.1.2 and the following formula variables:

.1 For non-tapered tanks, L_{min} is the smaller of the horizontal dimensions of the flat bottom of the tank. For tapered tanks, as would be used for the forward tank, L_{min} is the smaller of the length and the average width.

.2 For prismatic tanks whose distance between the flat bottom of the tank and bottom of the hold space is equal to or less than $L_{min}/10$:

A = external surface area minus flat bottom surface area.

.3 For prismatic tanks whose distance between the flat bottom of the tank and bottom of the hold space is greater than $L_{min}/10$:

A = external surface area. "

42 Paragraphs 8.4.2 and 8.4.3 are amended, as follows:

"**8.4.2 Sizing of vent ~~pipe~~ system**

8.4.2.1 Pressure losses upstream and downstream of the PRVs shall be taken into account when determining ~~their~~ the pipe size and routeing to ensure the flow capacity required by 8.4.1.

8.4.2.2 For ships constructed on or after [1 July 2028], the inclusion of isolation valves in which the flow area of the valve is equal to or larger than the inlet flow area of the pressure relief device and does not affect the PRV flow, capacity and stability are acceptable.

8.4.3 Upstream pressure losses

8.4.3.1 The pressure ~~drop~~ losses in the vent line from the tank to the PRV inlet shall not exceed 3% of the valve set pressure at the calculated flow rate, in accordance with 8.4.1. For ships constructed on or after [1 July 2028], the compliance shall be documented by flow calculations.

8.4.3.2 Pilot-operated PRVs shall be unaffected by inlet pipe pressure losses when the pilot senses directly from the tank dome. For ships constructed on or after [1 July 2028], pilot-operated PRV sensing lines shall be sized to avoid pressure losses which affect the function of the PRV. The sensing line shall be self-draining and free from liquid pockets.

~~8.4.3.3 Pressure losses in remotely sensed pilot lines shall be considered for flowing type pilots.~~"

43 Paragraph 8.4.5 is amended, as follows:

"8.4.5 To ensure stable PRV operation, the blow-down shall not be less than the sum of the inlet pressure loss and 0.02 MARVS at the rated capacity. This limitation does not apply to pilot-operated PRV fitted with a remote sensing line if confirmed by the PRV manufacturer."

CHAPTER 9
CARGO CONTAINMENT SYSTEM ATMOSPHERE CONTROL

9.4 Inerting

44 Paragraph 9.4.6 is amended, as follows:

"9.4.6 Where insulation spaces are continually supplied with an inert gas as part of a leak detection system, effective means shall be provided to monitor the quantity of gas being supplied to each individual space."

45 The following new paragraph 9.4.7 is added after existing paragraph 9.4.6:

"9.4.7 For ships constructed on or after [1 July 2028], abnormal flow of inert gas in leak detection system shall trigger audible and visible alarms at the locations specified in 13.6.13. The alarm(s) set points shall be defined by the designer and accepted by the Administration or recognized organization acting on its behalf with due consideration of the operational pressure which shall be maintained in the space and flow rate(s) necessary for reliable gas leak detection."

CHAPTER 10
ELECTRICAL INSTALLATIONS

10.2 General requirements

46 Paragraph 10.2.6 is amended, as follows:

"10.2.6 Electrical generation and distribution systems, ~~and associated control systems~~ including their control systems, shall be designed such that a single fault will not result in the loss of ability to maintain cargo tank pressures, as required by 7.8.1, and hull structure temperature, as required by 4.19.1.6, within normal operating limits. Failure modes and effects shall be analysed and documented to a standard not inferior to those acceptable to the Administration.*

* IEC 60812, Edition 2.0 2006-01 "Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA)"

47 Paragraph 10.2.8 is amended, as follows:

"10.2.8 Electronic devices which are not of certified safe type, including ~~Electrical~~ depth sounding or log devices, radar and impressed current cathodic protection system anodes ~~or electrodes~~, if located in the hazardous areas, shall be housed in gastight enclosures."

CHAPTER 11
FIRE PROTECTION AND EXTINCTION

11.1 Fire safety requirements

48 Paragraph 11.1.4 is amended, as follows:

"11.1.4 For the purposes of fire-fighting, any weather deck areas above cofferdams, ballast or void spaces at the after end of the aftermost hold space or at the forward end of the forwardmost hold space shall be included in the cargo area. For ships constructed on or after [1 July 2028], 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, the weather deck area above these tanks shall be regarded as a cargo area for the purpose of applying paragraph 11.3.6."

11.2 Fire mains and hydrants

49 The following new paragraphs are added after existing paragraph 11.2.5:

"11.2.6 For ships constructed on or after [1 July 2028], the maximum capacity of emergency fire pump shall be calculated in accordance with this paragraph.

11.2.6.1 If all the fire pumps (required in accordance with SOLAS regulation II-2/10.2.2.2.2) mentioned in paragraph 11.3.4, supplying the water spray system (for covering the superstructures and deckhouses) are disabled owing to a fire in any one compartment, then the emergency fire pump shall be sized to cover:

.1 the water spray system for the boundaries of the superstructures and deckhouses, and lifeboats, liferafts and muster areas facing the cargo area, (as required in paragraph 11.3.4); and

.2 two fire hydrants (as required in paragraph 11.2).

11.2.6.2 When the ship is also fitted with a fixed high-expansion foam fire-extinguishing system or a fixed pressure water-spraying fire- extinguishing system protecting the engine-room (to comply with SOLAS regulation II-2/10.4.1.1.2 or SOLAS regulations II-2/10.4.1.1.3 and 10.5.1.1) and the emergency fire pump is intended to supply seawater to this system, the emergency fire pump shall also be sized to cover the fixed high-expansion foam fire-extinguishing system or the fixed pressure water-spraying fire-extinguishing system for dealing with an engine-room fire, if the main fire pumps are disabled owing to a fire in any one compartment.

11.2.6.3 On the basis of the principle of dealing with a single fire incident at a time, the emergency fire pump does not need to be sized to cover all systems in paragraph 11.2.6.1 and paragraph 11.2.6.2 above at the same time and shall need only be sized to cover the most demanding area and required systems, as follows:

.1 the fixed high-expansion foam fire-extinguishing system or the fixed pressure water-spraying fire-extinguishing system (as required in paragraph 11.2.6.2) and two hydrants (as required in paragraph 11.2.6.1.2); or

.2 the water spray system and two hydrants (as required in paragraph 11.2.6.1),

whichever is greater."

11.3 Water-spray system

50 The following new sub-paragraph is added after existing sub-paragraph 11.3.1.7, the word "and" at the end of existing paragraph 11.3.1.7 is deleted, and existing sub-paragraph 11.3.1.8 is renumbered as 11.3.1.9:

".8 remote survival crafts facing cargo area, taking into consideration cargo area extension for fire-fighting purposes as stated in paragraph 11.1.4. Remote liferafts located in areas covered by the water-spraying system as required in .6 shall be considered as adequately protected; and"

51 Paragraph 11.3.2.2 is amended, as follows:

"11.3.2.2 On vertical surfaces and for structures not having clearly defined horizontal or vertical surfaces, spacing of nozzles protecting lower areas may take account of anticipated rundown from higher areas. Stop valves shall be fitted in the main supply line(s) in the water-spray system, at intervals not exceeding 40 m, for the purpose of isolating damaged sections. Alternatively, the system may be divided into two or more sections that may be operated independently, provided the necessary controls are located together in a readily accessible position outside the cargo area. A section protecting any area included in 11.3.1.1 and 11.3.1.2 shall cover at least the entire athwartship tank grouping in that area. Any gas process unit(s) included in 11.3.1.3 may be served by an independent section."

52 Paragraph 11.3.3 is amended, as follows:

"11.3.3 The capacity of the water-spray pumps shall be capable of simultaneous protection of the greater of the following:

.1 any two complete ~~athwartship~~ tank groupings, where one group is defined as tanks located in transverse direction from ship side to ship side, representing an area equal to the combined area of the largest tank groupings, including any gas process units within these areas. Where there is only one cargo tank occupying a hold space from ship side to ship side, it will be considered as a grouping for the purpose of the above requirement; or

.2 for ships intended for operation as listed in 1.1.10, necessary protection subject to special consideration under 11.3.1 of any added fire hazard and the adjacent athwartship tank grouping,

in addition to the surfaces specified in 11.3.1.4 to 11.3.1.~~8~~9. Alternatively, the main fire pumps may be used for this service, provided that their total capacity is increased by the amount needed for the water-spray system. In either case, a connection, through a stop valve, shall be made between the fire main and water-spray system main supply line outside the cargo area."

53 Paragraph 11.3.4 is amended, as follows:

"11.3.4 The boundaries of normally manned superstructures and deckhouses, and lifeboats, liferafts and muster areas facing the cargo area, shall also be capable of being served by one of the fire pumps (required in accordance with SOLAS regulation II-2/10.2.2.2.2) or the emergency fire pump, if a fire in one compartment could disable both fire pumps (required in accordance with SOLAS regulation II-2/10.2.2.2.2).

11.3.4.1 For ships constructed on or after [1 July 2028], in cases where the emergency fire pump is used to meet paragraph 11.3.4, its capacity, in addition to being capable of maintaining two jets of water as required by paragraph 12.2.2.1.1 of the FSS Code, shall be increased taking into account the spray application rates stated in paragraph 11.3.2.1, but limiting coverage to boundaries of normally manned superstructures and deckhouses, survival crafts and their muster areas. Also, see paragraph 11.2.6 for requirements regarding maximum capacity calculation for emergency fire pump.

11.3.4.2 For ships constructed on or after [1 July 2028], fire pumps and emergency fire pumps required by SOLAS regulation II-2/10.2.2 and used to comply with 11.3.4 shall be installed outside the space where water-spray pump(s) are located.

11.3.4.3 For ships constructed on or after [1 July 2028], the compartment in paragraph 11.3.4 is a compartment provided with A class boundaries in which the fire pump(s), or the source of power of the fire pump(s), serving the water-spray system in accordance with paragraph 11.3.3, are located."

54 Paragraph 11.3.6 is amended, as follows:

"11.3.6 All pipes, valves, nozzles and other fittings in the water-spray system shall be resistant to corrosion by seawater. Piping, fittings and related components within the cargo area (except gaskets) shall be designed to withstand 925°C. The water-spray system shall be arranged with in-line filters to prevent blockage of pipes and nozzles. In addition, means shall be provided to flush or back-flush the system with fresh water to prevent any blockages."

55 The following new paragraph 11.3.8 is added after existing paragraph 11.3.7 and existing paragraph 11.3.8 is renumbered as paragraph 11.3.9:

"11.3.8 For ships constructed on or after [1 July 2028], when isolating valves are fitted in the water-spray system to maintain the required water supply in the case that the system is fed from the emergency fire pump as indicated by 11.3.4, the operating position of the isolating valves shall be located outside the cargo area, so that they are readily accessible and, for valves that are normally closed, located in accordance with 11.3.7."

11.4 Dry chemical powder fire-extinguishing systems

56 The following new paragraph 11.4.8.1 is added after existing paragraph 11.4.8:

"11.4.8.1 Testing arrangements shall involve discharge using dry chemical powder from all monitors and hand hose lines on board, but a full discharge of the installed quantity of dry powder is not required. This testing can also be used to satisfy the requirement that the piping be free of obstructions, in lieu of blowing through all the distribution piping with dry air. However, after completion of this testing, the system, including all monitors and hand hose lines, shall be blown through with dry air, but only for the purpose of the system subsequently being cleared from any residues of dry chemical powder."

CHAPTER 12
ARTIFICIAL VENTILATION IN THE CARGO AREA

12.1 Spaces required to be entered during normal cargo handling operations

57 The following new paragraph is added after existing paragraph 12.1.1, together with the associated footnote:

"12.1.1.1 For ships constructed on or after [1 July 2028], electric motor rooms located outside the cargo area defined by 1.2.7 shall comply with requirements for separation of non-hazardous areas and hazardous areas, including 12.1.10, and be designed in accordance with specifications not inferior to standards acceptable to the Organization.*

* Refer to the recommendations published by the International Electrotechnical Commission (IEC 60092-502:1999)."

58 Paragraph 12.1.8 is amended, as follows:

"12.1.8 Where fans are required by this chapter, full required ventilation capacity for each space shall be available after failure of any single fan, or spare parts shall be provided for at least one entire fan of each type, comprising a motor, starter spares and complete rotating element, including shaft and bearings. Full ventilation capacity shall be restored before use of the space for operational purposes."

12.2 Spaces not normally entered

59 Paragraph 12.2.2 is amended, as follows:

"12.2.2 For permanent installations, the capacity of 8 air changes per hour shall be provided and for portable systems, the capacity of 16 air changes per hour shall be

provided. Accessed hold spaces and cofferdams shall be provided with ventilation not less than the capacity of 2 air changes per hour, subject to meeting the requirements of 18.8."

CHAPTER 13
INSTRUMENTATION AND AUTOMATION SYSTEMS

13.2 Level indicators for cargo tanks

60 Paragraph 13.2.2 is amended, as follows:

"13.2.2 Where only one liquid level gauge is fitted, it shall be arranged so that it can be maintained in an operational condition without the need to empty or gas free the tank. Any part of this level gauge, other than components not subject to failure under normal service, shall be capable of being repaired with the tank in service."

13.3 Overflow control

61 Paragraph 13.3.1 is amended, as follows:

"13.3.1 ~~Except as provided in 13.3.4,~~ ~~e~~Each cargo tank shall be fitted with an independent high liquid level alarm ~~operating independently of other liquid level indicators and~~ giving an audible and visual warning when activated."

62 Paragraph 13.3.2 is amended, as follows:

"13.3.2 An additional independent sensor ~~operating independently of the high liquid level alarm~~ shall automatically actuate a shut-off valve in a manner that will both avoid excessive liquid pressure in the loading line and prevent the tank from becoming liquid full."

63 The following new paragraph 13.3.3 is inserted after existing paragraph 13.3.2 and the subsequent paragraphs are renumbered accordingly:

"13.3.3 For ships constructed on or after [1 July 2028], the sensors in 13.3.1 and 13.3.2 shall be independent from other liquid level indicators."

64 Renumbered paragraph 13.3.4 is amended, as follows:

"13.3.4 ~~The~~ An emergency shutdown valve referred to in 5.5.2 and 18.10 may be used for this purpose. If another valve is used for this purpose, the same information as referred to in 18.10.2.1.3 shall be available on board. During loading, whenever the use of these valves may possibly create a potential excess pressure surge in the loading system, alternative arrangements such as limiting the loading rate shall be used."

65 Existing paragraphs 13.3.4 and 13.3.5 are amended as follows:

"13.3.~~4~~9 For ships constructed before [1 July 2028], ~~a~~A high liquid level alarm and automatic shut-off of cargo tank filling need not be required, when the cargo tank:

.1 is a pressure tank with a volume of not more than 200 m^3; or

.2 is designed to withstand the maximum possible pressure during the loading operation, and such pressure is below that of the set pressure of the cargo tank relief valve.

13.3.5 ~~The position of the sensors shall be capable of being verified before commissioning. At the first occasion of full loading after delivery and after each dry-docking, testing of high-level alarms shall be conducted by raising the cargo liquid level in the cargo tank to the alarm point~~. The position of the sensors required by 13.3.1 and 13.3.2 shall be verified at each of the following occasions:

.1 at the first full cargo loading, or after the initial survey required in 1.4.2.1; and

.2 after each renewal survey required in 1.4.2.2.

Function testing of high-level alarms shall be conducted by raising the cargo liquid level in the cargo tank to the alarm point. Alternative equivalent function testing arrangements may be accepted, subject to the satisfaction of the Administration or recognized organization acting on its behalf."

66 The following new paragraph 13.3.8 is added after existing paragraph 13.3.7:

"13.3.8 The override system permitted by 13.3.7 may be used at sea to prevent false alarms or shutdowns. When level alarms are overridden, operation of cargo pumps and the opening of manifold ESD valves shall be inhibited except when high-level alarm testing is carried out in accordance with 13.3.5 (see 18.10.3.6)."

13.6 Gas detection

67 The following new paragraph is added after existing paragraph 13.6.4:

"13.6.4.1 For ships constructed on or after [1 July 2028], two oxygen sensors shall be positioned at appropriate locations in the space or spaces containing the inert gas system, in accordance with paragraph 2.2.4.5.4 in chapter 15 of the FSS Code, irrespective of the carriage of cargo indicated by an "A" in column "f" in the table in chapter 19 of the Code."

68 Paragraph 13.6.17 is amended, as follows:

"13.6.17 For other spaces described by 13.6.2, alarms shall be activated when the vapour concentration reaches 30% LFL and safety functions required by chapter 16 shall be activated before the vapour concentration reaches 60% LFL. Where required by 16.7.3.3, ~~T~~the crankcases of internal combustion engines that can run on gas shall be arranged to alarm before 100% LFL."

13.9 System integration

69 Paragraph 13.9.3 is amended, as follows:

"13.9.3 Key hazards of the integrated system based on combination and of computer-based technologies and interconnection of computer systems used for control, monitoring/alarm and safety systems for carriage, handling and conditioning of cargo liquid and vapours shall be identified using appropriate risk-based techniques. For ships constructed on or after [1 July 2028], such integrated systems shall ensure

reliable communication between computer-based system components* and allow centralized access to monitoring/alarm and safety information and/or command/control.

* Refer to the *Guidelines for the onboard use and application of computers* (MSC/Circ.891)."

CHAPTER 15
FILLING LIMITS FOR CARGO TANKS

15.1 Definitions

70 Paragraph 15.1.3.1 is amended, as follows:

".1 when no cargo vapour pressure/temperature control, as referred to in chapter 7, is provided, or for products requiring a type 1G ship, the temperature corresponding to the vapour pressure of the cargo at the set pressure of the PRVs; and"

15.2 General requirements

71 Section 15.2 is amended, as follows:

"**15.2 General requirements**

15.2.1 The default value for the filling limit (FL) of cargo tanks is 98% at the reference temperature. Exceptions to this value shall meet the requirements of 15.3. The maximum filling limit of cargo tanks shall be so determined that the vapour space has a minimum volume at reference temperature allowing for:

.1 tolerance of instrumentation such as level and temperature gauges; and

.2 volumetric expansion of the cargo between the PRV set pressure and the maximum allowable rise stated in 8.4.~~; and~~

~~.3 an operational margin to account for liquid drained back to cargo tanks after completion of loading, operator reaction time and closing time of valves, see 5.5 and 18.10.2.1.4.~~

15.2.2 The ship shall be designed and operated in a manner to ensure the liquid level in the cargo tank shall not exceed the filling limit under all design conditions."

15.3 Default filling limit

72 Section 15.3 (Default filling limit) is deleted.

"~~**15.3 Default filling limit**~~

~~The default value for the filling limit (FL) of cargo tanks is 98% at the reference temperature. Exceptions to this value shall meet the requirements of 15.4.~~"

15.4 Determination of increased filling limit

73 Section 15.4 is renumbered as section 15.3 and amended, as follows:

"~~**15.4**~~ **15.3 Determination of increased filling limit**

15.3.1 This section does not apply to type C tanks or tanks with MARVS greater than 0.07 MPa except where it is verified and accepted by the Administration or recognized organization acting on its behalf that the risks associated with the higher design pressure of these tanks are properly mitigated taking into account the specific design features, including venting systems required in paragraph 8.2.18, of the individual tank.

~~15.4.1~~ 15.3.2 A filling limit greater than the limit of 98% specified in ~~15.3~~ 15.2.1 may be permitted under the trim and list conditions specified in 8.2.17, providing:

~~.1 no isolated vapour pockets are created within the cargo tank;~~

~~.2~~ .1 the PRV inlet arrangement shall remain in the vapour space; and

~~.3~~ .2 allowances shall be provided for:

.1 volumetric expansion of the liquid cargo due to the pressure increase from the MARVS to full flow relieving pressure in accordance with 8.4.1;

.2 an operational margin of a minimum 0.1% of tank volume; and

.3 tolerances of instrumentation such as level and temperature gauges.

~~15.4.2~~ 15.3.3 In no case shall a filling limit exceeding 99.5% at reference temperature be permitted."

15.5 Maximum loading limit

74 Section 15.5 is renumbered as section 15.4 and amended, as follows:

"~~**15.5**~~ **15.4 Maximum loading limit**

~~15.5.1~~ 15.4.1 The maximum loading limit (LL) to which a cargo tank may be loaded shall be determined by the following formula:

$$LL = FL \cdot \frac{\rho_R}{\rho_L}$$

where:

LL = loading limit as defined in 15.1.2, expressed in percentage;

FL = filling limit as specified in ~~15.3 or 15.4~~ 15.1.1 expressed in percentage;

ρ_R = relative density of cargo at the reference temperature; and

ρ_L = relative density of cargo at the loading temperature.

~~15.5.2~~ 15.4.2 The Administration or recognized organization acting on its behalf may allow type C tanks to be loaded according to the formula in ~~15.5.1~~ 15.4.1 with the relative density ρ_R as defined below, provided that the tank vent system has been approved in accordance with 8.2.18:

ρ_R = relative density of cargo at the highest temperature that the cargo may reach upon termination of loading, during transport, or at unloading, under the ambient design temperature conditions described in 15.1.4.

This paragraph does not apply to products requiring a type 1G ship."

15.6 Information to be provided to the master

75 Section 15.6 and paragraphs therein are renumbered as section 15.5, and paragraphs 15.5.1, 15.5.2 and 15.5.3.

CHAPTER 16
USE OF CARGO AS FUEL

16.1 General

76 Section 16.1 is amended, as follows:

"**16.1 General**

16.1.1 Except as provided for in 16.9, methane (LNG) (CH_4), ethane (C_2H_6) and LPG ~~is~~ are the only ~~cargo whose vapour or boil-off gas~~ hydrocarbon fuels that may be utilized in machinery spaces of category A, and, in these spaces, they may only be utilized ~~only~~ in systems such as boilers, inert gas generators, internal combustion engines, gas combustion units and gas turbines.

16.1.2 LPG, for the purpose of chapter 16, is composed of propane (C_3H_8), butane (C_4H_{10}), or a propane-butane mixture as listed in chapter 19 and may contain small amounts of other hydrocarbons. It can be in either a liquefied or gaseous state. LPG in the liquefied state is referred to as LPG liquid, and LPG in the gaseous state is referred to as LPG vapour."

16.2 Use of cargo vapour as fuel

77 The title of section 16.2 is amended, as follows:

"**16.2 ~~Use of cargo vapour as fuel~~ General requirements for gas consumers and fuel systems**"

78 Paragraph 16.2.1 is amended, as follows:

"16.2.1 For ~~vaporized LNG~~ all fuels covered by 16.1**,** the fuel supply system shall comply with the requirements of 16.4.1, 16.4.2 and 16.4.3".

79 The following new paragraphs 16.2.3. 16.2.4 and 16.2.5 are added after existing paragraph 16.2.2:

"16.2.3 LPG or ethane fuel consumers and associated systems shall be designed for operation within the possible range of composition of the intended fuel. Information about the range of acceptable compositions shall be provided on board.

16.2.4 The LPG or ethane fuel consumers shall exhibit no external visible flame and shall maintain the uptake exhaust temperature sufficiently below the auto-ignition temperature of the fuel or, if impractical, as practically low as possible, taking into account the auto-ignition temperature. In a mixture of gases, the component with the lowest auto-ignition temperature shall be the appropriate reference. The LPG or ethane fuel consumer exhaust gas temperature shall be continuously monitored. In case of consumer with a turbocharger, the temperature shall be measured after the turbocharger.

16.2.5 A risk assessment using acceptable and recognized risk analysis techniques shall be conducted for LPG or ethane fuel supply arrangements including associated systems demonstrating an equivalent level of safety to utilizing LNG vapour as fuel and the results shall be documented. The scope of the risk assessment shall include aspects of the cargo-handling system that are part of the fuel supply, including consumers. Consideration shall be given to the hazards associated with the arrangement, operation and maintenance of the fuel system, considering reasonably foreseeable failures. The risk assessment shall address the consequences of fuel leakage, considering the properties of LPG or ethane vapour and its accumulation or escape into another space."

16.3 Arrangement of spaces containing gas consumers

80 The title of existing section 16.3 is replaced by the following:

"**16.3 Arrangement of spaces containing gas consumers or gas equipment**"

81 Paragraph 16.3.4 is amended, as follows:

"16.3.4 All vents and bleed lines that may contain or be contaminated by gas fuel shall be routed to a safe location external to the machinery space and be fitted with ~~a~~ flame screens. For ships constructed on or after [1 July 2028], these vent and bleed lines shall be independent from cargo and cargo vent piping systems."

82 The following new paragraphs 16.3.5 and 16.3.6 are added after existing paragraph 16.3.4:

"16.3.5 For spaces outside the cargo area containing LPG or ethane fuel systems, special consideration shall be given to the density and lower flammability limit (LFL) of LPG or ethane vapour. For ships constructed on or after [1 July 2028], ventilation capacity, including ventilation inlet and outlet location, shall be supported by numerical calculations. The numerical calculations shall be performed in accordance with a recognized standard. These may include computational fluid dynamics (CFD), gas dispersion analysis or another method approved by the Administration. Notwithstanding, for enclosed spaces within the cargo area, on the open deck and containing LPG or ethane fuel conditioning equipment, the requirements of paragraph 12.1.3 shall apply.

16.3.6 For spaces outside the cargo area containing LPG or ethane fuel systems, in addition to the requirements of paragraph 13.6.12, gas detection heads shall be fitted in spaces where LPG or ethane vapour may accumulate particularly where air circulation is reduced or near the bottom of the space. For ships constructed on or after [1 July 2028], the suitability of their location shall be supported by numerical calculations. The numerical calculations shall be performed in accordance with a recognized standard. These may include computational fluid dynamics (CFD), gas dispersion analysis, a physical smoke test or another method approved by the Administration. The numerical calculations shall include the possible range of composition of the intended fuel."

16.4 Gas fuel supply

16.4.1 General

83 The following new paragraphs 16.4.1.2 and 16.4.1.3 are inserted after existing paragraph 16.4.1.1 and existing paragraph 16.4.1.2 is renumbered as 16.4.1.4:

"16.4.1.2 LPG or ethane fuel piping outside the cargo area shall be of double wall design or ducted and the outer boundary shall be continuous in the space. In spaces outside the cargo area, non-continuous double barriers shall not be used under the circumstances described in paragraph 16.4.6.2.

16.4.1.3 For LPG fuel supply systems, liquid, vent and purging shall lead to a fuel collection tank, gas-liquid separator or similar device located in the cargo area. Heating of the gas-liquid separator may be necessary for ships operating in cold areas. Fuel supply vent piping systems shall be designed to safely handle any fuel condensate which may occur without restricting the function of the system. Any liquids formed shall be safely disposed. Vent piping associated with the fuel supply system shall be fitted with an inert gas purging interface and shall include a means for preventing condensation of vapour in the system."

84 The following new paragraphs are added after renumbered paragraph 16.4.1.4:

"16.4.1.5 For permanent installations for ships constructed on or after [1 July 2028], the inert gas piping connected to the fuel piping shall be fitted with double-block-and-bleed valves. In addition, a non-return valve shall be installed between the double-block-and-bleed arrangement and the fuel piping. For LPG liquid fuel supply systems, the piping shall have a means of being drained without release of liquid to the atmosphere. LPG liquid trapped in double-block-and-bleed valves or the inert gas system piping shall have a means of being drained without release of liquid to the atmosphere.

16.4.1.6 All safety functions related to gas burning form the Gas Burning Safety System. This system may be a part of the cargo automation and safety system as described in chapter 13.8.1 or a stand-alone system interfacing with the same and built to the same requirements.

16.4.1.6.1 Main functions as described in the subsequent paragraphs as well as in other parts with reference to table 18.1 as guidance.

16.4.1.6.2 A full cargo ESD shall initiate the closure of the Master Valves described in 16.4.6.1."

16.4.3 Routeing of fuel supply pipes

85 Section 16.4.3 is amended, as follows:

"**16.4.3 Routeing of fuel supply pipes**

16.4.3.1 Fuel piping may pass through or extend into enclosed spaces other than those mentioned in 16.4.1, provided it fulfils one of the following conditions:

.1 it is of a double-wall design with the space between the concentric pipes pressurized with inert gas at a pressure greater than the gas fuel pressure. The master gas fuel valve, as required by 16.4.6, closes automatically upon loss of inert gas pressure; or

.2 it is installed in a pipe or duct equipped with mechanical exhaust ventilation having a capacity of at least 30 air changes per hour and is arranged to maintain a pressure less than the atmospheric pressure. The mechanical ventilation is in accordance with chapter 12, as applicable. The ventilation is always in operation when there is fuel in the piping and the master gas fuel valve, as required by 16.4.6, closes automatically if the required air flow is not established and maintained by the exhaust ventilation system. The inlet or the duct may be from a non-hazardous machinery space, and the ventilation outlet is in a safe location.

16.4.3.2 For LPG or ethane fuel systems, the air inlet of the pipe or duct shall not be in a machinery space. In addition, the air inlet of the pipe or duct shall be in a location which would be safe in the absence of the air inlet. Consideration shall be given to the risk of liquid carry-over resulting from a liquid leak. Ventilation outlets of the pipe or duct shall be in the cargo area."

16.4.5 Gas consumer isolation

86 Paragraph 16.4.5 is amended, as follows:

"**16.4.5 Gas consumer isolation**

The supply and return piping of each gas consumer unit shall be provided with ~~gas~~ fuel isolation by automatic double block and bleed, vented to a safe location, under both normal and emergency operation. The automatic valves shall be arranged to fail to the closed position on loss of actuating power. In a space containing multiple consumers, the shutdown of one shall not affect the gas fuel supply to the others. For LPG or ethane liquid fuel supply systems, the piping shall be able to be drained and bleed valves opened without release of liquid to the atmosphere."

16.5 Gas fuel plant and related storage tanks

16.5.2 Remote stops

87 Paragraph 16.5.2.2 is amended, as follows:

"16.5.2.2 ~~The fuel supply equipment shall be automatically stopped in the case of low suction pressure or fire detection. Unless expressly provided otherwise, the requirements of 18.10 need not apply to gas fuel compressors or pumps when~~

~~used to supply gas consumers.~~ Fuel supply equipment shall be included into all safety actions/shutdowns required by any of the cargo system related safety systems insofar as fuel supply is not safe while the respective action is ongoing."

16.7 Special requirements for gas-fired internal combustion engines

16.7.1 Arrangements

88 Paragraph 16.7.1.4 is amended, as follows:

"16.7.1.4 Unless designed with the strength to withstand the worst-case overpressure due to ignited gas leaks, air inlet manifolds, scavenge spaces, exhaust system and crank cases shall be fitted with suitable pressure relief systems. Pressure relief systems shall lead to a safe location, away from personnel. For ships constructed on or after [1 July 2028]:

.1 A suitable pressure relief system for air inlet manifolds, scavenge spaces and exhaust system shall be provided 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 regarding the hazard potential of overpressure in air inlet manifolds, scavenge spaces and exhaust system shall be carried out and reflected in the safety concept of the engine.

.2 For crankcases, the explosion relief valves, as required by SOLAS regulation II-1/27.4, shall be considered suitable for the gas operation of the engine. For engines not covered by the said SOLAS regulation, a detailed evaluation regarding the hazard potential of fuel gas accumulation in the crankcase shall be carried out."

16.7.3 Safety

89 The following new paragraphs 16.7.3.3.1 to 16.7.3.3.3 are added after existing paragraph 16.7.3.3:

"16.7.3.3.1 For ships constructed on or after [1 July 2028], for Otto combustion process gas and dual fuel engines where the space below the piston is in direct communication with the crankcase, gas detection shall be provided to the crankcase, sumps (vent space) and charge air manifolds unless otherwise justified by the safety concept of the engine.

16.7.3.3.2 For ships constructed on or after [1 July 2028], for Otto combustion crosshead engine designs, gas detection shall be provided to the piston underspace side unless otherwise justified by the safety concept of the engine.

16.7.3.3.3 For ships constructed on or after [1 July 2028], for all engine types (e.g. 4-stroke, 2-stroke, trunk piston, crosshead, Otto or Diesel combustion process), a detailed evaluation regarding the hazard potential of fuel gas accumulation in the crankcase, sumps, scavenge spaces/charge air manifolds and cooling system vents shall be carried out and reflected in the safety concept of the engine. This may identify alternative means to detect and/or mitigate gas operation fault conditions."

16.8 Special requirements for gas turbines

16.8.1 Arrangements

90 The following new paragraph 16.8.1.2 is inserted after existing paragraph 16.8.1.1 and the subsequent paragraphs are renumbered accordingly:

"16.8.1.2 Each turbine using LPG fuel shall be fitted with a gastight enclosure unless fuel supply piping meets the requirements of paragraph 16.4.3. The consequences of gas leakage shall be evaluated in the risk assessment required by 16.2.5."

16.9 Alternative fuels and technologies

91 Paragraph 16.9.1 is amended as follows:

"16.9.1 If acceptable to the Administration, ~~other~~ cargo gases not covered by 16.1.1 may be used as fuel, ~~providing~~ provided that the same level of safety as natural gas in this Code is ensured."

92 Paragraphs 16.9.3 to 16.9.5 are amended as follows:

"16.9.3 For cargoes ~~other than LNG~~ not covered by 16.1.1, the fuel supply system and gas consumers shall comply with the requirements of ~~16.4.1, 16.4.2, 16.4.3 and 16.5~~ 16.2 to 16.8, as applicable, and shall include means for preventing condensation of vapour in the fuel supply system.

~~16.9.4 Liquefied gas fuel supply systems shall comply with 16.4.5.~~

16.9.~~5~~4 In addition to the requirements of 16.4.3.1.2, both ventilation inlet and outlet shall be located outside the machinery space. The inlet shall be in a non-hazardous area and the outlet shall be in a safe location."

CHAPTER 17
SPECIAL REQUIREMENTS

17.4 Refrigeration systems

93 The following new explanatory sentence is inserted under the title of section 17.4 (Refrigeration systems) before existing paragraph 17.4.1:

"The special requirements in this section listed under column "i" in the table in chapter 19 are applicable only when a refrigeration system is required or used to maintain the cargo tank pressure and temperature within design limits of the containment system and/or within the conditions of carriage of the cargo indicated on the Certificate of Fitness."

17.21 Carbon dioxide: high purity

94 The title of section 17.21 is amended, as follows:

"**17.21 Carbon dioxide~~: high purity~~**"

95 Paragraph 17.21.1 is amended, as follows:

17.21.1 Uncontrolled pressure loss from the cargo can cause ~~"sublimation"~~ solidification and the cargo will change from the liquid to the solid state. The precise ~~"~~triple point~~"~~ temperature of a particular carbon dioxide cargo shall be supplied before loading the cargo, and will depend on the purity of that cargo~~, and this shall be taken into account when cargo instrumentation is adjusted~~. The set pressure for the alarms and automatic actions described in this section shall be set to at least 0.05 MPa above the highest triple point pressure of ~~for~~ the ~~specific~~ cargo being carried under all expected conditions. The ~~"~~triple point~~"~~ for pure carbon dioxide occurs at ~~0.5~~ 0.417 MPa gauge and ~~-54.4~~ -56.6°C."

96 Paragraph 17.21.4 is amended, as follows:

"17.21.4 Cargo tanks shall be continuously monitored for low pressure when a carbon dioxide cargo is carried. An audible and visual alarm shall be given at the cargo control position and on the bridge. If the cargo tank pressure ~~continue to~~ falls to ~~within 0.05 MPa of the "triple point" for the particular cargo~~ the set pressure for alarms and automatic actions specified in 17.21.1, the monitoring system shall automatically close all cargo manifold liquid and vapour valves and stop all cargo compressors and cargo pumps. The emergency shutdown system required by 18.10 may be used for this purpose."

97 Paragraph 17.21.6 is replaced by the following:

"17.21.6 Cargo hold spaces, cargo compressor rooms and other enclosed spaces where carbon dioxide could accumulate shall be fitted with continuous monitoring for carbon dioxide build-up. ~~This fixed gas detection system replaces the requirements of 13.6, and hold spaces shall be monitored permanently even if the ship has type C cargo containment.~~ The alarms shall be set to 5,000 ppm."

98 The following new paragraphs 17.21.7 and 17.21.8 are added after existing paragraph 17.21.6:

"17.21.7 The materials of construction used in the cargo system shall also take into account the possibility of corrosion, in case carbon dioxide cargo contains impurities such as water or sulphur dioxide, which can cause acidic corrosion or other problems.

17.21.8 Other requirements

17.21.8.1 The requirements for flammable products may be waived.

17.21.8.2 Carbon dioxide is considered a toxic product for the purpose of the Code. The requirements applicable to carbon dioxide as a toxic product in the Code are limited to those indicated in the following paragraphs and as shown in the table in chapter 19 for carbon dioxide.

17.21.8.3 The requirements of 3.2.5, 3.3.4, 3.6, 5.7.4, 12.1.7, 12.1.9, 13.6.11, 13.6.14, 13.6.15, 13.6.17 and 18.10.3.4, as well as chapters 10 (except for 10.2.6) and 11 do not apply to ships that exclusively carry this cargo.

17.21.8.4 In the application of 3.1.2 and 3.1.3, a single A-0 bulkhead shall be considered sufficient for this cargo.

17.21.8.5 In the application of 3.3.1, the requirement of SOLAS regulation II-2/9.2.3 for cargo spaces shall be applied instead of SOLAS regulation II-2/9.2.4 for cargo pump-rooms.

17.21.8.6 In the application of 3.8, bow or stern loading and unloading may be allowed subject to the approval by the Administration.

17.21.8.7 When flammable or other toxic products are used for fuel or reliquefication systems, due consideration shall be given to the additional risk.

17.21.8.8 In the application of chapter 9, inert gas may be not required based on the specific design. Dry air may be required to prevent condensation in hold space, cargo tanks and piping to gas free tanks.

17.21.8.9 In the application of chapter 13, all requirements (except those exclusively related to flammability) shall be applied except for 13.6.5."

99 Section 17.22 (Carbon dioxide: reclaimed quality) is deleted.

"~~**17.22 Carbon dioxide: reclaimed quality**~~

~~17.22.1 The requirements of 17.21 also apply to this cargo. In addition, the materials of construction used in the cargo system shall also take account of the possibility of corrosion, in case the reclaimed quality carbon dioxide cargo contains impurities such as water, sulphur dioxide, etc., which can cause acidic corrosion or other problems.~~"

CHAPTER 18
OPERATING REQUIREMENTS

18.9 Cargo sampling

100 The following new paragraph is added after existing paragraph 18.9.5:

"18.9.6 The requirements in paragraphs 18.9.1 to 18.9.5 are only applicable if such a sampling system is fitted on board. Connections used for control of atmosphere in cargo tanks during inerting or gassing up are not considered as cargo sampling connections."

18.10 Cargo emergency shutdown (ESD) system

18.10.1 General

101 Paragraph 18.10.1.1 is amended, as follows:

"18.10.1.1 A cargo emergency shutdown system shall be fitted to stop cargo flow in the event of an emergency, either internally within the ship, or during cargo transfer to ship or shore. The ESD system is intended to return the cargo system to a safe static condition so that any remedial action can be taken. The design of the ESD system shall avoid the potential generation of surge pressures within cargo transfer pipe work ~~(see 18.10.2.1.4)~~."

102 Paragraph 18.10.1.3 is amended, as follows:

"18.10.1.3 The ESD system shall be activated by the manual and automatic initiations listed in table 18.1, which is a summary of ESD shutdown related system functions taking into account those required by the relevant sections of the Code, including chapter 16, and may not describe all requirements. The actual enforceable requirements are found in the Code. Any additional initiations shall only be included in the ESD system if it can be shown that their inclusion does not reduce the integrity and reliability of the system overall. A failure of any part of the system shall activate an ESD. Failure of the system includes loss of power for ESD valves and main electric power failure."

18.10.2 ESD valve requirements

103 Paragraph 18.10.2.1.3 is amended, as follows:

"18.10.2.1.3 ESD valves in liquid piping systems shall close fully and smoothly within 30 seconds of ~~actuation~~ initiation of the emergency shutdown. Information about the closure time of the valves and their operating characteristics shall be available on board, and the closing time shall be verifiable and repeatable."

104 Paragraphs 18.10.2.1.4, 18.10.2.2 (Ship-shore and ship-ship manifold connections) and 18.10.2.3 (Cargo system valves) are deleted.

18.10.3 ESD system controls

105 The following new paragraphs 18.10.3.1 and 18.10.3.2 are inserted after the heading "18.10.3 ESD system controls", and the subsequent paragraphs are renumbered accordingly:

"18.10.3.1 The ESD system shall be designed to be activated by the manual and automatic initiations as specified in the Code. Any additional initiations shall only be included in the ESD system if it can be shown that their inclusion does not reduce the integrity and reliability of the system overall.

18.10.3.2 The ESD system shall be fail-safe. If any single part of the system fails, ESD shall be initiated."

106 Renumbered paragraph 18.10.3.5 is amended, as follows:

"18.10.3.~~3~~5 Cargo machinery that is running shall be stopped by activation of the ESD system ~~in accordance with the cause and effect matrix in table 18.1~~ using the causes found in the relevant sections of the Code with reference to table 18.1 as guidance."

107 The title of section 18.10.4 (Additional shutdowns) is amended, as follows:

"**18.10.4 ~~Additional shutdowns~~ Associated safety systems**"

108 Table 18.1 is replaced by the following table:

"Table 18.1 – Shutdown-related system cause and effect functions

Initiation		Shutdown action (See 18.10.1.1)								
		Emergency shutdown system (ESD)						Gas Burning Safety System (GBSS)		
		Cargo Pumps	Compressor used for cargo handling	ESD valves on manifold	Cargo tank ESD valves	ESD link (to terminal)	Reliquefication plant including relevant aux systems and compressor	Pumps used for gas fuel	Compressors used for gas fuel	Master valve
1	ESD System failure (see 18.10.1.3)	√	√	√	√	√	√	√	√	√
2	ESD Push-button (see 18.10.3.3)	√	√	√	√	√	√	√	√	√
3	Fire detection in cargo area. (see 18.10.3.4)	√	√	√	√	√	√	√	√	√
4	ESD link from terminal① (see 18.10.1.4)	√	√	√	√①	√	N/A	N/A	N/A	N/A
5	Overflow protection (See 13.3.2) ②	√	√	√	√	√	√	√	√	√
6	Low pressure protection in cargo tanks ④ (see 8.3.1.1, 18.10.4)	√	√	√	√	√	√	√	√	√
7	Master valve receives shut signal ③ (see 16.4.2, 16.4.3, 16.4.6.2.1, 16.4.6.3.1, 16.4.8)	N/A	N/A	N/A	N/A	N/A	N/A	√	√	√
8	Fuel gas push-button (see 16.4.6.2.2, 16.4.6.3.2, 16.5.2.1)	N/A	N/A	N/A	N/A	N/A	N/A	√	√	√
9	Low suction pressure in gas fuel (see 16.5.2.2) ④	N/A	N/A	N/A	N/A	N/A	N/A	√	√	√
10	Fire detection outside cargo area (see 16.5.2.2)	N/A	N/A	N/A	N/A	N/A	N/A	√	√	√

Note:

① "ESD link (from terminal)" does not trip the gas fuel supply or cargo reliquefication as the emergency is on the terminal, tripping of necessary tank valves is optional.

② The sensors referred to in 13.3.2 may be used to automatically close the individual tank filling valve if this can be done in a manner that will avoid excessive liquid pressure in the loading line. Alternatively full ESD can be initiated as given in the table.

③ "Master valve receives shut signal" refers to main valve required by 16.4.6.1 and not individual consumers. In case several consumers are served by different supply systems, only common equipment needs to be shut down.

④ "Vacuum protection of cargo tanks" and "low suction pressure in gas fuel" can be the same protection.

CHAPTER 19

SUMMARY OF MINIMUM REQUIREMENTS

109 The entries for "Carbon Dioxide (high purity)" and "Carbon Dioxide (Reclaimed quality)" in the table in chapter 19 are replaced by the following single entry:

Product name		***Ship type***	***Independent tank type C required***	***Control of vapour space within cargo tanks***	***Vapour detection***	***Gauging***		***Special requirements***
Carbon Dioxide		3G	'	'	T	C		14.4.2, 14.4.4 and 17.21

110 The following new entry is added after the existing entry of "Vinylidene chloride" in the table in chapter 19.

Product name		***Ship type***	***Independent tank type C required***	***Control of vapour space within cargo tanks***	***Vapour detection***	***Gauging***		***Special requirements***
VOC Condensate		2G/2PG	-	-	F + T †	C		14.4.2, 14.4.3, 17.9, 17.11

"† The toxic vapour detection equipment shall be able to detect "Benzene", "Hexane" and "Toluene"."

APPENDIX 2

MODEL FORM OF INTERNATIONAL CERTIFICATE OF FITNESS FOR THE CARRIAGE OF LIQUEFIED GASES IN BULK

111 The entries under "Particulars of ships" are amended, as follows:

"Name of ship …….
Distinctive number or letters …….
IMO number …….
Port of registry …….
Cargo capacity (m^3) …….
Ship type (Code paragraph 2.1.2) …….
Date of build (all applicable dates shall be completed)
Date of building contract …….
Date on which keel was laid or on which the ship was at similar stage of construction ~~or in the case of a converted ship, date on which conversion to a gas carrier was commenced~~ …….
Date of delivery ……
Date on which conversion to a gas carrier was commenced …….
The ship also complies fully with the following amendments to the Code: ……..
The ship is exempted from compliance with the following provisions of the Code: ……."

112 The table in paragraph 3.3 is amended, as follows:

".3

Tank type and number	Stress factors[5]				Materials[5]	MARVS[6]	Cargo/Fuel
	A	B	C	D			
Cargo piping							
Fuel vapour or liquid piping							

"

113 The following new paragraph 3.5 is added after existing paragraph 3.4:

".5 Mechanical properties of the fuel tank materials were determined at ….°C.[7]"

114 Paragraph 4 is amended, as follows, the following new paragraph 5 is added after existing paragraph 4, and the subsequent paragraphs are renumbered accordingly:

"4 That the ship is suitable for the carriage in bulk of the following products as cargo provided that all the relevant operational provisions of the Code are observed.[8]

Products	Conditions of carriage (tank numbers, etc.)	Minimum temperature
Continued on attachment 1, additional signed and dated sheets. Tank numbers referred to in this list are identified on attachment 2, signed and dated tank plan.		

"

"5 That the ship is suitable for the carriage and use of the following products as fuel provided that all the relevant operational provisions of the Code are observed.[8]

Products	Conditions of carriage and use (tank numbers, etc.)	Minimum temperature
Tank numbers referred to in this list are identified on attachment 2, signed and dated tank plan.		

"

Consequential amendments to referenced figure numbers

115 According to each row of the following table, in the paragraph indicated in the left column, the referenced figure number specified in the second column from the left is replaced with the figure number shown in the third column, following the note specified in the right column.

Paragraph	Existing referenced figure number	Amended referenced figure number	Note
paragraph 3.5.3.5.1	figure 3.1	figure 3.3	
paragraph 3.5.3.5.2	figure 3.2	figure 3.4	
paragraph 3.5.3.5.3	figure 3.3	figure 3.5	
paragraph 3.5.3.5.4	figure 3.4	figure 3.6	
paragraph 3.5.3.5.5	figure 3.5	figure 3.7	twice
paragraph 3.5.3.5.6	figure 3.6	figure 3.8	
paragraph 4.18.2.6.3	figure 4.4	figure 4.5	
paragraph 4.28.1.2 in the text for α_β	figure 4.1	figure 4.2	
paragraph 4.28.1.2 in the text for Z_β	figure 4.2	figures 4.3 and 4.4	
paragraph 8.4.1.2	figure 8.1	figure 8.2	

Consequential amendments to referenced paragraph numbers

116 According to each row of the following table, in the paragraph indicated in the left column, the referenced paragraph number specified in the second column from the left is replaced with the paragraph number shown in the third column.

Paragraph	Existing referenced paragraph number	Amended referenced paragraph number
paragraph 1.4.1.2	1.2.43	1.2.46
paragraph 3.8.2	1.2.53	1.2.57
paragraph 7.4.1	1.2.52	1.2.56
paragraph 7.7	1.2.47	1.2.51
renumbered paragraph 8.2.18	1.2.31	1.2.34
paragraph 17.15	1.2.47	1.2.51
paragraph 17.16.5	1.2.28	1.2.30
paragraph 17.16.5	1.2.47	1.2.51
paragraph 17.18.23	1.2.28	1.2.30
paragraph 18.4.2.2	1.2.47	1.2.51
paragraph 5.6.2	8.2.7	8.2.8
paragraph 5.6.2	8.2.8	8.2.9
renumbered paragraph 8.2.9	8.2.7	8.2.8
renumbered paragraph 8.2.13	8.2.10	8.2.11
renumbered paragraph 8.2.13	8.2.11.1	8.2.12.1
renumbered paragraph 8.2.13	8.2.11.2	8.2.12.2
paragraph 13.4.3	8.2.7	8.2.8
new paragraph 15.3.1	8.2.18	8.2.19
renumbered paragraph 15.3.2	8.2.17	8.2.18
renumbered paragraph 15.4.2	8.2.18	8.2.19
paragraph 17.9	8.2.15	8.2.16
paragraph 17.16.4.3	8.2.10	8.2.11
paragraph 17.16.4.3	8.2.11	8.2.12
paragraph 17.16.4.3	8.2.15	8.2.16
paragraph 17.21.2	8.2.9.2	8.2.16
paragraph 17.21.2	8.2.15	8.2.16
paragraph 17.21.3	8.2.10	8.2.11
paragraph 17.21.3	8.2.15	8.2.16
paragraph 18.2.2.10	8.2.8	8.2.9
paragraph 18.12	8.2.7	8.2.8
paragraph 18.12	8.2.8	8.2.9
paragraph 18.12	8.2.9	8.2.10
paragraph 11.3.2.1	11.3.1.8	11.3.1.9
paragraph 16.4.4.2	16.4.3.2	16.4.3.1.2
paragraph 16.9.5	16.4.3.2	16.4.3.1.2
renumbered paragraph 8.2.i in section starting with the words "THIS IS TO CERTIFY:" in Appendix 2	6	7
renumbered paragraph 8.2.iii in section starting with the words "THIS IS TO CERTIFY:" in Appendix 2	6	7
renumbered paragraph 8.2.iv in section starting with the words "THIS IS TO CERTIFY:" in Appendix 2	6	7

APPENDIX

CHECK/MONITORING SHEET FOR THE PROCESS OF AMENDING THE CONVENTION AND RELATED MANDATORY INSTRUMENTS (PROPOSAL/DEVELOPMENT)

Part III – Process monitoring to be completed during the work process at the Sub-Committee and checked as part of the final approval process by the Committee (refer to paragraph 3.2.1.3)

1	The Sub-Committee, at an initial engagement, has allocated sufficient time for technical research and discussion before the target completion date, especially on issues needing to be addressed by more than one Sub-Committee and for which the timing of relevant sub-committees meetings and exchanges of the result of consideration needed to be carefully examined.	Yes
2	The scope of application agreed at the proposal stage was not changed without the approval of the Committee.	Yes
3	The technical base document/draft amendment addresses the proposal's issue(s) through the suggested instrument(s); where it does not, the Sub-Committee offers the Committee an alternative method of addressing the problem raised by the proposal.	N/A
4	Due attention is to be paid to the *Interim guidelines for the systematic application of the grandfather clause* (MSC/Circ.765).	N/A
5	All references have been examined against the text that will be valid if the proposed amendment enters into force.	Yes
6	The location of the insertion or modified text is correct for the text that will be valid when the proposed text enters into force on a four-year cycle of entry into force, as other relevant amendments adopted might enter into force on the same date.	Yes
7	There are no inconsistencies in respect of scope of application between the technical regulation and the application statement contained in regulation 1 or 2 of the relevant chapter, and application is specifically addressed for existing and/or new ships, as necessary.	Yes
8	Where a new term has been introduced into a regulation and a clear definition is necessary, the definition is given in the article of the Convention or at the beginning of the chapter.	Yes
9	Where any of the terms "fitted", "provided", "installed" or "installation" are used, consideration has been given to clarifying the intended meaning of the term.	Yes
10	All necessary related and consequential amendments to other existing instruments, including non-mandatory instruments, in particular to the forms of certificates and records of equipment required in the instrument being amended, have been examined and included as part of the proposed amendment(s).	Yes
11	The forms of certificates and records of equipment have been harmonized, where appropriate, between the Convention and its Protocols.	N/A
12	It is confirmed that the amendment is being made to a currently valid text and that no other bodies are concurrently proposing changes to the same text.	Yes

Part III – Process monitoring to be completed during the work process at the Sub-Committee and checked as part of the final approval process by the Committee (refer to paragraph 3.2.1.3)

13	All entry-into-force criteria (building contract, keel laying and delivery) have been considered and addressed.	Yes
14	Other impacts of the implementation of the proposed/approved amendment have been fully analysed, including consequential amendments to the "application" and "definition" regulations of the chapter.	Yes
15	The amendments presented for adoption clearly indicate changes made with respect to the original text, so as to facilitate their consideration.	Yes
16	For amendments to mandatory instruments, the relationship between the Convention and the related instrument has been observed and addressed, as appropriate.	Yes
17	The related record format has been completed or updated, as appropriate.	Yes

RECORD FORMAT

The following records should be created and kept updated for each regulatory development.

The records can be completed by providing references to paragraphs of related documents containing the relevant information, proposals, discussions and decisions.

1 Title (number and title of regulation(s))
IGC Code chapters 1,2,4,5,8,9,10,11,12,13,15,16,17,18, and the Model Form of the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk
2 Origin of the requirement (original proposal document)
The output was proposed by MSC 102/21/1. The large number of UIs submitted to the CCC Sub-Committee since the entry into force of the IGC Code in 2016 indicates there is a clear need to update the IGC Code, taking account of the experience gained. Additional tasks were added by MSC 103/21, paragraph 18.
3 Main reason for the development (extract from the proposal document)
The amendments include a variety of issues, including application of finite element analysis to type C tanks, carriage of CO_2 cargoes, the use of LPG and toxic cargoes as fuel, the causes and effects of an ESD and cargo tank filling limits.
4 Related output
Amendments to the IGC Code and development of guidelines for ammonia cargo as fuel
5 History of the discussion (approval of work programmes, sessions of sub-committees, including CG/DG/WG arrangements)
CCC 6 endorsed the work plan for the next phase of the development of the IGC Code and endorsed the output on "Review of the IGC Code". CCC 9 developed amendments, for approval at MSC 109 and subsequent adoption at MSC 110. CCC 10 continued development of additional amendments which had not been agreed upon at CCC 9. Having considered the draft amendments to the IGC Code, further progressed by the Drafting Group (MSC 110/WP.7, annex 15), MSC 110 noted the progress made and endorsed the list of substantial proposals to the draft amendments to the IGC Code for further consideration by the CCC Sub-Committee, with a view to reporting to MSC 111 for approval (MSC 110/WP.7, annex 14). In this regard, MSC 110 agreed that an experts group could be established at CCC 11 to consider the aforementioned

list of substantial proposals concerning the draft amendments to the IGC Code (MSC 110/21, paragraph 3.61). CCC 11 agreed to the draft amendments to the IGC Code prepared by the Experts Group, as set out in annex 9 of document CCC 11/16; and agreed to request the Secretariat to prepare a document containing consolidated draft amendments to the IGC Code with a view to approval at MSC 111 and subsequent adoption at MSC 112.
6 Impact on other instruments (codes, performance standards, guidance circulars, certificates/records format, etc.)
Model Form of the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk and the *Interim Guidelines for the safety of ships using ammonia as fuel* (MSC.1/Circ.1687)
7 Technical background
7.1 Scope and objective (to cross-check with items 4 and 5 in part II of the checklist)
The amendments include a variety of issues, including application of finite element analysis to type C tanks; carriage of CO_2 cargoes; the use of LPG and toxic cargoes as fuel; the causes and effects of an ESD; and cargo tank filling limits.
7.2 Technical/operational background and rationale (e.g. summary of FSA study, if available, or engineering challenge posed)
Not applicable
7.3 Source/derivation of requirement (non-mandatory instrument, industry standard, national/regional requirement)
Not applicable
7.4 Short summary of requirement (what is the new requirement – in short and lay terms)
The amendments will enhance safety by regulating a variety of issues, including application of finite element analysis to type C tanks; carriage of CO_2 cargoes; the use of LPG and toxic cargoes as fuel; the causes and effects of an ESD; and cargo tank filling limits.
7.5 Points of discussions (controversial points and conclusion)
Not applicable

APPENDIX 2

CHECKLIST FOR THE IDENTIFICATION OF CAPACITY-BUILDING IMPLICATIONS

1 For Administrations

☐ Is new legislation required? No

☐ Is there a requirement for new equipment and/or systems? Yes

- Does equipment manufacturing capacity exist internationally? Yes
- Do equipment repair/servicing facilities exist internationally? Yes
- Is there capacity to develop new systems? Unknown

☐ Will the implementation require additional financial resources? Yes

☐ Is there a need for additional human resources or new skills? No

☐ Will there be a need to upgrade current infrastructure? No

☐ Is there enough lead time towards implementation? The timeline between adoption and implementation is extremely short – only about 18 months

☐ Will a rapid implementation procedure be adopted? None planned

☐ Is there a substantial modification of existing standards? Yes

☐ Will a guide to implementation be needed? Maybe

2 For the industry

☐ Would the industry require new and/or enhancement of existing systems? Maybe

- Does capacity exist internationally to develop new systems? Unknown

☐ Is there a need for additional training of seafarers? Additional system-specific training may be required

- Do related and validated training courses exist?
- Are sufficient simulation training courses available internationally?

☐ Will there be a requirement for new equipment? Maybe

- Does manufacturing capacity exist internationally? Unknown

☐ Is there repair/servicing and/or retrofitting and does maintenance capacity exist internationally? Unknown

FORM FOR CAPACITY-BUILDING MEASURES

Capacity-building Measures Form

Instrument IGC Code, chapters 1,2,4,5,8,9,11,12,13,15,16,17,18

Measure number ___1___ of __1____

Required for	☒	Administration
	☒	Industry
Implementation	☒	Prior to adoption
	☒	Once adopted
	☒	Prior to entry into force
	☐	Once ratified
	☐	Phased in

Description of capacity-building activity needed for the implementation of new measures:

Document MSC 111/INF.10 provides an implication analysis of the IGC Code draft amendments. Document MSC 111/INF.10 groups the proposed changes into 97 individual amendment items, of which 39 are considered to have notable design implications for either newbuilds or existing ships. Owing to the short timeline between adoption and implementation, it is recommended that any relevant design implications from MSC 111/INF.10 that remain once the amendments are finalized/adopted be proactively shared with Administrations and industry stakeholders as early as possible to afford the best chance for successful implementation.

***

ANNEX 21

RESOLUTION MSC.448(99)/Rev.1
(adopted on 21 May 2026)

REVISED GUIDELINES ON THE PREVENTION OF ACCESS BY STOWAWAYS AND THE ALLOCATION OF RESPONSIBILITIES TO SEEK THE SUCCESSFUL RESOLUTION OF STOWAWAY CASES

THE MARITIME SAFETY COMMITTEE,

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

HAVING CONSIDERED the general purposes of the Convention on Facilitation of International Maritime Traffic, 1965, as amended (FAL Convention), and in particular article III thereof,

RECALLING the provisions of resolution A.1027(26) on *Application and revision of the Guidelines on the allocation of responsibilities to seek the successful resolution of stowaway cases* (resolution A.871(20)),

RECALLING ALSO that the International Convention Relating to Stowaways, which attempted to establish an internationally acceptable regime for dealing with stowaways, has not yet come into force,

RECALLING FURTHER that, in accordance with article VII(2)(a) of the FAL Convention, the Facilitation Committee, at its twenty-ninth session, adopted on 10 January 2002 resolution FAL.7(29) on *Amendments to the Convention on Facilitation of International Maritime Traffic, 1965, as amended*, which introduced a new section 4 on Stowaways in the annex to the FAL Convention, prescribing Standards and Recommended Practices on matters relating to stowaways (the FAL provisions on stowaways), which entered into force on 1 May 2003,

RECALLING IN ADDITION that, for the purpose of this resolution, a stowaway is defined as a person who is secreted on a ship or in cargo which is subsequently loaded on the ship, without the consent of the shipowner or the master or any other responsible person, and who is detected on board the ship after it has departed from a port, or in the cargo while unloading it in the port of arrival, and is reported as a stowaway by the master to the appropriate authorities,

NOTING with concern the number of incidents involving stowaways, the consequent potential for disruption of maritime traffic, the impact such incidents may have on the safe and secure operation of ships and the considerable risks faced by stowaways, including loss of life,

NOTING FURTHER that the Assembly, at its twentieth regular session, adopted, by resolution A.871(20), *Guidelines on the allocation of responsibilities to seek the successful resolution of stowaway cases* (the Guidelines),

RECALLING that resolution A.1027(26) expressed conviction of the need to align, to the extent possible and desirable, the Guidelines with the FAL provisions on stowaways and to revise them in a manner that reflects developments in efforts undertaken to prevent stowaways, as well as to provide guidance and recommendations, taking into account the FAL provisions

on stowaways, on measures which can be implemented by vessels to prevent cases involving stowaways,

RECOGNIZING that the revision of the Guidelines should be done in a manner that does not duplicate the existing provisions of the Special measures to enhance maritime security contained in chapter XI-2 of the International Convention for the Safety of Life at Sea, 1974, as amended, and in the International Ship and Port Facility Security (ISPS) Code, but augments and supplements them in the context of preventing cases involving stowaways,

RECALLING that one of the functional requirements of the ISPS Code is to prevent unauthorized access of any kind to ships, port facilities and their restricted areas, and that ship security assessments and port facility security assessments should consider all possible threats, including the presence of stowaways,

TAKING INTO ACCOUNT that some stowaways may be asylum seekers and refugees, which should entitle them to such relevant procedures as those provided by international instruments and national legislation,

BEING AWARE that considerable difficulties continue to be encountered by masters and shipping companies, shipowners and ship operators when stowaways are to be disembarked from ships into the care of the appropriate authorities,

AGREEING that the existence of the present guidance should in no way be regarded as condoning or encouraging the practice of stowing away and other illegal migration, and should not undermine efforts to combat the separate problems of alien smuggling or human trafficking,

NOTING that several Member States which are also Contracting Governments to the FAL Convention:

(a) have notified the Secretary-General, in accordance with article VIII(1) of the FAL Convention (in relation to the Standards specified in section 4 of the annex to the FAL Convention) either that they find it impracticable to comply with the above-mentioned Standards or of differences between their own practices and those Standards; or

(b) have not yet notified the Secretary-General, in accordance with article VIII(3) of the FAL Convention, that they have brought their formalities, documentary requirements and procedures into accord in so far as practicable with the Recommended Practices specified in section 4 of the annex to the FAL Convention,

NOTING ALSO that the parallel existence of the Guidelines and the FAL provisions on stowaways has raised questions in relation to the procedures to be followed for dealing with stowaways by Member States which are also Contracting Governments to the FAL Convention, in particular those referred to above,

BELIEVING that, at present, stowaway cases can best be resolved through close cooperation among all authorities and persons concerned,

BELIEVING FURTHER that, in normal circumstances, through such cooperation, stowaways should, as soon as practicable, be removed from the ship concerned and returned to the country of nationality/citizenship or to the port of embarkation, or to any other country which would accept them,

RECOGNIZING that stowaway incidents should be dealt with humanely by all Parties involved, giving due consideration to the operational safety of the ship and its crew,

WHILST URGING national authorities, port authorities, shipowners and masters to take all reasonable precautions to prevent stowaways gaining access to vessels,

RECALLING ALSO resolution A.1027(26), adopted by the Assembly at its twenty-sixth regular session, by which the Assembly, inter alia, authorized the Facilitation Committee and the Maritime Safety Committee to adopt jointly the necessary amendments to the Guidelines and to promulgate them by appropriate means,

NOTING that the Maritime Safety Committee, at its eighty-eighth session, adopted the *Revised guidelines on the prevention of access by stowaways and the allocation of responsibilities to seek the successful resolution of stowaway cases* (resolution MSC.312(88)), superseded by resolution MSC.448(99),

RECALLING that the Facilitation Committee, at its fiftieth session, adopted amendments to the annex to the FAL Convention (resolution FAL.20(50)),

AGREEING that these amendments should be reflected in the revised guidelines as adopted by resolution MSC.448(99),

NOTING that the Facilitation Committee, at its fiftieth session, adopted the resolution on *Revised guidelines on the prevention of access by stowaways and the allocation of responsibilities to seek the successful resolution of stowaway cases*, with identical amendments to the Guidelines,

1 ADOPTS the *Revised guidelines on the prevention of access by stowaways and the allocation of responsibilities to seek the successful resolution of stowaway cases*, set out in the annex to the present resolution;

2 AGREES that the provisions of this resolution should, in accordance with resolution A.1027(26), be considered as being of relevance only with respect to:

(a) Member States which are not Contracting Governments to the FAL Convention; and

(b) Member States which are Contracting Governments to the FAL Convention and which:

(i) have notified the Secretary-General, in accordance with article VIII(1) of the FAL Convention (in relation to the Standards specified in section 4 of the annex to the FAL Convention) either that they find it impracticable to comply with the aforementioned Standards or of differences between their own practices and those Standards; or

(ii) have not yet notified the Secretary-General, in accordance with article VIII(3) of the FAL Convention, that they have brought their formalities, documentary requirements and procedures into accord in so far as practicable with the Recommended Practices specified in section 4 of the annex to the FAL Convention;

3 URGES Governments to implement in their national policies and practices the amended procedures recommended in the annexed Guidelines; as from July 2026;

4 URGES ALSO Governments to deal with stowaway cases in a spirit of cooperation with other parties concerned, on the basis of the allocation of responsibilities set out in the annexed Guidelines;

5 INVITES shipping companies, shipowners, ship operators and other stakeholders to take on the relevant responsibilities set out in the annexed Guidelines and to guide their masters and crews as to their respective responsibilities in stowaway cases;

6 INVITES Governments to develop, in cooperation with the industry, comprehensive strategies to improve access control and prevent intending stowaways from gaining access to ships;

7 AGREES that the Maritime Safety Committee should continue to monitor the effectiveness of the annexed Revised Guidelines on the basis of information provided by Governments and the industry, to keep them under review and to take further action, including the development of a relevant binding instrument, as may be considered necessary in light of developments;

8 REVOKES resolution MSC.448(99);

9 REQUESTS the Assembly to endorse the action taken by the Maritime Safety Committee and the Facilitation Committee.

ANNEX

REVISED GUIDELINES ON THE PREVENTION OF ACCESS BY STOWAWAYS AND THE ALLOCATION OF RESPONSIBILITIES TO SEEK THE SUCCESSFUL RESOLUTION OF STOWAWAY CASES

1 Introduction

1.1 Masters, shipowners, public authorities, port authorities and other stakeholders, including those providing security services ashore, have a responsibility to cooperate to the fullest extent possible in order:

.1 to prevent stowaway incidents; and

.2 to resolve stowaway cases expeditiously and secure that an early return or repatriation of the stowaway will take place; all appropriate measures should be taken in order to avoid situations where stowaways must stay on board ships for a significant period of time.

1.2 However, no matter how effective port and ship security measures are, it is recognized that there will still be occasions when stowaways gain access to vessels, either secreted in the cargo or by surreptitious boarding.

1.3 The resolution of stowaway cases is difficult because of different national legislation in each of the several potentially involved States: the State of embarkation, the State of disembarkation, the flag State of the ship, the State of apparent, claimed or actual nationality/citizenship or right of residence of the stowaway, and States of transit during repatriation.

2 Definitions

For the purpose of these Guidelines, the following meanings shall be attributed to the terms listed:

.1 *Attempted stowaway*. A person who is secreted on a ship, or in cargo which is subsequently loaded on the ship, without the consent of the shipowner or the master or any other responsible person, and who is detected on board the ship before it has departed from the port.

.2 *Port*. Any port, terminal/facility, offshore terminal, ship and repair yard or roadstead which is normally used for the loading, unloading of cargo, embarkation and disembarkation of passengers, repair and anchoring of ships, or any other place at which a ship can call.

.3 *Public authorities*. The agencies or officials in a State responsible for the application and enforcement of the laws and regulations of that State which relate to any aspect of the present Guidelines.

.4 *Security measures*. Measures developed and implemented in accordance with international agreements and national regulations to improve security on board ships and in port areas and facilities, and of goods moving in the international supply chain, to detect and prevent unlawful acts.[1]

[1] Reference is made to chapter XI-2 of the International Convention for the Safety of Life at Sea, 1974, as amended (1974 SOLAS Convention) and the International Ship and Port Facility Security Code, as amended (ISPS Code); and to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation, 1988 (1988 SUA Convention) and its 2005 Protocol (2005 SUA Protocol).

.5 *Shipowner.* The owner of the ship or any other organization or person such as the manager or the bareboat charterer who has assumed responsibility for operation of the ship, and any person acting on its behalf, excluding the ship agent.

.6 *Stowaway.* A person who is secreted on a ship, or in cargo which is subsequently loaded on the ship, without the consent of the shipowner or the master or any other responsible person and who is detected on board the ship after it has departed from a port, or in the cargo while unloading it in the port of arrival.

3 Basic principles

On the basis of the experience thus far, the application of the following basic principles have been useful in preventing stowaway incidents and have been helpful in the speedy resolution of stowaway cases:

.1 Stowaway incidents should be dealt with in a manner consistent with humanitarian principles. Due consideration must always be given to the operational safety and security of the ship and to the safety and well-being of the crew, the stowaways and any other persons present on board.

.2 Public authorities, port authorities, shipowners and masters should cooperate to the fullest extent possible in order to prevent stowaway incidents.

.3 Shipowners, masters, port authorities and public authorities should have adequate security arrangements in place which, as far as practicable, will prevent intending stowaways from getting aboard a ship or, if this fails, will detect them before the ship leaves port or, at the latest, before it arrives at the next port of call.

.4 Adequate, frequent and well-timed searches minimize the risk of having to deal with a stowaway case and may also save the life of a stowaway who may, for example, be hiding in a place which is subsequently sealed and/or chemically treated.

.5 Public authorities, port authorities, shipowners and masters should cooperate to the fullest extent possible in order to resolve stowaway cases expeditiously and securely, so that an early return or repatriation of the stowaways will take place. All appropriate measures should be taken in order to avoid situations where stowaways must stay on board ships for a significant period of time.

.6 Public authorities, ports, shipowners or masters should not give any payments, or other benefits to the stowaways, beyond the minimal requirements to ensure the security, general health, welfare and safety of the stowaways while on board or on shore, as that might act as an incentive to reoffend or as an encouragement to other persons attempting to stow away on board ships.

.7 Stowaways arriving at or entering a State without the required documents are, in general, illegal entrants. Decisions on dealing with such situations are the prerogative of the States where such arrival or entry occurs.

.8 Stowaway asylum seekers should be treated in accordance with international protection principles as set out in international instruments, such as the provisions of the United Nations Convention relating to the Status of Refugees of 28 July 1951 and of the United Nations Protocol relating to the Status of Refugees of 31 January 1967 and relevant national legislation.[2]

.9 Every effort should be made to avoid situations where a stowaway has to be detained on board a ship indefinitely. In this regard States should cooperate with the shipowner in arranging the disembarkation of a stowaway to an appropriate State.

.10 Irrespective of whether or not a ship deviates from the planned route, the disembarkation of stowaways who declare themselves to be a refugee or an asylum seeker should not be conducted in their (alleged) country of origin or any other country from which they have fled and in which they claim a risk of harm.

.11 States should accept the return of stowaways who have full nationality/ citizenship status in that State, or have a right of residence in that State.

.12 Where the nationality or citizenship or right of residence cannot be established, the State of the original port of embarkation of a stowaway should accept the return of such a stowaway for examination pending final case disposition.

4 Preventive measures

4.1 Port/terminal authorities

4.1.1 States and port and terminal owners, operators and authorities should ensure that the necessary infrastructure, and operational and security arrangements for the purpose of preventing persons attempting to stowaway on board ships from gaining access to port installations and to ships, are established in all their ports, taking into consideration when developing these arrangements the size of the port, and what type of cargo is shipped from the port. This should be done in close cooperation with relevant public authorities, shipowners and shore-side entities, with the aim of preventing stowaway occurrences in the individual port.

4.1.2 Operational arrangements and/or port facility security plans should at least be equivalent to those contained in the relevant text of section B/16 of the ISPS Code.[3]

4.1.3 All cases of stowaways detected in port while attempting to board a ship or ships should be reported to the appropriate port and public authorities, which will inform all nearby ships. Ships should follow the guidance of the appropriate port and law enforcement authorities. Any procedures should be conducted in such a manner as to cause a minimum of interference and to prevent unnecessary delays to ships.

4.1.4 Where appropriate, Contracting Governments should be encouraged to incorporate into their national legislation legal grounds to allow prosecution of stowaways, attempted

[2] In addition, public authorities may wish to consider the non-binding conclusion of the UNHCR Executive Committee on Stowaway Asylum Seekers (1988, No.53 (XXXIX)).

[3] Recommended Practice 4.3.1.2 of the FAL Convention.

stowaways and any individual or company aiding a stowaway or an attempted stowaway with the intention to facilitate access to the port area, any ship, cargo or freight containers.

4.1.5 Contracting Governments should consider entering into arrangements for the exchange of information and best practices regarding the detection of stowaways. The confidentiality and integrity of the information collated and shared should be ensured. The use of the information should be for official purposes only. However, Contracting Governments should also consider sharing relevant information to the extent necessary and as appropriate with shipowners and other parties to prevent future stowaway incidents.

4.2 Shipowner/master

4.2.1 Shipowners and masters should ensure that adequate security arrangements are in place which, as far as practicable, will prevent intending stowaways from getting aboard the ship, and, if this fails, as far as practicable, will detect them before the ship leaves port or, at the latest, before it arrives at the next port of call.

4.2.2 When calling at ports and during stay in ports, where there is risk of stowaway embarkation, operational arrangements and/or ship security plans should at least be equivalent to those contained in the relevant text of paragraph B/9 of the ISPS Code.[4]

4.2.3 When departing from a port, where there is risk of stowaway embarkation, a ship should undergo a thorough search in accordance with a specific plan or schedule, and with priorities given to places where stowaways might hide taking into account the specific ship type and its operations. Search methods which are likely to harm secreted stowaways should not be used.

4.2.4 Fumigation or sealing should not be carried out until a thorough search of the areas to be fumigated or sealed has taken place in order to ensure that no stowaways are present in those areas. Such searches should take place as early as possible, as referenced in the ISPS Code,[5] and after all cargo operations have finished.

4.2.5 Contracting governments are encouraged to ensure the use of appropriate non-intrusive means and technologies or measures to detect stowaways.

5 Responsibilities in relation to the resolution of stowaway cases

5.1 Questioning and notification by the master

It is the responsibility of the master of the ship which finds any stowaways on board:

.1 to make every effort to determine immediately the port of embarkation of the stowaway;

.2 to take practical steps to establish the identity, including the nationality/citizenship and the right of residence, of the stowaway;

.3 to prepare a statement containing all available information relevant to the stowaway for presentation to the appropriate authorities (for example, the public authorities at the port of embarkation, the flag State and, if necessary, subsequent ports of call) and the shipowner; in this respect the reporting

[4] Recommended Practice 4.3.2.2 of the FAL Convention.

[5] Refer to paragraph B/8.9 of the ISPS Code.

document provided in the appendix should be used and completed as far as practicable;

.4 to notify the existence of a stowaway and any relevant details to the shipowner and appropriate authorities at the port of embarkation, the next port of call and the flag State, with the understanding that when a stowaway declares himself or herself to be a refugee or an asylum seeker, this information should be treated as confidential to the extent necessary for the security of the stowaway; to ensure confidentiality in these cases no information should be forwarded to authorities public or private in the country of origin or residence of the stowaway;

.5 not deviate from the planned voyage to seek the disembarkation of stowaways discovered on board the ship after it has left the territorial waters of the country where the stowaways embarked, unless:

- permission to disembark the stowaways has been granted by the public authorities of the State to whose port the ship deviates; or
- repatriation has been arranged elsewhere with sufficient documentation and permission for disembarkation; or
- there are extenuating safety, security, health or compassionate reasons; or
- attempts to disembark in other ports on the planned voyage have failed and deviation is necessary in order to avoid the stowaways remaining on board for a significant period of time;

.6 to ensure that the stowaway is presented to the appropriate authorities at the next port of call in accordance with their requirements;

.7 to take appropriate measures to ensure the security, general health, welfare and safety of the stowaway until disembarkation, including providing him or her with adequate provisioning, accommodation, proper medical attention and sanitary facilities;

.8 to ensure that stowaways are not permitted to work on board the ship, except in emergency situations or in relation to the stowaway's accommodation and provisioning on board; and

.9 to ensure that stowaways are treated humanely, consistent with the basic principles.

5.2 The shipowner

It is the responsibility of the shipowner of the ship on which stowaways are found:

.1 to ensure that the existence of, and any relevant information on, the stowaway has been notified to the appropriate authorities at the port of embarkation, the next port of call and the flag State;

.2 to comply with any removal directions made by the competent national authorities at the port of disembarkation; and

3 to cover any applicable costs relating to the removal, detention, care and disembarkation of the stowaway in accordance with the legislation of the States which may be involved.

5.3 The State of the first port of call according to the voyage plan

It is the responsibility of the State of first port of call according to the voyage plan after the discovery of the stowaway:

.1 to accept the stowaway for examination in accordance with the national laws of that State and, where the competent national authority considers that it would facilitate matters, to allow the shipowner and the competent or appointed P&I Club correspondent to have access to the stowaway;

.2 to favourably consider allowing disembarkation and provide, as necessary and in accordance with national law, secure accommodation which may be at the expense of the shipowner, where:

.1 a case is unresolved at the time of sailing of the ship; or

.2 the stowaway is in possession of valid documents for return and the public authorities are satisfied that timely arrangements have been or will be made for repatriation and all the requisites for transit fulfilled; or

.3 other factors make it impractical for the stowaway to remain on the ship; such factors may include but are not limited to cases where a stowaway's presence on board would endanger the safe and secure operation of the ship, the health of the crew, other persons on board or the stowaway;

.3 to make every effort to cooperate in the identification of the stowaway and the establishment of his or her nationality/citizenship or right of residence;

.4 to make every effort to cooperate in establishing the validity and authenticity of a stowaway's documents and, when a stowaway has inadequate documents, to whenever practicable and to an extent compatible with national legislation and security requirements issue a covering letter with a photograph of the stowaway and any other important information or, alternatively, a suitable travel document accepted by the public authorities involved; the covering letter, authorizing the return of the stowaway either to his or her country of origin or to the point where the stowaway commenced his or her journey, as appropriate, by any means of transportation and specifying any other conditions imposed by the authorities, should be handed over to the operator affecting the removal of the stowaway; this letter will include information required by the authorities at transit points and/or the point of disembarkation;

.5 to give directions for the removal of the stowaway to the port of embarkation, State of nationality/citizenship or right of residence or to some other State to which lawful directions may be made, in cooperation with the shipowner;

.6 to inform the shipowner on whose ship the stowaway was found of the level of cost of detention and return and any additional costs for the documentation of the stowaway, if the shipowner is to cover these costs; in

addition, public authorities should cooperate with the shipowner to keep such costs to a minimum as far as practicable and according to national legislation, if they are to be covered by the shipowner, as well as keeping to a minimum the period during which shipowners are held liable to defray costs of maintenance of a stowaway by public authorities;

.7 to consider mitigation of other charges, according to national legislation, that might otherwise be applicable when shipowners have cooperated with the competent authorities to the satisfaction of those authorities in measures designed to prevent the transportation of stowaways; or where the master has properly declared the existence of a stowaway to the appropriate authorities in the port of arrival, and has shown that all reasonable preventive measures had been taken to prevent stowaways gaining access to the ship;

.8 to issue, if necessary, in the event that the stowaway has no identification and/or travel documents, a document attesting to the circumstances of embarkation and arrival to facilitate the return of the stowaway either to his or her State of origin, to the State of the port of embarkation, or to any other State to which lawful directions can be made, by any means of transport;

.9 to provide the document to the transport operator effecting the removal of the stowaway;

.10 to contact the relevant public authorities at transit points during the return of a stowaway, in order to inform them of the status of the stowaway;

.11 to take proper account of the interests of, and implications for, the shipowner when directing detention and setting removal directions, so far as is consistent with the maintenance of control, their duties or obligations to the stowaway under the law, and the cost to public funds;

.12 to report incidents of stowaways of which they become aware to the Organization;[6]

.13 to cooperate with the flag State of the ship in identifying the stowaway and his or her nationality/citizenship and right of residence, to assist in removal of the stowaway from the ship, and to make arrangements for removal or repatriation; and

.14 if disembarkation is refused, to notify, without undue delay, the flag State of the ship carrying the stowaway the reasons for refusing disembarkation, except when the stowaway declares himself or herself to be a refugee or an asylum seeker and the flag State is his or her (alleged) country of origin from which he or she has fled and in which he or she claims a risk of harm.

5.4 Subsequent ports of call

When the disembarkation of a stowaway has not been possible at the first port of call, it is the responsibility of the State of the subsequent port of call to follow the guidance provided in paragraph 5.3.

6 Refer to FAL.2/Circ.50/Rev.3 on *Information on stowaway incidents*, as may be amended.

5.5 State of embarkation

It is the responsibility of the State of the original port of embarkation of the stowaway (i.e. the State where the stowaway first boarded the ship):

.1 to accept any returned stowaway having nationality/citizenship or right of residence;

.2 to accept a stowaway back for examination where the port of embarkation is identified to the satisfaction of the public authorities of the receiving State; the public authorities of the State of embarkation should not return such stowaways to the State where they were earlier found to be inadmissible;

.3 to apprehend and detain the attempted stowaway, and any individual or company aiding an attempted stowaway with the intention of facilitating access to the port area, any ship, cargo or freight containers where permitted by national legislation, if the attempted stowaway is discovered before sailing either on the ship or in cargo due to be loaded; to refer the attempted stowaway and any individual or company aiding an attempted stowaway with the intention of facilitating access to the port area, any ship, cargo or freight containers to local authorities for prosecution, and/or, where applicable, to the immigration authorities for examination and possible removal; no charge is to be imposed on the shipowner in respect of detention or removal costs, and no penalty is to be imposed;

.4 to apprehend and detain the stowaway and any individual or company aiding a stowaway with the intention of facilitating access to the port area, any ship, cargo or freight containers, where permitted by national legislation, if the stowaway is discovered while the ship is still in the territorial waters of the State of the port of his or her embarkation, or in another port in the same State (not having called at a port in another State in the meantime); no charge is to be imposed on the shipowner in respect of detention or removal costs, and no penalty is to be imposed;

.5 to undertake an investigation into how the stowaways managed to gain access to the ship and consider modifying security provisions, as appropriate, and thereafter provide feedback to the appropriate public authority at the port of disembarkation;

.6 to report incidents of stowaways or attempted stowaways of which they become aware to the Organization;[7] and

.7 to reassess the preventive arrangements and measures in place and to verify the implementation and effectiveness of any corrective actions.

5.6 State of nationality or right of residence

It is the responsibility of the apparent or claimed State of nationality/citizenship of the stowaway and/or of the apparent or claimed State of residence of the stowaway:

.1 to assist in determining the identity and nationality/citizenship or the rights of residence of the stowaway and to document the stowaway accordingly once satisfied that he or she holds the nationality/citizenship or the right

[7] Refer to FAL.2/Circ.50/Rev.3 on *Information on stowaway incidents*, as may be amended.

of residence claimed; where possible, the local embassy, consulate or other diplomatic representation of the country of the stowaway's alleged nationality will be required to assist in verifying the stowaway's nationality and providing emergency travel documentation;

.2 to seek to cooperate with foreign embassies through cooperation mechanisms in determining the nationality of stowaways to mutually understand and resolve the true facts of each case;

.3 to accept the stowaway where nationality/citizenship or right of residence is established; and

.4 to report incidents of stowaways of which they become aware to the Organization.[8]

5.7 The flag State

It is the responsibility of the flag State of the ship:

.1 to be willing, if practicable, to assist the master/shipowner and the appropriate authority at the port of disembarkation in identifying the stowaway and determining his or her nationality/citizenship or right of residence;

.2 to be prepared to make representations to the relevant authority to assist in the removal of the stowaway from the ship at the first available opportunity;

.3 to be prepared to assist the master/shipowner or the authority at the port of disembarkation in making arrangements for the removal or repatriation of the stowaway; and

.4 to report incidents of stowaways of which they become aware to the Organization.[9]

5.8 Countries of transit during repatriation

Public authorities in countries of transit during the return of any stowaway should allow, subject to normal visa requirements and national security concerns, the transit through their ports and airports of stowaways travelling under the removal instructions or directions of public authorities of the country of the port of disembarkation.

[8] Refer to FAL.2/Circ.50/Rev.3 on *Information on stowaway incidents*, as may be amended.

[9] Refer to FAL.2/Circ.50/Rev.3 on *Information on stowaway incidents*, as may be amended.

APPENDIX

STOWAWAY DETAILS REFERRED TO IN RECOMMENDED PRACTICE 4.6.2 OF THE CONVENTION ON FACILITATION OF INTERNATIONAL MARITIME TRAFFIC 1965, AS AMENDED

SHIP DETAILS	*Date of birth:*
Name of ship:	*Place of birth:*
IMO number:	*Claimed nationality:*
Flag:	*Home address:*
Company:	*Country of domicile:*
Company address:	*ID document type, e.g. passport no.:*
	ID card no. or Seaman's book no.:
Agent in next port:	*If yes,*
Agent address:	*When issued:*
IRCS:	*Where issued:*
Recognized mobile satellite service identity:	*Date of expiry:*
Port of registry:	*Issued by:*
Name of master:	
	Photograph of the stowaway:
STOWAWAY DETAILS	Photograph if available
Date/time found on board:	
Place of boarding:[10]	
Country of boarding:	
Date/time of boarding:	
Intended final destination:	
Stated reasons for boarding the ship:[11]	*General physical description of the stowaway:*
Surname:	
Given name:	
Name by which known:	
Gender:	
First language:	*Other languages:*
Spoken:	*Spoken:*
Read:	*Read:*
Written:	*Written:*

[10] Include port, port facility number, berth and terminal information.

[11] If the stowaway declares himself or herself to be a refugee or an asylum seeker, this information shall be treated as confidential to the extent necessary to the security of the stowaway.

Other details:

Method of boarding, including other persons involved (e.g. crew, port workers), and whether the stowaway was secreted in cargo/container or hidden in the ship:

Inventory of the stowaway's possessions:

Statement made by the stowaway:

Care provided to the stowaway (first aid, clothing, food):

Date(s) of interview(s):

Stowaway's signature: *Master's signature:*

Date: *Date:*

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ANNEX 22

DRAFT AMENDMENTS TO CHAPTER V OF THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974

CHAPTER V
Safety of Navigation

Regulation 19-1
Long-range identification and tracking of ships

The following new paragraph is inserted after existing paragraph 12:

"**12.1** Notwithstanding the provisions of paragraph 11.1, a Contracting Government exercising the coastal State entitlements established in paragraph 8.1.3 shall be entitled to receive, free of any charge, long-range identification and tracking information transmitted automatically at specific intervals, taking into account the cost model specified in the performance standards and functional requirements adopted by the Organization.*

* Refer to *Performance standards and functional requirements for the long-range identification and tracking of ships* (resolution MSC.263(84), as revised)."

***

ANNEX 23

DRAFT RESOLUTION MSC.263(84)/REV.2 ON PERFORMANCE STANDARDS AND FUNCTIONAL REQUIREMENTS FOR THE LONG-RANGE IDENTIFICATION AND TRACKING OF SHIPS

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) on *Procedure for the adoption of, and amendments to, performance standards and technical specifications*, 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,

BEARING IN MIND the provisions of regulation V/19-1 of the International Convention for the Safety of Life at Sea, 1974 (the Convention), relating to the long-range identification and tracking of ships, and the revised *Performance standards and functional requirements for the long-range identification and tracking of ships* (~~Revised~~ Performance Standards), adopted by resolution MSC.263(84)/Rev.1~~, as amended by resolutions MSC.330(90) and MSC.400(95)~~,

HAVING CONSIDERED, at its ~~106th~~ […] session, proposals relating to the financial architecture of the LRIT system and the need to adopt certain amendments to the Performance Standards for enhanced utilization of the LRIT system by coastal States ~~the recommendation made by the Sub-Committee on Navigation, Communications and Search and Rescue at its ninth session~~,

1 ADOPTS the revised *Performance standards and functional requirements for the long-range identification and tracking of ships*, set out in the annex to the present resolution;

2 REVOKES resolution MSC.263(84)/Rev.1 as from~~, MSC.330(90) and MSC.400(95)~~ [1 January 2028];

3 AGREES that any reference to resolution MSC.263(84), as ~~amended~~ revised, should be read as reference to the present resolution;

4 INVITES Contracting Governments to the Convention to bring the enclosed revised performance standards to the attention of all parties concerned.

ANNEX

PERFORMANCE STANDARDS AND FUNCTIONAL REQUIREMENTS FOR THE LONG-RANGE IDENTIFICATION AND TRACKING OF SHIPS

1 Overview

1.1 The Long-range Identification and Tracking (LRIT) system provides for the global identification and tracking of ships.

1.2 The LRIT system consists of the shipborne LRIT information transmitting equipment, the Communication Service Provider(s), the Application Service Provider(s), the LRIT Data Centre(s), including any related vessel monitoring system(s), the LRIT Data Distribution Plan and the International LRIT Data Exchange. Certain aspects of the performance of the LRIT system are reviewed or audited by an LRIT Coordinator acting on behalf of all Contracting Governments. Figure 1 provides an illustration of the LRIT system architecture.

LRIT system architecture

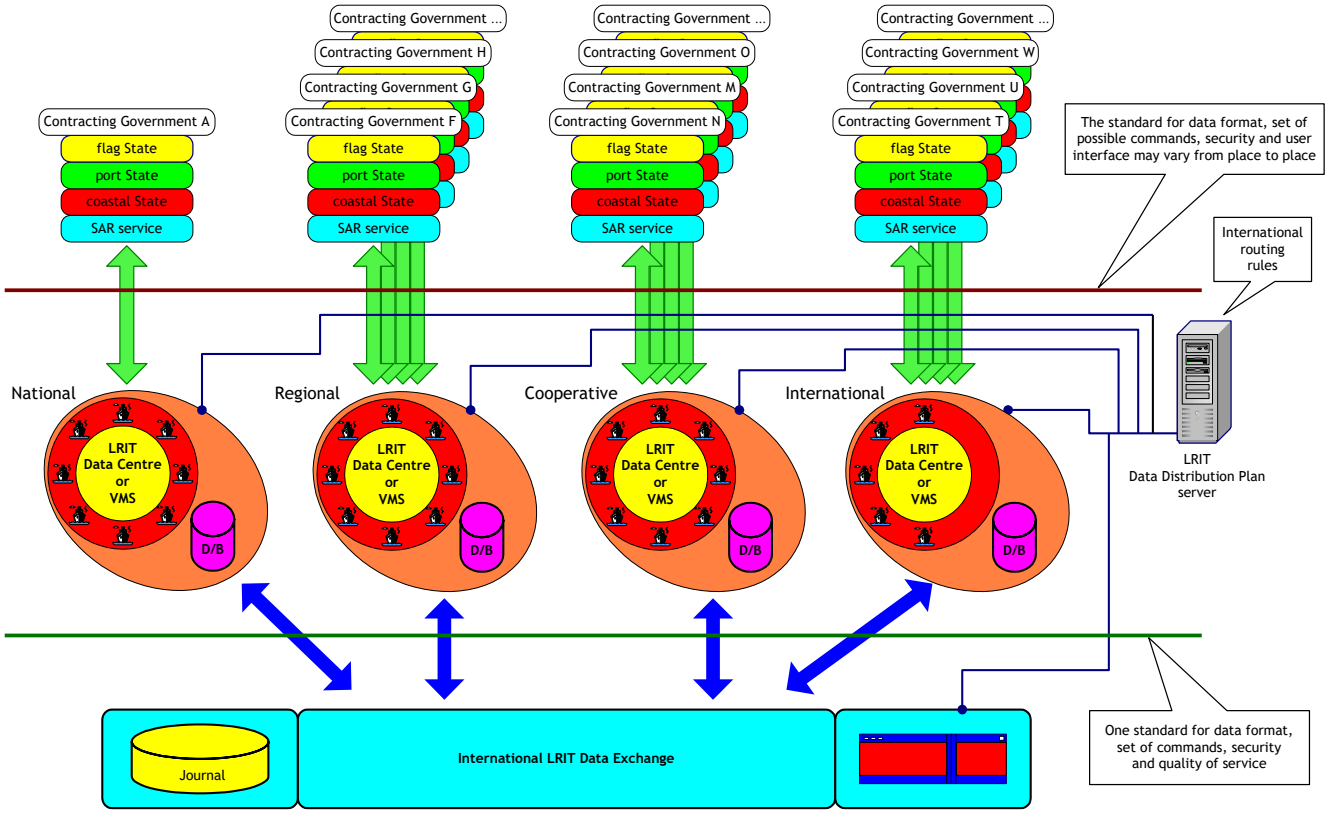

Figure 1

1.3 LRIT information is provided to Contracting Governments and search and rescue services[1] entitled to receive the information, upon request, through a system of National, Regional, Cooperative and International LRIT Data Centres, using where necessary, the International LRIT Data Exchange.

[1] The term "search and rescue service" is defined in regulation V/2.5.

1.4 Each Administration should provide to the LRIT Data Centre it has selected a list of the ships entitled to fly its flag which are required to transmit LRIT information, together with other salient details and should update, without undue delay, such lists as and when changes occur. Ships should only transmit the LRIT information to the LRIT Data Centre selected by their Administration.

1.5 The obligations of ships to transmit LRIT information and the rights and obligations of Contracting Governments and of search and rescue services to receive LRIT information are established in regulation V/19-1 of the 1974 SOLAS Convention.

2 Definitions

2.1 Unless expressly provided otherwise:

.1 *Convention* means the International Convention for the Safety of Life at Sea, 1974, as amended.

.2 *Regulation* means a regulation of the Convention.

.3 *Chapter* means a chapter of the Convention.

.4 *LRIT Data User* means a Contracting Government or a search and rescue (SAR) service which opts to receive the LRIT information it is entitled to.

.5 *Committee* means the Maritime Safety Committee.

.6 *High-speed craft* means a craft as defined in regulation X/1.3.

.7 *Mobile offshore drilling unit* means a mobile offshore drilling unit as defined in regulation XI-2/1.1.5.

.8 *Organization* means the International Maritime Organization.

.9 *Vessel monitoring system* means a system established by a Contracting Government or a group of Contracting Governments to monitor the movements of the ships entitled to fly its or their flag. A vessel monitoring system may also collect from the ships information specified by the Contracting Government(s) which has established it.

.10 *LRIT information* means the information specified in regulation V/19-1.5.

2.2 The term "ship", when used in the present performance standards, includes mobile offshore drilling units and high-speed craft as specified in regulation V/19-1.4.1 and means a ship which is required to transmit LRIT information.

2.3 Terms not otherwise defined should have the same meaning as the meaning attributed to them in the Convention.

3 General provisions

3.1 It should be noted that regulation V/19-1.1 provides that:

> *Nothing in this regulation or the provisions performance standards and functional requirements adopted by the Organization in relation to the long-range identification and tracking of ships shall prejudice the rights, jurisdiction or obligations of States under international law, in particular, the legal regimes of the high seas, the exclusive economic zone, the contiguous zone, the territorial seas or the straits used for international navigation and archipelagic sea lanes.*

3.2 In operating the LRIT system, recognition should be given to international conventions, agreements, rules or standards that provide for the protection of navigational information.

3.3 The present performance standards should always be read together with regulation V/19-1 and the technical specifications for the LRIT system.[2]

4 Shipborne equipment

4.1 In addition to the general requirements contained in resolution A.694(17) on *Recommendations on general requirements for shipborne radio equipment forming part of the Global Maritime Distress and Safety System (GMDSS) and for electronic navigational aids*, the shipborne equipment should comply with the following minimum requirements:

.1 be capable of automatically and without human intervention on board the ship transmitting the ship's LRIT information at 6-hour intervals to an LRIT Data Centre;

.2 be capable of being configured remotely to transmit LRIT information at variable intervals;

.3 be capable of transmitting LRIT information following receipt of polling commands;

.4 interface directly to the shipborne global navigation satellite system equipment, or have internal positioning capability;

.5 be supplied with energy from the main and emergency source of electrical power;[3] and

.6 be tested for electromagnetic compatibility taking into account the recommendations[4] developed by the Organization.

4.2 In addition to the provisions specified in paragraph 4.1 above, the shipborne equipment should provide the functionality specified in table 1.

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[2] Refer to the *Long-range identification and tracking system - Technical documentation (Part I)* (MSC.1/Circ.1259, as revised).

[3] This provision should not apply to ships using for the transmission of LRIT information any of the radio communication equipment provided for compliance with the provisions of chapter IV. In such cases, the shipborne equipment should be provided with sources of energy as specified in regulation IV/13.

[4] Refer to resolution A.813(19) on *General requirements for electromagnetic compatibility of all electrical and electronic ship's equipment*.

Table 1

Data to be transmitted from the shipborne equipment

Parameter	Comments
Shipborne equipment identifier	The identifier used by the shipborne equipment.
Positional data	The Global Navigation Satellite System (GNSS) position (latitude and longitude) of the ship (based on the WGS 84 datum). *Position*: The equipment should be capable of transmitting the GNSS position (latitude and longitude) of the ship (based on WGS 84 datum) as prescribed by regulation V/19-1, without human interaction on board the ship. *On-demand*(1) *position reports*: The equipment should be capable of responding to a request to transmit LRIT information on demand without human interaction on board the ship, irrespective of where the ship is located. *Pre-scheduled*(2) *position reports*: The equipment should be capable of being remotely configured to transmit LRIT information at intervals ranging from a minimum of 15 min to periods of 6 hours to the LRIT Data Centre, irrespective of where the ship is located and without human interaction on board the ship.
Time Stamp 1	The date and time(3) associated with the GNSS position. The equipment should be capable of transmitting the time(3) associated with the GNSS position with each transmission of LRIT information.

Notes: (1) *On-demand position reports* means transmission of LRIT information as a result of either receipt of polling command or of remote configuration of the equipment so as to transmit at intervals other than the preset ones.

(2) *Pre-scheduled position reports* means transmission of LRIT information at the preset transmit intervals.

(3) All times should be indicated as Universal Coordinated Time (UTC).

4.3 The shipborne equipment should transmit the LRIT information using a communication system which provides coverage in all areas where the ship operates.

4.4 The shipborne equipment should be set to automatically transmit the ship's LRIT information at 6-hour intervals to the LRIT Data Centre identified by the Administration, unless the LRIT Data User requesting the provision of LRIT information specifies a more frequent transmission interval.

4.4.1 When a ship is undergoing repairs, modifications or conversions in dry dock or in-port or is laid up for a long period, the master or the Administration may reduce the frequency of the transmission LRIT information to one transmission every 24-hour period, or may temporarily stop the transmission of such information.

5 Application Service Providers

5.1 Application Service Providers (ASPs) providing services to:

.1 a National LRIT Data Centre, should be recognized by the Contracting Government establishing the centre;

.2 a Regional or a Cooperative LRIT Data Centre, should be recognized by the Contracting Governments establishing the centre. In such a case, the arrangements for recognizing the ASPs should be agreed amongst the Contracting Governments establishing the centre; and

.3 an International LRIT Data Centre, should be recognized by the Committee.

5.2 Contracting Governments should provide to the Organization a list with the names and contact details of the ASPs they recognize together with any associated conditions of recognition and thereafter should, without undue delay, update the Organization as changes occur.

5.2.1 The Organization should communicate information it receives pursuant to the provisions of paragraph 5.2 and information in relation to the ASP(s) recognized by the Committee for providing services to the International LRIT Data Centre and any changes thereto to all Contracting Governments, all LRIT Data Centres, the International LRIT Data Exchange and the LRIT Coordinator.

5.3 An ASP function should:

.1 provide a communication protocol interface between the Communication Service Providers and the LRIT Data Centre to enable the following minimum functionality:

.1 remote integration of the shipborne equipment into an LRIT Data Centre;

.2 automatic configuration of transmission of LRIT information;

.3 automatic modification of the interval of transmission of LRIT information;

.4 automatic suspension of transmission of LRIT information;

.5 on-demand transmission of LRIT information; and

.6 automatic recovery and management of transmission of LRIT information;

.2 provide an integrated transaction management system for the monitoring of LRIT information throughput and routeing; and

.3 ensure that LRIT information is collected, stored and routed in a reliable and secure manner.

5.4 The ASP where used should add the data identified in table 2 to each transmission of LRIT information:

Table 2

Data to be added by an Application Service Provider and at the LRIT Data Centre

Parameters	Comments
Ship Identity(1)	The IMO ship identification number(1) and MMSI for the ship.
Name of ship	Name of the ship which has transmitted the LRIT information in the English language using Latin-1 alphabet and UTF-8 encoding.
Type of ship(2)	Type of the ship which has transmitted the LRIT information using a predefined code.
Time Stamp 2	The date and time(3) the transmission of LRIT information is received by the ASP (if used).
Time Stamp 3	The date and time(3) the received LRIT information is forwarded from the ASP (if used) to the appropriate LRIT Data Centre.
LRIT Data Centre Identifier	The identity of the LRIT Data Centre to be clearly indicated by a Unique Identifier.
Time Stamp 4	The date and time(3) the LRIT information is received by the LRIT Data Centre.
Time Stamp 5	The date and time(3) the transmission of LRIT information is forwarded from the LRIT Data Centre to an LRIT Data User.

Notes: (1) See regulation XI-1/3 and resolution A.1078(28) on *IMO Ship Identification Number Scheme*.

(2) Types of ships to be used in LRIT messages are outlined in *LRIT Technical documentation, part I* (MSC.1/Circ.1259, as revised).

(3) All times should be indicated as Universal Coordinated Time (UTC).

5.5 In addition to the provisions of paragraph 5.3, Administrations, Contracting Governments and the Committee may establish, in relation to the ASPs seeking their recognition, specific requirements as a condition of recognizing a particular ASP.

6 Communication Service Providers

6.1 Communication Service Providers (CSPs) provide services which link the various parts of the LRIT system using communications protocols in order to ensure the end-to-end secure transfer of the LRIT information. This requirement precludes the use of non-secure broadcast systems.

6.2 A CSP may also provide services as an ASP.

7 LRIT Data Centre

7.1 All LRIT Data Centres should:

.1 establish and continuously maintain systems which ensure, at all times, that LRIT Data Users are only provided with the LRIT information they are entitled to receive as specified in regulation V/19-1;

.2 collect LRIT information from ships instructed by their Administrations to transmit the LRIT information to the centre;

.3 obtain, when requested to provide LRIT information transmitted by ships other than those which transmit the information to the centre, LRIT information from other LRIT Data Centres through the International LRIT Data Exchange;

.4 make available, when requested to provide LRIT information transmitted by ships which transmit the information to the centre, LRIT information transmitted to the centre to other LRIT Data Centres through the International LRIT Data Exchange;

.5 execute requests received from LRIT Data Users for polling of LRIT information or for change(s) in the interval(s) of transmission of LRIT information by a ship or a group of ships transmitting the information to the centre;

.6 relay, when required, requests received from LRIT Data Users through the International LRIT Data Exchange to the other LRIT Data Centres for polling of LRIT information or for change(s) in the interval(s) of transmission of LRIT information by a ship or a group of ships not transmitting the information to the centre;

.7 execute requests received through the International LRIT Data Exchange from other LRIT Data Centres for polling of LRIT information or for change(s) in the interval(s) of transmission of LRIT information by a ship or a group of ships transmitting the information to the centre;

.8 upon request disseminate to LRIT Data Users the LRIT information they are entitled to receive in accordance with the agreed arrangements and notify the LRIT Data User and the Administration when a particular ship stops transmitting LRIT information;

.9 archive LRIT information from ships which transmit the information to the centre, for at least one year and until such time as the Committee reviews and accepts the annual report of the audit of its performance by the LRIT Coordinator. However, the archived LRIT information should provide a complete record of the activities of the centre between two consecutive annual audits of its performance;

.10 for LRIT information archived within the last four days, send the LRIT information within 30 min of receiving a request;

.11 for LRIT information archived between four and 30 days previously, send the LRIT information within one hour of receiving a request;

.12 for LRIT information archived more than 30 days previously, send the LRIT information within five days of receiving a request;

.13 ensure, using appropriate hardware and software, that LRIT information is backed-up at regular intervals, stored at a suitable off-site location(s) and available as soon as possible in the event of disruption to ensure continuity of service;

.14 maintain a record of the ships which transmit LRIT information to the centre including name of ship, IMO ship identification number, call sign, maritime mobile service identity (MMSI) and type of ship;

.15 use a standard protocol for communications and agreed protocols to connect with the International LRIT Data Exchange and the LRIT Data Distribution Plan server;

.16 use a standard secure transmission method with the International LRIT Data Exchange and the LRIT Data Distribution Plan server;

.17 use a secure authentication method with LRIT Data Users;

.18 use a standard and expandable message format for communicating with the International LRIT Data Exchange and the LRIT Data Distribution Plan server;

.19 use reliable connections (e.g. TCP) to ensure that the LRIT information is successfully received by the LRIT Data Centres;

.20 add the appropriate data identified in table 2 to each transmission of LRIT information collected by the centre; and

.21 have access to the current LRIT Data Distribution Plan and to earlier versions of the plan.

7.2 All LRIT Data Centres should comply with the relevant provisions of the Technical specifications for communications within the LRIT system[5] and of the Technical specifications for the LRIT Data Distribution Plan and should take into account the relevant provisions of the technical specifications for the International LRIT Data Exchange.

7.3 All Regional or Cooperative LRIT Data Centres and the International LRIT Data Centre should only internally route LRIT information transmitted by ships entitled to fly the flag of the Contracting Governments establishing or participating in such centres and should automatically maintain journal(s) for all of the internally routed LRIT information. The journal(s) should only contain message header information which should be used for audit and invoicing purposes. The journal(s) should be transmitted to the International LRIT Data Exchange at regular intervals in order to be combined with the journal(s) maintained by the International LRIT Data Exchange.

[5] Refer to the *Long-range identification and tracking system - Technical documentation (part I)* (MSC.1/Circ.1259, as revised).

7.4 Each LRIT Data Centre should settle its financial obligations vis-à-vis the LRIT Data Centres which provide to it LRIT information and the International LRIT Data Exchange in a timely manner in accordance with the arrangements they have agreed.

7.5 The performance of all LRIT Data Centres should be audited by the LRIT Coordinator.

7.5.1 All LRIT Data Centres should cooperate and make available to the LRIT Coordinator the information required to enable the satisfactory completion of an audit of their performance.

7.5.2 All LRIT Data Centres should settle their financial obligations vis-à-vis the LRIT Coordinator in a timely manner in accordance with the arrangements they have agreed.

7.6 When providing LRIT information to LRIT Data Users, other than to a SAR service, LRIT Data Centres should:

.1 in case such information is not archived, utilize the current version of the LRIT Data Distribution Plan;

.2 in case such information is archived, utilize the version(s) of the LRIT Data Distribution Plan which were applicable at the time the archived LRIT information requested was originally received; and

.3 apply the geographical areas specified by the Contracting Governments concerned in the LRIT Data Distribution Plan and should not endeavour to resolve any issues which may arise when such areas are either not specified or overlap geographical areas specified by other Contracting Governments.

7.7 Notwithstanding the provisions of paragraph 7.1 and subject to the provisions of paragraph 17.2, all LRIT Data Centres should provide to SAR services LRIT information transmitted by all ships located within the geographical area specified by the SAR service requesting the information so as to permit the rapid identification of ships which may be called upon to provide assistance in relation to the search and rescue of persons in distress at sea. The LRIT information should be provided irrespective of the location of the geographical area and should be provided even if the geographical area is outside the search and rescue region associated with the SAR service requesting the information (regulation V/19-1.12 refers).

7.8 When providing LRIT information to Contracting Governments entitled to receive such information under the provisions of SOLAS regulations V/19-1.8.1.2 and 8.1.3, LRIT Data Centres should apply the cost model: "US$0.25 0:1:2:6", where:

.1 "US$0.25" is the unit fee for LRIT information;

.2 "0" is the unit fee multiplier for LRIT position reports automatically transmitted at 6-hour intervals and provided in response to a coastal State standing order in the LRIT Data Distribution Plan;

.3 "1" is the unit fee multiplier for LRIT position reports provided in response to a position request message, other than a polling request message;

.4 "2" is the unit fee multiplier for polled LRIT position reports; and

.5 "6" is the unit fee multiplier for changes of the intervals of transmission.

8 National, Regional and Cooperative LRIT Data Centres

8.1 A Contracting Government may establish a National LRIT Data Centre. A Contracting Government establishing such a centre should provide relevant details to the Organization and thereafter should, without undue delay, update the information provided as and when changes occur.

8.2 A group of Contracting Governments may establish either a Regional or a Cooperative LRIT Data Centre. The arrangements for establishing such a centre should be agreed amongst the Contracting Governments concerned. One of the Contracting Governments establishing such a centre should provide relevant details to the Organization and thereafter should, without undue delay, update the information provided as and when changes occur.

8.3 Upon request, National, Regional and Cooperative LRIT Data Centres may provide services to Contracting Governments other than those establishing the centre.

8.3.1 The arrangements for providing services should be agreed between the LRIT Data Centre and the Contracting Government requesting the provision of the services.

8.3.2 The Contracting Government establishing the National LRIT Data Centre or one of the Contracting Governments establishing the Regional or Cooperative LRIT Data Centre should, if the centre provides services to Contracting Governments other than those which established the centre, provide relevant details to the Organization and thereafter should, without undue delay, update the information provided as and when changes occur.

8.4 National, Regional and Cooperative LRIT Data Centres may also serve as a national, regional or cooperative vessel monitoring system (VMS) and may require, as VMS, the transmission from ships of additional information, or of information at different intervals, or of information from ships which are not required to transmit LRIT information. VMSs may also perform other functions.

8.4.1 If a National, Regional or Cooperative LRIT Data Centre collects additional information from ships, it should transmit only the required LRIT information to the other LRIT Data Centres through the International LRIT Data Exchange.

9 International LRIT Data Centre

9.1 An International LRIT Data Centre recognized by the Committee should be established.

9.2 Contracting Governments not participating in a National, Regional or Cooperative LRIT Data Centre, or Contracting Governments having an interest in the establishment of an International LRIT Data Centre should cooperate, under the coordination of the Committee, with a view to ensuring its establishment.

9.3 Ships, other than those which are required to transmit LRIT information to either a National, Regional or Cooperative LRIT Data Centre, should transmit the required LRIT information to the International LRIT Data Centre.

9.4 An International LRIT Data Centre may, upon request, collect additional information from ships entitled to fly the flag of an Administration on the basis of specific arrangements concluded with the Administration concerned.

9.5 In addition to the provisions of section 7, the International LRIT Data Centre should comply with the provisions of the technical specifications for the International LRIT Data Centre.[6]

10 International LRIT Data Exchange

10.1 An International LRIT Data Exchange recognized by the Committee should be established.

10.2 Contracting Governments should cooperate, under the coordination of the Committee, with a view to ensuring the establishment of the International LRIT Data Exchange.

10.3 The International LRIT Data Exchange should:

.1 route LRIT information between LRIT Data Centres using the information provided in the LRIT Data Distribution Plan;

.2 be connected to all LRIT Data Centres and the LRIT Data Distribution Plan server;

.3 use a store and forward-buffer to ensure LRIT information is received;

.4 automatically maintain journal(s) containing message header information only which may be used for:

.1 invoicing functions and settlement of invoicing disputes; and

.2 audit purposes;

.5 archive journal(s), for at least one year and until such time as the Committee reviews and accepts the LRIT Coordinator's annual report of the audit of its performance. However, the archived journal(s) should provide a complete record of the activities of the exchange between two consecutive annual audits of its performance;

.6 receive journal(s) from Regional, Cooperative and the International LRIT Data Centre and combine these journal(s) with its own journal(s);

.7 prepare, as necessary, performance-related statistical information based on the information contained in the journal(s);

.8 use a standard protocol for communications and agreed protocols to connect with LRIT Data Centres and the LRIT Data Distribution Plan server;

.9 use a standard secure access method with the LRIT Data Centres and the LRIT Data Distribution Plan server;

.10 use a standard and expandable message format for communicating with the LRIT Data Centres and the LRIT Data Distribution Plan server;

[6] Refer to the *Long-range identification and tracking system - Technical documentation (part I)* (MSC.1/Circ.1259, as revised).

.11 use reliable connections (e.g. TCP) to ensure that the LRIT information is successfully received by the LRIT Data Centres;

.12 not have the capability to archive LRIT information;

.13 not have the capability to view or access the LRIT information;

.14 have access to the current LRIT Data Distribution Plan and to earlier versions of the plan; and

.15 receive pricing information from LRIT Data Centres.

10.4 The International LRIT Data Exchange should comply with the provisions of the technical specifications for the International LRIT Data Exchange[7] and with the relevant provisions of the technical specifications for communications within the LRIT system and of the technical specifications for the LRIT Data Distribution Plan.

10.5 The International LRIT Data Exchange should provide to:

.1 the LRIT Coordinator offline access to all journals; and

.2 Contracting Governments and LRIT Data Centres offline access only to their share of the journals which relate to the LRIT information they have requested and were provided with.

10.6 The performance of the International LRIT Data Exchange should be audited by the LRIT Coordinator.

10.6.1 The International LRIT Data Exchange should cooperate and make available to the LRIT Coordinator the information required to enable the satisfactory completion of an audit of its performance.

10.6.2 The International LRIT Data Exchange should settle its financial obligations vis-à-vis the LRIT Coordinator in a timely manner in accordance with the arrangements they have agreed.

11 LRIT Data Distribution Plan

11.1 The Organization should establish and maintain the LRIT Data Distribution Plan. The Organization should also host, build, operate and maintain the LRIT Data Distribution Plan server.

11.2 The LRIT Data Distribution Plan should include:

.1 a list indicating the unique LRIT identities of Contracting Governments, and search and rescue services entitled to receive LRIT information, LRIT Data Centres, the International LRIT Data Exchange, ASPs, the LRIT Data Distribution Plan server and the LRIT Coordinator;

[7] Refer to the *Long-range identification and tracking system - Technical documentation (part I)* (MSC.1/Circ.1259, as revised).

.2 for the purpose of the implementation of the provisions of regulation V/19-1.8.1, for each Contracting Government a list of geographical coordinates of points, taking into account the related provisions of the technical specifications for the LRIT Data Distribution Plan,[8] based on the WGS 84 datum defining the geographical area:

.1 of the waters[9] landward of the baselines for measuring the breadth of the territorial sea of the Contracting Government concerned in accordance with international law;

.2 of the territorial sea[10] of the Contracting Government concerned in accordance with international law;

.3 between the coast of the Contracting Government concerned and a distance of 1,000 nautical miles from its coast. The Contracting Government concerned may, in lieu of defining the aforesaid area with reference to the geographical coordinate points defining its coast, define the area with reference to the geographical coordinate points of the baselines for measuring the breadth of the territorial sea of the Contracting Government concerned in accordance with international law; and

.4 within which the Contracting Government concerned is seeking the provision of LRIT information pursuant to the provisions of regulation V/19-1.8.1.3, if other than that defined under sub-paragraph .3 above;

.3 for the purpose of the implementation of the provisions of regulation V/19-1.9.1 the following information:

.1 the name of the Administration (together with its associated unique LRIT identity) which opts to exercise its right under the provisions of regulation V/19-1.9.1;

.2 the name(s) of the Contracting Government(s) (together with their associated unique LRIT identities) to which LRIT information about ships entitled to fly the flag of the aforesaid Administration shall not be provided pursuant to the provisions of paragraph V/19-1.8.1.3 together with the date and time as from which the decision of the Administration applies and any particulars thereof stated in the related communication to the Organization;

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8 Refer to the *Long-range identification and tracking system - Technical documentation (part I)* (MSC.1/Circ.1259, as revised).

9 The baselines for measuring the breadth of the territorial sea of the Contracting Government concerned in accordance with international law, the lines of delimitation between the Contracting Governments concerned and States with adjacent coasts and the coast of the Contracting Government concerned including any landward waters within which any ship which is required to comply with the provisions of regulation V/19-1 is able to navigate.

10 The baselines for measuring the breadth of the territorial sea and the outer limit of the territorial sea of the Contracting Government concerned in accordance with international law and the lines of delimitation of the territorial sea between the Contracting Governments concerned and States with opposite or adjacent coasts in accordance with international law.

.3 in case of amendment, suspension or annulment of such decisions by the aforesaid Administration, the salient details; and

.4 the date and time the Organization has received the related communication, including related amendment, suspension or annulment and the date and time the Organization has informed all Contracting Governments pursuant to the provisions of regulation V/19-1.9.2;

.4 a list of ports and port facilities located within the territory and a list of places under jurisdiction of each Contracting Government together with the associated geographical coordinates of points (based on WGS 84 datum) in which ships that are required to comply with the provisions of regulation V/19-1 may enter or proceed to;

.5 a list indicating which LRIT Data Centre is collecting and archiving LRIT information for each of the Contracting Governments together with the related LRIT identities;

.6 a list indicating the *Uniform Resource Locator/Uniform Resource Identifier* (URL/URI) (Web Service Endpoint) of each LRIT Data Centre, the International LRIT Data Exchange and the LRIT Data Distribution Plan server;

.7 a list indicating the ASPs providing services to each LRIT Data Centre together with the related LRIT identities;

.8 the contact details of Contracting Governments for LRIT-related matters;

.9 the contact details of search and rescue services entitled to receive LRIT information for LRIT-related matters;

.10 information in relation to the ASPs recognized by each Contracting Government together with any conditions attached to such recognitions, and their points of contact;

.11 information in relation to each National, Regional and Cooperative LRIT Data Centre, the International LRIT Data Centre and the International LRIT Data Exchange, and their points of contact;

.12 information in relation to the LRIT Coordinator, and its contact details;

.13 information in relation to the LRIT Data Distribution Plan and its server and contact details of official(s) of the Organization who may be contacted for matters relating to the operation or maintenance of the plan or its server or for seeking help in relation to issues relating to or arising from the operation of the plan or its server; and

.14 a record of all previous versions of the plan together with the dates and times between which each version was in effect.

11.3 The LRIT Data Distribution Plan server should:

.1 allow the International LRIT Data Exchange, the LRIT Data Centres and the LRIT Coordinator to have access to the current version of the plan;

.2 provide earlier versions of the LRIT Data Distribution Plan to the International LRIT Data Exchange, the LRIT Data Centres and the LRIT Coordinator upon request;

.3 use a standard protocol for communications and agreed protocols to connect with the International LRIT Data Exchange and the LRIT Data Centres;

.4 use a standard secure transmission method with the International LRIT Data Exchange and the LRIT Data Centres;

.5 use a standard and expandable message format for communicating with the International LRIT Data Exchange and the LRIT Data Centres;

.6 use reliable connections (e.g. TCP) to ensure that the information in the plan is successfully received by the International LRIT Data Exchange and the LRIT Data Centres;

.7 use industry standard file compression technology to reduce the size of the plan and its incremental updates when these are downloaded by the International LRIT Data Exchange and the LRIT Data Centres;

.8 provide for the submission of the geographical areas in a standard industry format and use a consistent naming convention for the elements;

.9 provide for uploading of the geographical areas in batch files in Geography Markup Language (GML) format;

.10 maintain a unique number for each published version of the plan, incrementing each time a new version of the plan is published;

.11 provide for the downloading of the plan and its incremental updates by the LRIT Data Centres and the International LRIT Data Exchange on the publishing of a new version of the plan;

.12 archive all published versions of the plan and its incremental updates;

.13 use a standard secure access method with the Contracting Governments and the LRIT Coordinator; and

.14 provide a web interface for the entry and amendment of information in the plan.

11.4 The LRIT Data Distribution Plan server should comply with the technical specifications for the LRIT Data Distribution Plan[11] and with the relevant provisions of the technical specifications for communications within the LRIT system.

[11] Refer to the *Long-range identification and tracking system - Technical documentation (part I)* (MSC.1/Circ.1259, as revised).

12 LRIT system security

12.1 LRIT communications using landline links should provide for data security using methods such as:

.1 authorization: Access should only be granted to those who are authorized to see the specific LRIT information;

.2 authentication: Any party exchanging information within the LRIT system should require authentication before exchanging information;

.3 confidentiality: Parties running an application server should protect the confidentiality of the LRIT information to ensure that it is not disclosed to unauthorized recipients when it travels across the LRIT system; and

.4 integrity: Parties exchanging LRIT information should ensure that the integrity of the LRIT information is guaranteed and that no data have been altered.

13 LRIT system performance

13.1 LRIT information should be available to an LRIT Data User within 15 min of the time it is transmitted by the ship.

13.2 On-demand LRIT information should be provided to an LRIT Data User within 30 min of the time the LRIT Data User requested the information.

13.3 The quality of service:

$$\frac{\text{Number of delivered LRIT information meeting latency requirements}}{\text{Total number of LRIT information requests}} \times 100\%$$

should be:

.1 95% of the time over any 24-hour period; and

.2 99% over any one month.

14 LRIT Coordinator

14.1 The LRIT Coordinator should be appointed by the Committee.

14.2 The LRIT Coordinator should assist in the establishment of the International LRIT Data Centre and/or International LRIT Data Exchange by:

.1 participating in the development of any new technical specifications for the LRIT system or of any amendments to existing ones taking into account the provisions of regulation V/19-1, the present performance standards, the existing technical specifications and any related decisions of the Committee;

.2 issuing, when requested by the Committee, requests for the submission of proposals for the establishment and operation of the International LRIT Data Centre and/or the International LRIT Data Exchange;

.3 evaluating the management, operational, technical and financial aspects of the proposals received taking into account the provisions of regulation V/19-1, the present performance standards, the technical specifications for the LRIT system and any other related decisions of the Committee and submitting its recommendations in this respect for consideration by the Committee; and

.4 participating, as and when requested by the Committee, in their testing and integration into the LRIT system and reporting its findings in this respect for consideration by the Committee.

14.3 The LRIT Coordinator should, taking into account the provisions of regulation V/19--1, the present performance standards, the technical specification for the LRIT system and any related decisions of the Committee:

.1 upon request, by any party concerned or the Committee, undertake the investigation of operational or technical disputes or invoicing difficulties and make recommendations for their settlement to the parties concerned and the Committee, as appropriate;

.2 participate, as and when requested by the Committee, in the testing and integration of LRIT Data Centre(s) into the LRIT system and report its findings in this respect for consideration by the Committee; and

.3 participate, as and when requested by the Committee, in the testing of new or modified procedures or arrangements for communications between the International LRIT Data Exchange, the LRIT Data Centres and the LRIT Data Distribution Plan server and report its finding in this respect for consideration by the Committee.

14.4 The LRIT Coordinator should undertake a review of the performance of the LRIT system taking into account the provisions of regulation V/19-1, the present performance standards, the technical specification for the LRIT system and any related decisions of the Committee and should report its findings to the Committee at least annually. In this respect, the LRIT Coordinator should on an annual basis:

.1 review the performance of ASPs (or CSPs when they act as ASPs) providing services to the International LRIT Data Centre;

.2 audit the performance of all LRIT Data Centres based on archived information and their fee structures;

.3 audit the performance of the International LRIT Data Exchange and its fee structure, if any; and

.4 verify that Contracting Governments and search and rescue services receive only the LRIT information they have requested and are entitled to receive.

14.5 In addition to reporting to the Committee on the performance of the LRIT system including any identified non-conformities, the LRIT Coordinator may make recommendations to the Committee, based on an analysis of its findings, with a view to improving the efficiency, effectiveness and security of the LRIT system.

14.6 The LRIT Coordinator should, for the purpose of performing the functions specified in paragraphs 14.2.4 and 14.3 to 14.5:

.1 be given the required level of access, by the LRIT Data Centres and the International LRIT Data Exchange, to management, charging, technical and operational data;

.2 collect and analyse samples of LRIT information provided to LRIT Data Users;

.3 collect and analyse statistics compiled by LRIT Data Centres and the International LRIT Data Exchange; and

.4 be given access to the current LRIT Data Distribution Plan and to earlier versions of the plan.

14.7 The LRIT Coordinator should establish and communicate to the Committee the charges it would be levying in order to recover the expenditure it incurs for providing the services specified in paragraphs 14.2 to 14.5.

14.7.1 The related charges should be paid to the LRIT Coordinator in accordance with agreed arrangements – taking into account the laws of the Contracting Government(s) concerned – as follows:

.1 in relation to the evaluation of proposals for the establishment of the International LRIT Data Centre and/or the International LRIT Data Exchange (paragraph 14.2.3), by those submitting the related proposals;

.2 when participating in the testing and integration of the International LRIT Data Centre and/or the International LRIT Data Exchange into the LRIT system (paragraph 14.2.4), by the International LRIT Data Centre and/or the International LRIT Data Exchange as the case may be;

.3 when undertaking the investigation of operational or technical disputes or invoicing difficulties (paragraph 14.3.1), by the party requesting the service;

.4 when participating in the testing and integration of LRIT Data Centre(s) into the LRIT system (paragraph 14.3.2), by the LRIT Data Centre(s) being tested or integrated;

.5 when participating in the testing of new or modified procedures or arrangements for communications between the International LRIT Data Exchange, the LRIT Data Centres and the LRIT Data Distribution Plan server (paragraph 14.3.3), by the International LRIT Data Exchange and/or the LRIT Data Centre(s);

.6 when reviewing the performance of ASPs (or CSPs when they act as ASPs) providing services to the International LRIT Data Centre (paragraph 14.4.1), by the ASPs concerned;

.7 when auditing the performance and fee structures of LRIT Data Centres (paragraph 14.4.2), by the LRIT Data Centre concerned; and

.8 when auditing the performance and fee structure of the International LRIT Data Exchange (paragraph 14.4.3), by the International LRIT Data Exchange.

14.7.2 The Organization should not be required to make any payments to the LRIT Coordinator for any work the LRIT Coordinator may be required to carry out pursuant to any of the provisions of paragraphs 14.2 to 14.5; or for reporting or making recommendations to the Committee pursuant to any of the provisions of paragraphs 14.2 to 14.5.

14.7.3 Contracting Governments should not be responsible for making any direct payments to the LRIT Coordinator for the services it may be required to provide pursuant to any of the provisions of paragraphs 14.2 to 14.5. However, without prejudice as to the relations between Contracting Governments and the LRIT Data Centres the services of which may use, Contracting Governments may be required by LRIT Data Centres to pay fees for the LRIT information they request and receive which may contain elements to offset the charges paid by LRIT Data Centres to the LRIT Coordinator for the functions it performs. Notwithstanding the aforesaid, the Contracting Government which requests directly from the LRIT Coordinator the provision of a specific service should pay the LRIT Coordinator the relevant charges for the service it has requested.

15 Administrations

15.1 Each Administration should decide to which LRIT Data Centre ships entitled to fly its flag are required to transmit LRIT information.

15.2 Each Administration should provide to the selected LRIT Data Centre the following information for each of the ships entitled to fly its flag which is required to transmit LRIT information:

.1 name of ship;

.2 IMO ship identification number;

.3 call sign;

.4 maritime mobile service identity; and

.5 type of ship.

15.3 Upon the transfer of the flag of a ship which is required to transmit LRIT information from another State, the Administration whose flag the ship is now entitled to fly should provide, without undue delay, to the selected LRIT Data Centre in addition to the information specified in paragraph 15.2 the following information:

.1 the effective date and time (UTC) of transfer; and

.2 the State whose flag the ship was formally entitled to fly, if known.

15.4 Administrations should, without undue delay, update the LRIT Data Centre as and when changes to the information they have provided under paragraphs 15.2 and 15.3 occur.

15.5 Upon the transfer of the flag of a ship which is required to transmit LRIT information to another State or when the ship is to be taken permanently out of service, the Contracting

Government of the State whose flag the ship was entitled to fly hitherto should provide, without undue delay, to the LRIT Data Centre the following information:

.1 name of ship;

.2 IMO ship identification number;

.3 the effective date and time (UTC) of the transfer or when the ship was, or will be, taken permanently out of service; and

.4 the State to which the flag of the ship has been transferred, if known.

15.6 Administrations should either provide the ASP(s) they recognize with relevant information taking into account the provisions of paragraphs 15.2 to 15.5, or should make the necessary arrangements for the aforesaid information to be provided to the ASP(s) concerned by the selected LRIT Data Centre.

16 Contracting Governments

16.1 Each Contracting Government should:

.1 obtain the LRIT information to which it is entitled under the provisions of regulation V/19-1, and has requested, from the LRIT Data Centre designated under paragraph 15.1. Contracting Governments which have no ships entitled to fly their flag may receive the LRIT information they are entitled to under the provisions of regulation V/19-1 from any one of the LRIT Data Centres but should select one LRIT Data Centre from which they wish to receive the information. In such cases, the Contracting Government concerned should, after reaching an agreement with the LRIT Data Centre the services of which it would be using, inform accordingly the Organization and, without undue delay, update the information they have provided as and when it changes;

.2 if it wishes to receive LRIT information pursuant to the provisions of regulation V/19-1.8.1.1, indicate to the LRIT Data Centre the criteria for receiving such information. If so decided, the Contracting Government may give the LRIT Data Centre a standing order regarding the criteria for receiving LRIT information;

.3 if it wishes to receive LRIT information pursuant to the provisions of regulation V/19-1.8.1.2, indicate to the LRIT Data Centre the name and the IMO ship identification number of the particular ship and either:

.1 the distance from a port; or

.2 a point in time,

from when it requires the provision of LRIT information transmitted by the ship. If so decided the Contracting Government may give the LRIT Data Centre a standing order regarding the criteria for receiving LRIT information. If the standing order is a distance from a port, the Contracting Government also has to inform the centre of the name of the port each ship is proceeding to;

.4 if it wishes to receive LRIT information pursuant to the provisions of regulation V/19-1.8.1.3, indicate the distance from its coast within which it requires the provision of LRIT information transmitted by ships. If so decided, the Contracting Government may give the LRIT Data Centre a standing order regarding the criteria for receiving LRIT information;

.5 cooperate with a view to resolving any issues in connection with which flag a particular ship is entitled to fly; and

.6 ensure either the destruction of all received LRIT information which is no longer in use or its archiving in a secure and protected manner.

16.2 In accordance with regulation V/19-1.8.2, Contracting Governments are obliged to communicate to the Organization and enter into the LRIT Data Distribution Plan the information specified in paragraph 11.2 and thereafter update such information as and when changes occur before requesting the provision of LRIT information pursuant to the provisions of regulation V/19-1.8.1.

16.3 Contracting Governments are advised that the LRIT system would not apply any restrictions pursuant to the provisions of either regulations V/19-1.8.2 and V/19-8.1.3 in relation to ships located within the waters landward of baselines or regulation V/19-18.1.4 in relation to ships located within territorial seas until such time that they have communicated to the Organization and provided in the LRIT Data Distribution Plan the required information.

17 Search and rescue services

17.1 Subject to the provisions of paragraph 7.7, a search and rescue service when it wishes to receive LRIT information pursuant to the provisions of regulation V/19-1.12 should indicate to the LRIT Data Centre the criteria for receiving such information.

17.2 A search and rescue service should request the provision of LRIT information only via the LRIT Data Centre serving the Contracting Government in whose territory the service is located.

17.3 Subject to the provisions of the national legislation of the Contracting Government concerned, search and rescue services should provide information when requested by the LRIT Coordinator to enable the holistic review of the performance of the LRIT system and for the investigation of any disputes.

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ANNEX 24

DRAFT MSC RESOLUTION

AMENDMENTS TO THE TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS (RESOLUTION MSC.133(76), AS AMENDED)

THE MARITIME SAFETY COMMITTEE,

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

NOTING the *Technical provisions for means of access for inspections* (hereinafter referred to as "the Technical provisions"), adopted by resolution MSC.133(76), which are mandatory under SOLAS regulation II-1/3-6 on Access to and within spaces in the cargo area of oil tankers and bulk carriers adopted by resolution MSC.134(76),

ACKNOWLEDGING concerns expressed with regard to perceived problems which might be encountered when implementing the requirements of the Technical provisions,

NOTING ALSO the amendments to the aforementioned SOLAS regulation II-1/3-6 adopted by resolution MSC.151(78) and the amendments to the Technical provisions adopted by resolution MSC.158(78) to address the above concerns,

HAVING CONSIDERED, at its [112th session (… to …)], amendments to the Technical provisions, prepared and circulated in accordance with article VIII of the 1974 SOLAS Convention,

1 ADOPTS amendments to the Technical provisions, 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 January 2028], 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 SOLAS Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on [1 July 2028] upon their acceptance in accordance with paragraph 2 above;

4 REQUESTS the Secretary-General to transmit certified copies of this resolution and the text of the Technical provisions contained in the annex to all Contracting Governments to the Convention;

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

ANNEX

DRAFT AMENDMENTS TO THE TECHNICAL PROVISIONS FOR MEANS OF ACCESS FOR INSPECTIONS (RESOLUTION MSC.133(76), AS AMENDED)

1 The existing text of the Technical provisions for means of access for inspections is amended as follows:

1 Preamble

…

2 Definitions

For the purpose of these technical provisions, the following definitions apply in addition to those provided in the 1974 SOLAS Convention, as amended, and in ~~resolution A.744(18), as amended~~ the International Code on the Enhanced Programme of Inspections during Surveys of Bulk Carriers and Oil Tankers, 2011 (2011 ESP Code), adopted by the Assembly of the Organization by resolution A.1049(27), as may be amended by the Organization:

…

Table 2 – Means of access for bulk carriers

…

1.8 Subject to the provisions of paragraph 5.3, part A of annex A of the 2011 ESP Code (as amended)**,** ~~P~~portable or movable means of access may be utilized for access to hold frames up to their upper bracket in place of the permanent means required in 1.6. These means of access shall be carried on board the ship and readily available for use.

***

ANNEX 25

RESOLUTION MSC.596(111)
(adopted on 22 May 2026)

AMENDMENTS TO THE CODE FOR THE CONSTRUCTION AND EQUIPMENT OF MOBILE OFFSHORE DRILLING UNITS, 2009

THE MARITIME SAFETY COMMITTEE,

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

NOTING that mobile offshore drilling units continue to be moved and operated internationally,

RECALLING that the Assembly, when adopting the Code for the Construction and Equipment of Mobile Offshore Drilling Units in 2009 by resolution A.1023(26), authorized the Committee to amend the Code as appropriate, taking into consideration developments in design and technology, in consultation with appropriate organizations,

RECOGNIZING that regulations 6.5.1 and 6.5.5 of the 2009 MODU Code need further clarification for the application of the provisions therein, in order to facilitate their global and consistent implementation,

HAVING CONSIDERED, at its 111th session, recommendations made by the Sub-Committee on Ship Design and Construction, at its twelfth session (19 to 23 January 2026),

1 ADOPTS amendments to the 2009 MODU Code, the text of which is set out in the annex to the present resolution;

2 INVITES all Governments concerned to take appropriate steps to give effect to the annexed amendments to the 2009 MODU Code by 1 January 2027.

ANNEX

AMENDMENTS TO THE CODE FOR THE CONSTRUCTION AND EQUIPMENT OF MOBILE OFFSHORE DRILLING UNITS, 2009 (2009 MODU CODE)

CHAPTER 6

MACHINERY AND ELECTRICAL INSTALLATIONS IN HAZARDOUS AREAS FOR ALL TYPES OF UNITS

6.5 Emergency conditions due to drilling operations

The following sub-paragraphs are added after sub-paragraph 6.5.5:

"6.5.6 For MODUs constructed on or after 1 January 2027, equipment which is located in spaces other than enclosed spaces and which is capable of operation after each stage of selective shutdown as given in paragraph 6.5.1 should be suitable for installation in zone 2 locations, except for the equipment which is de-energized during drilling operations (such as shore power panel, towing winches, windlass, jacking motors, etc.). Such equipment which is located in enclosed spaces should be suitable for its intended application to the satisfaction of the Administration. At least the following facilities should be operable after an emergency shutdown:

.1 emergency lighting under paragraphs 5.4.6.1.1 to 5.4.6.1.4 for half an hour;

.2 blow-out preventer control system;

.3 general alarm system;

.4 public address system; and

.5 battery-supplied radiocommunication installations.

6.5.7 For MODUs constructed on or after 1 January 2027, the selective disconnection required in paragraph 6.5.1 may also be arranged so as to enable the isolation of ignition sources on the basis of shipboard location (i.e. accommodation block, drill floor, machinery space, etc.), system, or function specific considerations. However, the equipment located in open areas or within spaces not protected by specific mitigating measures against impingement by a flammable gas release, and that continue to operate after each stage of ESD, should be suitable for installation in zone 2 locations.

6.5.8 For MODUs constructed on or after 1 January 2027, the equipment located in enclosed spaces that continue to operate after each stage of ESD is to be arranged with appropriate mitigating measures for such equipment and the enclosure they are located within. This is to enable such equipment, which is potentially not suitable for installation in zone 2 locations, to continue operating in an installation gas release incident.

***

ANNEX 26

RESOLUTION MSC.597(111)
(adopted on 18 May 2026)

REVISED INTERIM RECOMMENDATIONS FOR CARRIAGE OF LIQUEFIED HYDROGEN IN BULK

THE MARITIME SAFETY COMMITTEE,

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

NOTING that the International Convention for the Safety of Life at Sea ("the Convention"), 1974 and the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk ("the IGC Code") currently do not specifically provide requirements for carriage of liquefied hydrogen in bulk by sea,

NOTING ALSO that paragraph 5 of the Preamble of the IGC Code states that requirements for new products and their conditions of carriage will be circulated as recommendations, on an interim basis, prior to the entry into force of the appropriate amendments,

RECOGNIZING a need for the development of the Revised interim recommendations for carriage of liquefied hydrogen in bulk,

ACKNOWLEDGING that, in the interim, there is an urgent need to provide recommendations to the Administrations on safe carriage of liquefied hydrogen in bulk,

ACKNOWLEDGING ALSO that the Revised Interim Recommendations are intended to facilitate establishment of a tripartite agreement for a pilot ship, which will be developed for the research and demonstration of safe long-distance overseas carriage of liquefied hydrogen in bulk,

HAVING CONSIDERED the Revised Interim Recommendations prepared by the Sub-Committee on Carriage of Cargoes and Containers at its eleventh session,

1 ADOPTS the Revised interim recommendations for carriage of liquefied hydrogen in bulk, the text of which is set out in the annex to the present resolution;

2 INVITES Member States to apply the Revised Interim Recommendations to the pilot ship carrying liquefied hydrogen in bulk, taking the explanatory notes into consideration;

3 AGREES to acquire information on safe carriage of liquefied hydrogen in bulk prior to amendment to the IGC Code for the inclusion of liquefied hydrogen;

4 ALSO AGREES that these Revised Interim Recommendations may need to be reviewed if they are to be applied to ships other than the pilot ship; and

5 URGES Member States and the industry to submit information, observations, comments and recommendations based on the practical experience gained through the application of the Revised Interim Recommendations and submit relevant safety analysis on ships carrying liquefied hydrogen in bulk.

6 REVOKES resolution MSC.565(108).

ANNEX

REVISED INTERIM RECOMMENDATIONS FOR CARRIAGE OF LIQUEFIED HYDROGEN IN BULK

1 INTRODUCTION

1.1 For the carriage of liquefied gases in bulk by ships, the ships should comply with the relevant requirements in the IGC Code, as amended ("the Code"). The scope of the Code provided in paragraph 1.1.1 is:

> "The Code applies to ships regardless of their size, including those of less than 500 gross tonnage, engaged in the carriage of liquefied gases having a vapour pressure exceeding 0.28 MPa absolute at a temperature of 37.8°C, and other products, as shown in chapter 19, when carried in bulk".

1.2 A ship carrying liquefied hydrogen in bulk (hereinafter called "liquefied hydrogen carrier") should comply with the Code.

1.3 The Code requires that a gas carrier should comply with the minimum requirements for the cargo listed in chapter 19. However, the requirements for liquefied hydrogen are not specified in the Code.

1.4 This annex provides the Revised Interim Recommendations, as referred to in paragraph 5 of the preamble of the Code, for the carriage of liquefied hydrogen in bulk, which are intended to provide the basis for the future minimum requirements for the carriage of this cargo. The Revised Interim Recommendations are intended to facilitate the establishment of a tripartite agreement among the relevant Administrations for the carriage of liquefied hydrogen in bulk. However, they are not intended to prohibit the adoption of designs and arrangements other than those specified in the Code or in these Revised Interim Recommendations, at the discretion of the Administrations.

1.5 These Revised Interim Recommendations have been developed under the assumption that a liquefied hydrogen carrier does not carry liquefied gases other than liquefied hydrogen. These Revised Interim Recommendations, therefore, are not applicable to liquefied hydrogen carriers carrying gases other than liquefied hydrogen.

1.6 In the Code, reference is made to paragraph 5 of the Preamble; paragraph 1.1.6.1; and Note No.8 on completion of certificate in "model form of international certificate of fitness for the carriage of liquefied gases in bulk" in appendix 2 to the Code.

1.7 These Revised Interim Recommendations consist of the following parts. Part A is applicable to ships with any type of cargo containment system. Part B and subsequent part(s) prescribe additional special requirements for cargo containment systems of specific types.

Part A: General (applicable to ships with any type of cargo containment system);

Part B: Cargo containment systems of independent cargo tanks using vacuum insulation;

Part C: Cargo containment systems of independent cargo tanks using insulation materials and hydrogen gas in the inner insulation spaces; and

Part D: Cargo containment systems of a membrane-type cargo tank maintaining the insulation spaces under vacuum.

1.8 Part A of these Revised Interim Recommendations was developed based on the design of parts B, C and D. If subsequent part(s) are added, the special requirements prescribed in part A may be reviewed.

Part A
General
(Applicable to ships with any type of cargo containment system)

2 GENERAL

2.1 Definition

2.1.1 The following definition should apply for the purpose of these Revised Interim Recommendations.

Permeation is the flow of a fluid through another material by diffusion without a defect or opening of the latter.[1]

2.2 Requirements for carriage of liquefied hydrogen in bulk

2.2.1 The requirements for the carriage of liquefied hydrogen in bulk have been developed based on the results of a comparison study of similar cargoes listed in chapter 19 of the Code, e.g. liquefied natural gas.

2.2.2 Chapter 19 of the Code governs the application of general requirements for respective cargoes. Selections of the general requirements for respective cargoes are expressed in columns 'c' to 'g'. In addition to general requirements, special requirements may apply to specific cargoes depending on the properties/hazards of the cargoes.

2.2.3 Tables 1 and 2 specify the proposed selection of the general requirements and the special requirements, respectively, for liquefied hydrogen. In addition to table 2, special requirements for cargo containment systems of specific types are prescribed in part B or subsequent part(s).

[1] See paragraph 3.79 of ISO/TR 15916:2015.

Table 1: Requirements for carriage of liquefied hydrogen in bulk

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
Product name		***Ship type***	***Independent tank type C required***	***Control of vapour space within cargo tanks***	***Vapour detection***	***Gauging***		***Special requirements***
Hydrogen		2G	-	-	F	C		See table 2 and, either corresponding table 4 or table 5 or table 6, as appropriate for the type of cargo containment systems

Table 2: Special requirements for carriage of liquefied hydrogen in bulk

No.	Special requirement	Related hazard
A-1	Requirements for materials whose design temperature is lower than -165°C should be agreed with the Administration, paying attention to appropriate standards. Where minimum design temperature is lower than -196°C, property testing for insulation materials should be carried out with the appropriate medium, over a range of temperatures expected in service.	Low temperature (see 4.2.1)
A-2	Materials of construction and ancillary equipment such as insulation should be resistant to the effects of high oxygen concentrations caused by condensation and enrichment at the low temperatures attained in parts of the cargo system (refer to the requirement for nitrogen). This special requirement is applied to all locations where contact with condensed oxygen is anticipated under normal conditions and foreseeable single failure scenarios.	Low temperature (see 4.2.2)
A-3	For cargo pipes containing liquid hydrogen and cold hydrogen vapour, measures should be taken to prevent the exposed surfaces from reaching -183°C. For places where preventive measures against low temperature are not sufficiently effective, such as cargo manifolds, other appropriate measures such as ventilation which avoids the formation of highly enriched oxygen and the installation of trays recovering liquid air may be permitted in lieu of the preventive measures. Insulation on liquid hydrogen piping systems exposing to air should be of non-combustible material and should be designed to have a seal in the outer covering to prevent the condensation of air and subsequent oxygen enrichment within the insulation.	Low temperature (see 4.2.2)
A-4	Appropriate means, e.g. filtering, should be provided in cargo piping systems to remove impure substances condensed at low temperature.	Low temperature (see 4.2.3)

No.	Special requirement	Related hazard
A-5	Pressure relief systems should be suitably designed and constructed to prevent blockage due to formation of water or ice.	Low temperature (see 4.2.4)
A-6	At places where contact with hydrogen is anticipated, suitable materials should be used to prevent any structural deterioration owing to hydrogen embrittlement and degradation of strength and fatigue properties due to continual exposure to hydrogen, as necessary.	Hydrogen embrittlement (see 4.3)
A-7	Double tube structures ensuring no leakage, or fixed hydrogen detectors being capable of detecting a hydrogen leak, should be provided for confined places where leakage of hydrogen may occur, such as cargo valves, flanges and seals.	Susceptibility to leakage (see 4.4.2)
A-8	Helium or a mixture of 5% hydrogen and 95% nitrogen should be used as the tightness test medium for cargo tank and cargo piping.	Susceptibility to leakage (see 4.4.3)
A-9	The amount of carbon dioxide carried for a carbon dioxide fire-extinguishing system should be sufficient to provide a quantity of free gas equal to 75% or more of the gross volume of the cargo compressor and pump rooms in all cases.	Fire by Hydrogen (see 4.7.3) Wide range of flammability limits (see 4.10)
A-10	When deterioration of insulation capability by single damage is possible, appropriate safety measures should be adopted taking into account the deterioration.	High pressure (see 4.8)
A-11	Appropriate measures should be provided to prevent vents becoming blocked by accumulations of ice formed from moisture in the air.	Low temperature (see 4.2.2)
A-12	Due consideration should be given to means for handling boil-off gas.	High pressure (see 4.8)
A-13	Due consideration should be given to static electricity associated with rotating or reciprocating machinery including the installation of conductive machinery belts and precautionary measures incorporated in operating and maintenance procedures, in addition to the bonding of tanks, piping and equipment required by paragraph 5.7.4 of the Code. Anti-static clothing and footwear, and a portable hydrogen detector should be provided for each crew member working in the cargo area.	Static electricity (see 4.9.2)
A-14	The cargo operation manuals required in paragraph 18.2 of the Code should include limitations of various operations in relation to environmental conditions.	Wide range of flammability limits (see 4.10)

No.	Special requirement	Related hazard
A-15	An appropriate procedure should be established for warm-up, inert gas purge, gas-free, hydrogen purge and pre-cooling. The procedure should include: .1 selection of inert gas in relation to temperature limit; .2 measurement of gas concentration; .3 measurement of temperature; .4 rates of supply of gases; .5 conditions for commencement, suspension, resuming and termination of each operation; .6 treatment of return gases; and .7 discharge of gases.	Prevention of dangerous purging operation (see 4.11)
A-16	Only almost pure para-hydrogen (i.e. more than 95%) should be loaded in order to avoid excessive heating by ortho- to para-hydrogen conversion.	General (see 4.1)
A-17	Fire detectors for detecting hydrogen fire should be selected, taking into account the features of hydrogen fire, to the satisfaction of the Administration.	Features of hydrogen fire and fire hazard (see 4.7.4)
A-18	At the design stage, dispersion of hydrogen from vent outlets should be analysed in order to minimize risk of ingress of flammable gas into accommodation spaces, service spaces, machinery spaces and control stations. Extension of hazardous areas should be considered based on the results of the analysis.	Low density and high diffusivity (see 4.5)
A-19	Due consideration should be given to appropriate safety measures to prevent formation of explosive mixture in the case of a leakage and permeation of hydrogen, including: .1 installation of hydrogen detectors in order to detect a possible ground-level travel of low temperature hydrogen gas, and at high points in spaces where warm hydrogen gas can be trapped; and .2 application of "best practice" for land-based liquid hydrogen storage taking into account appropriate guidance such as "Cryogenics Safety Manual – Fourth Edition (1998)"[8)].	General (see 4.1)
A-20	In the case that fusible elements are used as a means of fire detection required by paragraph 18.10.3.2 of the Code, flame detectors suitable for hydrogen flames should be provided in addition at the same locations. Appropriate means should be adopted to prevent the activation of the ESD system owing to false alarms of flame detectors, e.g. avoiding activation of the ESD system by a single sensor (voting method).	Fire hazard (see 4.7.4)

No.	Special requirement	Related hazard
A-21	Consideration should be given to enhance the ventilation capacity of the enclosed spaces subject to liquefied hydrogen leakage and permeation, taking into account the latent heat of vaporization, specific heat and the volume of hydrogen gas in relation to temperature and heat capacity of adjacent spaces.	Low density and high diffusivity (see 4.5)
A-22	Liquid and gas hydrogen pipes should not pass through enclosed spaces in addition to other than those referred to in paragraph 5.2.2.1.2 of the Code, unless: .1.1 the spaces are equipped with gas detection systems which activate the alarm at not more than 20% LFL and shut down the isolation valves, as appropriate, at not more than 40% LFL (see sections 16.4.2 and 16.4.8 of the Code); and .1.2 the spaces are adequately ventilated; or .2 the spaces are maintained in an inert condition.	Susceptibility to leakage (see 4.4)
A-23	A risk assessment should be conducted to ensure that risks arising from liquefied hydrogen cargo affecting persons on board, the environment, the structural strength or the integrity of the ship are addressed. Consideration should be given to the hazards associated with properties of liquefied hydrogen and hydrogen gas, physical layout, operation and maintenance, following any reasonably foreseeable failure. For the risk assessment, appropriate methods, e.g. HAZID, HAZOP, FMEA/FMECA, what-if analysis, etc., should be adopted taking into account IEC/ISO 31010:2019 "Risk management – Risk assessment techniques"[7)] and SAE ARP 5580-2001 "Recommended failure modes and effects analysis (FMEA) practices for non-automobile applications"[9)].	General (see 4.1)
A-24	Relief valve sizing should be undertaken for the most onerous scenario. The evaluation should include the fire scenario and should consider the resulting magnitude of the heat flux on the cargo containment system.	High pressure hazard (see 4.8)
A-25	A filling limit exceeding 98% at reference temperature should not be permitted.	High pressure hazard (see 4.8)
A-26	Bolted flange connections of hydrogen piping should be avoided where welded connections are feasible.	Susceptibility to leakage (see 4.4.2)
A-27	Due consideration should be given to the invisible nature of hydrogen fire from the viewpoint of safety of ships and especially personnel in case of fire.	Fire hazard (see 4.7.1)

3 EXPLANATION ON GENERAL REQUIREMENTS

3.1 Properties of liquefied hydrogen

The application of general requirements in the Code for liquefied hydrogen has been considered based on a comparison study on the physical properties of liquefied hydrogen and LNG. LNG and liquefied hydrogen are cryogenic liquids, non-toxic, and generate flammable high pressure gas. For reference, table 3 shows the comparison of physical properties of hydrogen and methane, the major component of LNG.

Table 3: Comparison of physical properties of Hydrogen and Methane

	Hydrogen	Methane	References
Boiling temperature (K)*	20.3	111.6	ISO[1)], Annex A, Table A.3
Liquid density (kg/m^3)*	70.8	422.5	ISO[1)], Annex A, Table A.3
Gas density (kg/m^3)** (Air: 1.198)	0.084	0.668	NIST RefProp[10)]
Viscosity (g/cm•s x 10^{-6}) Gas Liquid	 8.8 13.49	 10.91 116.79	 NIST RefProp[10)] NIST RefProp[10)]
Flame temperature in air (°C)	2396	2230	Calculated using Cantera and GRI 3.0 mechanism
Maximum burning velocity (m/s)	3.15	0.385	Calculated using Cantera and GRI 3.0 mechanism
Heat of vaporization (J/g)*	454.6	510.4	ISO[1)], Annex A, Table A.3
Lower flammability limit (% vol. fraction)***	4	5.3	ISO[1)], Annex B, Table B.2
Upper flammability limit (% vol. fraction)***	77	17.0	ISO[1)], Annex B, Table B.2
Minimum ignition energy (mJ)***	0.017	0.274	ISO[1)], Annex B, Table B.2
Auto-ignition temperature***	858	810	ISO[1)], Annex B, Table B.2
Toxicity	Non	Non	Orange book[5)]
Temperature at critical point (K)	33.19****	190.55	Hydrogen: ISO[1)], Annex A, Table A.1 Methane: The Japan Society of Mechanical Engineers, Data Book, Thermophysical Properties of Fluids (1983)
Pressure at critical point (kPaA)	1315****	4595	Hydrogen: ISO[1)], Annex A, Table A.1 Methane: The Japan Society of Mechanical Engineers, Data Book, Thermophysical Properties of Fluids (1983)

Remarks:
* At their normal boiling points for comparison purposes.
** At normal temperature and pressure.
*** Ignition and combustion properties for air mixtures at 25°C and 101.3 kPaA.
**** Normal Hydrogen.

3.2 Explanation on respective requirements

3.2.1 Ship type (column 'c')

As the hazard associated with hydrogen cargo is flammability but not toxicity, the ship type is considered 2G.

3.2.2 Independent tank type C required (column 'd')

Independent tank type C is allocated only to dangerous goods of class 2.3 whose vapour density is heavier than air. Independent tank type C is considered not to be required for liquefied hydrogen.

3.2.3 Control of vapour space within cargo tank (column 'e')

Special environment controls such as drying and inerting are generally required for liquid chemical products in consideration of the reactivity of cargo vapour and air. As is the case for LNG, it is considered not to be necessary to apply such requirements for liquefied hydrogen.

3.2.4 Vapour detection (column 'f')

Because hydrogen is flammable and non-toxic, it is appropriate to require Flammable (F) as vapour detection for liquefied hydrogen.

3.2.5 Gauging (column 'g')

On the grounds that Closed (C) gauging is required, in principle, for flammable or toxic cargoes, such as methane, it is considered to be appropriate to require Closed (C) gauging for hydrogen, taking into account that hydrogen has high ignitability and a wide flammable range in air and that closed gauging is effective to prevent leakage of gases into air.

4 SPECIAL REQUIREMENTS AGAINST HAZARDS OF LIQUEFIED HYDROGEN

4.1 Hazards of liquefied hydrogen to be considered

4.1.1 The hazards related to liquefied hydrogen are low ignition energy, a wide range of flammability limits, low visibility of flames in case of fire, high flame velocity which may lead to the detonation with shockwave, low temperature and liquefaction/solidification of inert gas and constituents of air which may result in an oxygen-enriched atmosphere, high permeation, low viscosity, and hydrogen embrittlement including weld metals. Where vacuum insulation is adopted, due consideration should be given to the possibility of untimely deterioration of insulation properties at the envisaged carriage temperatures of liquid hydrogen. The vacuum insulation evaluation should be specified for the normal range or upper limit of cold vacuum pressure (CVP), and loss of vacuum should be defined with respect to this value. Accordingly, the effect of vacuum pressure should be taken into account at the time of design and testing of piping with vacuum insulation. Supporting structure and adjacent hull structure should be designed taking into account the cooling owing to loss of vacuum insulation.

4.1.2 Hydrogen is essentially a mixture of ortho- and para-hydrogen, with an equilibrium concentration of 75% ortho-hydrogen and 25% para-hydrogen at ambient temperature. When liquefied at 20K, there is a slow but continuous transformation of ortho-hydrogen to para-hydrogen. The exothermic conversion of the nuclear spin isomers of hydrogen (ortho- to para-hydrogen) may take place and the effect of the conversion may have an impact on the cooling capacity and relief valve capacity of the vessel's equipment.

4.1.3 Trace amounts of air will condense or solidify in an environment with liquid hydrogen possibly resulting in an unstable and explosive mixture. Precautions should be taken to assure that the possibility of condensed air is accounted for within properly secured hazard areas.

4.2 Low temperature hazard

4.2.1 Selection of appropriate material

4.2.1.1 Tables 6.3 and 6.4 in the Code prescribe material selection for piping or cargo tanks whose design temperature is -165°C or higher. According to Note 2 of table 6.3 and Note 3 of table 6.4 of the Code, the requirements for materials whose design temperatures are lower than -165°C should be specially agreed with the Administration. In this regard, the publication by AIAA[2)] introduces some appropriate materials corresponding to the design temperature and the Administration should take into account such references for the material selection.

4.2.1.2 Although paragraph 4.19.3 in the Code requires testing of materials used for thermal insulation for various properties adequate for the intended service temperature, the minimum test temperature is -196°C. The requirements in the Code do not refer to the normal boiling point of hydrogen, being -253°C. In case of carriage of liquefied hydrogen, special requirements should be provided to consider the lower design temperature.

4.2.2 Measures for condensed air

4.2.2.1 In the case of nitrogen whose normal boiling point is -196°C, for which air condensation and oxygen enrichment are concerns, the following special requirement has already been included in paragraph 17.17 in the Code:

> "Material of construction and ancillary equipment such as insulation shall be resistant to the effect of high oxygen concentrations caused by condensation and enrichment at the low temperatures attained in parts of the cargo system. Due consideration shall be given to ventilation in such areas where condensation might occur to avoid the stratification of oxygen-enriched atmosphere."

A similar special requirement is applicable to hydrogen.

4.2.2.2 A vent may be blocked by accumulation of ice formed from moisture in the air, which may result in excessive pressure leading to rupture of the vent and relevant piping (see paragraph 4.2.4).

4.2.3 Removal of impure substances condensed

The removal of impure substances, such as those contained in condensate in pipes, should be separately considered. Installation of filters can be an appropriate measure and should be stipulated as a special requirement.

4.2.4 Prevention of blockage due to formation of water or ice

Pressure relief systems may become blocked owing to the formation of water or ice, depending on the temperature and humidity of air, resulting from the low temperature of the cargo and its vapour (see paragraph 4.2.2). Appropriate means should be provided to prevent such phenomena.

4.3 Hydrogen embrittlement

4.3.1 Selection of appropriate materials should be required to prevent failures owing to hydrogen embrittlement. The publication by AIAA[2)] introduces some appropriate materials resistant to hydrogen embrittlement, and concludes that aluminium is the material least affected.

4.3.2 International or national standards should be followed for the selection of materials for the design of liquefied and gaseous hydrogen installations in a marine environment.

4.4 Susceptibility to leakage

4.4.1 Prevention of leakage from pipes

To mitigate undetected accumulation of hydrogen in a confined space, effective measures should be employed to reduce the possibility of leakage of hydrogen, taking its leakage characteristics into account. Effective measures can be double tube structures, or fixed hydrogen leak detectors in areas assessed as being highly hazardous with regard to hydrogen leakage. Hydrogen leakage through welds, joints and seals is an important consideration for the design of hydrogen systems and an important operational issue.

4.4.2 Implementation of effective tightness test

4.4.2.1 Tightness tests for cargo tanks and cargo pipes/valves are required by paragraphs 4.20.3.2, 5.13.1 and 5.13.2.3 in the Code respectively. Helium or a mixture of 5% hydrogen and 95% nitrogen should be used as the medium for tightness tests, instead of air, because hydrogen is highly susceptible to leakage.

4.4.2.2 For a hydrogen installation, the pipework should be pressure-tested at its design pressure. Consideration should be given to using oxygen-free nitrogen with a small molecule tracer gas, such as helium as the test medium and an electronic leak detector for identifying leaks.

4.4.3 Confirmation of appropriate operating procedure

Instructions/manuals containing the operating procedures for the prevention of leakage during transport, methods for early detection in case of leakage, and appropriate measures after such events, should be provided. For this, paragraph 18.3 of the Code requires that the information shall be on board and available to all concerned, giving the necessary data for the safe carriage of cargo. In detail, the Code requires such information on action to be taken in the event of spills or leak, countermeasures against accidental personal contact, procedures for cargo transfer, and emergency procedures to be on board. With regard to the manuals on procedures for liquefied hydrogen during carriage and transfer operations, the requirements in the Code are applicable and no special requirement is necessary.

4.5 Low density and high diffusivity

Though low density and high diffusivity of hydrogen may reduce the possibility of formation of a flammable atmosphere in open spaces, adequate ventilation is necessary for enclosed spaces in cargo areas where formation of hydrogen-oxygen/air mixture may occur. Paragraph 12.2 of the Code requires fixed ventilation systems or portable mechanical ventilation for such enclosed spaces. These requirements in the Code are applicable to liquefied hydrogen carriers and no special requirement is necessary in this regard.

4.6 Ignitability

4.6.1 The Code requires electrical bonds of the piping and the cargo tanks in paragraph 5.7.4, exclusion of all sources of ignition in paragraph 11.1.2, electrical installations to minimize the risk of fire and explosion from flammable products in paragraph 10.2.1 and so on, in order to prevent ignition of flammable cargoes.

4.6.2 The Code requires compliance with the relevant standards issued by the International Electrotechnical Commission (IEC) and the IEC standards specify the details of such safety measures depending on the respective properties of flammable gases including hydrogen. No special requirement is necessary with regard to ignitability of hydrogen.[2]

4.7 Fire hazard

4.7.1 Safety of personnel in case of fire

To avoid the effects of flame and UV radiation produced by a hydrogen fire, it is effective to use fire-fighter's outfits and protective equipment. The Code already requires fire-fighter's outfits for ships carrying flammable products in paragraph 11.6.1 and safety equipment in paragraph 14.3. This issue should be considered as the matter of cargo information required by paragraph 18.3 of the Code. Due consideration should be given to the invisible nature of hydrogen fire.

4.7.2 Compatibility of fire-extinguishing systems

Dry chemical powder fire-extinguishing or carbon dioxide fire-extinguishing systems are considered to be effective in case of hydrogen fire and such fire-extinguishing systems are already required by paragraphs 11.4 and 11.5 of the Code. Special requirements for installation of other types of fire-extinguishing systems are considered unnecessary, except with regard to the increase in the amount of carbon dioxide required, as mentioned in the next paragraph in this document.

4.7.3 Increase of the amount of gas for carbon dioxide fire-extinguishing systems

4.7.3.1 Paragraph 11.5.1 of the Code requires as follows:

> "Enclosed spaces meeting the criteria of cargo machinery spaces in 1.2.10, and the cargo motor room within the cargo area of any ship, shall be provided with a fixed fire-extinguishing system complying with the provisions of the FSS Code and taking into account the necessary concentrations/application rate required for extinguishing gas fires."

4.7.3.2 Chapter 5 of the FSS Code, i.e. Fixed gas fire-extinguishing systems, requires that the quantity of carbon dioxide for cargo spaces, unless otherwise provided, shall be sufficient to give a minimum volume of free gas equal to 30% of the gross volume of the largest cargo space to be protected in the ship, in paragraph 2.2.1.1.

4.7.3.3 On the other hand, NFPA 12[3)] requires that the design quantity of carbon dioxide for hydrogen fire should be 75% or more of the gross volume of the protected space. The special requirement for an increased amount of carbon dioxide should be provided for carbon dioxide fire-extinguishing systems.

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[2] Electrical equipment used in hydrogen/air mixture should be, at least, the type of "II-C" and "T-1" as the group based on the maximum experimental safe gap for flameproof enclosures and the temperature class based on maximum surface temperature, respectively, according to ISO/IEC 80079-20-1[4)].

4.7.4 Features of hydrogen fire

Hydrogen burns at high temperature, but generally gives off less radiant heat than propane or other hydrocarbons (e.g. only about 10% of that radiated by an equal-sized propane flame). Although the heat radiated by a hydrogen flame is also relatively low compared to hydrocarbons, it is important to take into account the differences in heats of combustion, burning rate and flame size. Hydrogen flames are colourless or nearly colourless. Both of these characteristics make it more difficult to detect a hydrogen fire. Even relatively small hydrogen fires are very difficult to extinguish. The only reliable approach to extinguish a fire is to shut off the source of hydrogen supply.

4.8 High pressure hazard

4.8.1 High pressure is a hazard common to hydrogen and other flammable gases listed in the Code. To prevent overpressure, the Code requires various measures such as pressure control and pressure design. Specifically, paragraph 8.2, in regard to the provision of pressure control of cargo tanks, requires fittings of pressure relief valves to the cargo tanks. Furthermore, paragraph 7.1.1 requires temperature control by the use of mechanical refrigeration and/or design to withstand possible increases of temperature and pressure. In addition, paragraph 15.2 specifies the filling limit of cargo tanks taking into account cargo volume increase by its thermal expansion. These requirements are applicable for hydrogen and no special requirement is considered necessary in this regard.

4.8.2 Boil-off may be a more significant issue for hydrogen than for LNG in particular when insulation properties have deteriorated. Means of handling boil-off gas should be carefully considered taking into account the following issues:

.1 Re-liquefaction of hydrogen involves very specific and costly equipment. Cargo cooling in order to avoid boil-off shows the same kind of issues; and

.2 Notwithstanding the provision in paragraph 7.4.1 of the Code, thermal oxidation of hydrogen may be permitted in accordance with paragraph 1.3 of the Code.

4.8.3 The special requirements in these aspects are considered necessary.

4.9 Health hazard

4.9.1 Human safety concern under low temperature

With regard to the influences of cold hydrogen on persons' bodies, suitable protective equipment is effective. In this aspect, paragraph 14.1 of the Code requires suitable protective equipment taking into account the character of the products, therefore, no special requirement is considered necessary.

4.9.2 Static electricity

Hydrogen ignition energy is very low and hydrogen can be easily ignitable by static electricity and due consideration should be given to this issue, in accordance with the requirement in the Code on suitable protective equipment.

4.9.3 Oxygen depletion and asphyxiation

Leakage of hydrogen may cause a low level of oxygen and associated asphyxiation.

4.10 Wide range of flammable limits

4.10.1 Extinguishing hydrogen fire

4.10.1.1 As mentioned in paragraph 4.6, for flammable products the Code already requires elimination of sources of ignition, including use of electrical installations of appropriate types in order to minimize the risk of fire and explosion. No special requirement is considered necessary with regard to ignitability of hydrogen.

4.10.1.2 Furthermore, with regard to the wide range of flammable limits of hydrogen, the increased quantities of carbon dioxide as a fire-extinguishing medium should be specified as mentioned in paragraph 4.7. No additional special requirement is considered to be necessary with regard to the wide range of flammable limits of hydrogen.

4.10.2 Disposal of cold hydrogen gas

The wide flammability range makes disposal of cold hydrogen gas a major hazard. Cold plumes of released hydrogen may impede adequate dilution of hydrogen down to below 4% and may lead to flash-back to the vent from distant ignition sources outside safety-controlled areas. The low ignition energy and wide flammable range may present significant challenges.

4.11 Prevention of dangerous purging operation

4.11.1 During cargo operations for maintenance, pipes and tanks should be purged with an inert gas or inert gases as illustrated in the figure below. For safety, due consideration should be given to temperature and boiling points of the inert gases. Residual pockets of hydrogen or the purge gas will remain in the enclosure if the purging rate, duration, or extent of mixing is too low. Therefore, reliable gas concentration measurements should be obtained at a number of different locations within the system for suitable purges. Temperature should also be measured at a number of locations. Oxidizing agents may exist in a hydrogen containing equipment, specifically: air, cold box atmospheres containing air diluted with nitrogen, or oxygen-enriched air that can be condensed on process pipe work within the cold box in special circumstances.

4.11.2 There are special measures that may need to be put in place in order to mitigate the hazards, e.g. air should be eliminated by nitrogen purge prior to introduction of hydrogen into cargo piping or processing equipment. Nitrogen should then be eliminated by hydrogen purge, where there is a possibility of its solidification in the subsequent process.

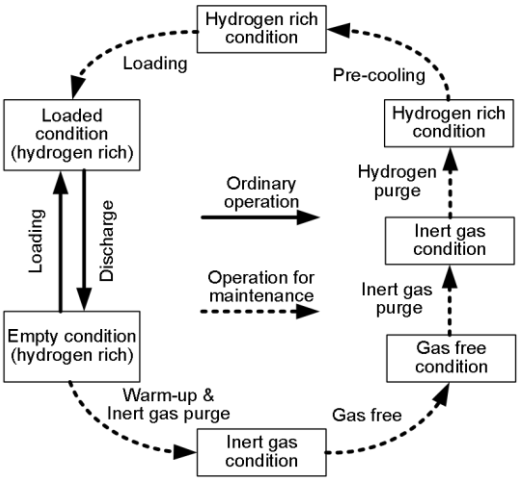

Figure 1

References in part A

1 ISO/TR 15916:2015, Basic consideration for the safety of hydrogen systems (ISO)

2 American Institute of Aeronautics and Astronautics, "Safety Standard for Hydrogen and Hydrogen Systems (Guide to Safety of Hydrogen and Hydrogen Systems)", 2005 (AIAA)

3 NFPA 12: Standard on Carbon Dioxide Extinguishing Systems 2020 Edition (NFPA)

4 ISO/IEC 80079-20-1:2017 Explosive atmospheres – Part 20-1: Material characteristics for gas and vapour classification – Test methods and data

5 UN Recommendations on the Transport of Dangerous Goods – Model Regulations, twenty-second revised edition

6 NFPA 2: Hydrogen Technologies Code 2016 Edition (NFPA)

7 IEC/ISO 31010: 2019 Risk management – Risk assessment techniques

8 Cryogenics Safety Manual – Fourth Edition (1998)

9 SAE ARP 5580-2001 "Recommended failure modes and effects analysis (FMEA) practices for non-automobile applications"

10 National Institute of Standards and Technology (NIST) RefProp database

Part B
Cargo containment systems of independent cargo tanks using vacuum insulation

5 Additional requirements

5.1 Additional special requirements for cargo containment systems of independent cargo tanks using vacuum insulation are prescribed in table 4 and these special requirements should apply in addition to the requirements in table 2.

Table 4: Special requirements for cargo containment systems of independent cargo tanks using vacuum insulation

No.	Special requirement	Related hazard
B-1	The insulation performance of vacuum insulation of cargo containment system should be evaluated to the satisfaction of the Administration based on experiments, as necessary.	General (see 4.1 and 6.1)
B-2	Notwithstanding special requirement A-22, liquid and gas hydrogen pipes may pass through spaces constituting a part of a cargo containment system using vacuum insulation where the degree of vacuum is monitored.	Susceptibility to leakage (see 4.4)
B-3	When selecting the most onerous scenario stipulated in special requirement A-24, the evaluation should include fire or loss of vacuum from the overall insulation system and should also consider the resulting magnitude of the heat flux in case of a single failure on the cargo containment system in each case.	High pressure hazard (see 4.8 and 6.2)

6 Additional special requirements to mitigate hazards of liquefied hydrogen

6.1 Hazards of liquefied hydrogen to be considered

6.1.1 In addition to 4.1.1, due consideration should be given to the possibility of untimely deterioration of insulation properties at the envisaged carriage temperatures of liquid hydrogen. The vacuum insulation evaluation should be specified for the normal range or upper limit of cold vacuum pressure (CVP), and loss of vacuum should be defined with respect to this value. Accordingly, the effect of vacuum pressure should be taken into account at the time of design and testing of cargo containment systems. Supporting structure and adjacent hull structure should be designed taking into account the cooling owing to loss of vacuum insulation.

6.1.2 For consideration on the special requirements for this part, bibliographic studies were conducted using the references at the end of this document, in particular, ISO/TR 15916[1)], "High Pressure Gas Safety Act" (Japanese law), "Safety standard for hydrogen and hydrogen system" by AIAA[2)] and NFPA 2 "Hydrogen Technologies Code"[3)]. The majority of special requirements for liquefied hydrogen carriers are provided based on ISO/TR 15916. This standard refers to liquefied hydrogen tank storage facilities on shore, tank trucks and so on, and includes basic viewpoints when discussing the properties of liquefied hydrogen.

6.2 High pressure hazard

In addition to 4.8, vacuum insulation systems are likely to be used for liquefied hydrogen containment systems and the insulation capability of such systems may be adversely affected by damage to the system, depending on the design of the system. If a rapid deterioration of the insulation system took place, rapid increase of temperature in the cargo tank would occur and/or the rate of vaporization of liquefied hydrogen might exceed the capacity of pressure relief valves. To prevent such dangerous deterioration of insulation, appropriate safety measures should be taken.

References in part B

1 ISO/TR 15916:2015, Basic consideration for the safety of hydrogen systems (ISO)

2 American Institute of Aeronautics and Astronautics, "Safety Standard for Hydrogen and Hydrogen Systems (Guide to Safety of Hydrogen and Hydrogen Systems)", 2005 (AIAA)

3 NFPA 2: Hydrogen Technologies Code 2016 Edition (NFPA)

Part C
Cargo containment systems of independent cargo tanks using insulation materials and hydrogen gas in the inner insulation spaces

7 Application of the requirements in this part

7.1 Design of cargo containment systems

The safety measures set out in this part should apply to cargo containment systems of independent cargo tanks using insulation materials and hydrogen gas in the inner insulation spaces as described below.

Figure 2 illustrates a cargo containment system of independent cargo tanks using insulation materials and hydrogen gas in the inner insulation spaces. In this cargo containment system, an inner shell corresponds to a cargo tank. An insulation structure is installed outside of the inner shell. The insulation structure consists of an inner insulation space, an outer shell and an outer

insulation layer from the inside. The inner insulation layer, which is located outside the inner shell, is a part of the inner insulation space. The inner insulation space needs to be filled with the appropriate gas to prevent condensation and/or solidification of a large amount of gas caused by the low temperature of the inner shell surface, which will be almost equal to the boiling point of hydrogen. Thus, the inner insulation space is filled with hydrogen gas and no liquid.

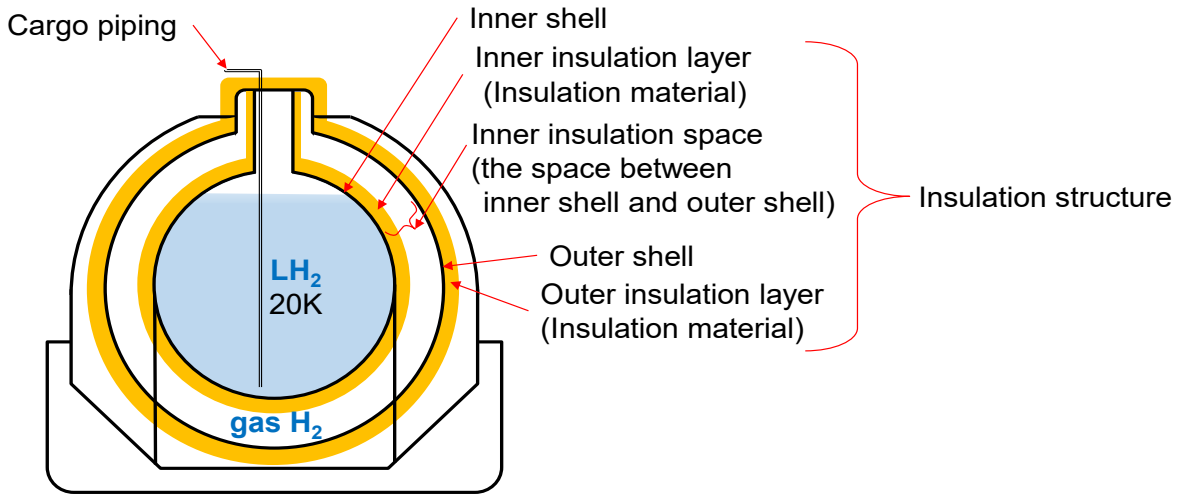

Figure 2 Illustration of cargo containment system

7.2 Conditions for the application of the requirements in this part

The safety requirements set out in this part should apply under the following conditions of use:

.1 the inner shell satisfies the requirements of the Code for a cargo tank; and

Note: This part focuses on the safety measures for the inner insulation space and the outer shell, as a part of the insulation structure for which no specific requirements are specified in the Code.

.2 appropriate measures are adopted to prevent leakage of gas from the inner insulation space to ensure the reliability of the insulation structure, taking into account that the space is filled with flammable gas.

8 Additional requirements

Special requirements for the cargo containment systems are prescribed in table 5 and these special requirements should apply in addition to the requirements in table 2.

Table 5: Special requirements for cargo containment systems of independent cargo tanks using insulation materials and hydrogen gas in the inner insulation spaces

No.	Special requirement	Explanation
C-1	The outer shell of the cargo containment system should be located at the distance from the ship's outer shell, as required in paragraphs 2.4.1 and 2.4.2 of the Code for cargo tanks of type 2G ship.	
C-2	Strength of the outer shell should be determined by analyses and tests considering safety principles, all applicable design conditions, materials used, and construction processes in reference to chapter 4 of the Code, and should be approved by the Administration.	
C-3	Notwithstanding special requirement C-2, the temperature of the outer shell should be determined by a temperature calculation, under the assumption that the inner shell is at the cargo temperature.	
C-4	The following special requirements should be applied to the outer shell: .1 All joints of the outer shell should be welded and of full penetration type. All joints of the outer shell should be of in-plane butt weld, as far as practicable. Tee welds of full penetration type may be used depending on the results of the test carried out at the approval of the welding procedure where the in-plane butt weld is not practicable owing to the construction process and structure of the outer shell. .2 If a manhole is sealed by welding using backing rings, backing rings may be left after welding without removal, provided that they do not cause any significant harmful effects.	see 9.1
C-5	The outer shell should be subjected to pneumatic pressure testing to check its strength.	see 9.2
C-6	Appropriate thermal insulation should be provided to keep the temperature of the outer shell and outer insulation layer above the boiling point of oxygen. The insulation performance should be evaluated to the satisfaction of the Administration based on experiments, as necessary. When applying paragraph 4.19.1.1.5 of the Code, the degradation of insulation performance caused by a hydrogen atmosphere should be considered. Means should be provided for monitoring the condition of the insulation for detection of failures.	
C-7	The pressure of the inner insulation space should be monitored taking into account the requirement for a cargo tank in paragraph 13.4 of the Code.	see 9.3
C-8	Under normal conditions, appropriate measures should be taken to maintain the pressure of the inner insulation space within the design limits.	see 9.3

No.	Special requirement	Explanation
C-9	Pressure and vacuum relief valves should be provided for inner insulation space which may be subject to pressures beyond their design capabilities, taking into account the requirements for pressure relief systems of cargo tanks in paragraphs 8.2 and 8.3 of the Code. The appropriate capacity of vacuum relief valves should be provided taking into account the expected rate of pressure drop in the inner insulation space of the cargo tanks of the ship under normal cargo operations, which replaces the requirements of paragraph 8.3.1.2 of the Code. When applying 8.3.2 of the Code, the vacuum relief valves should not admit air to the inner insulation space. In the event that the pressure relief valve for the inner insulation space is activated, the hydrogen gas release should be vented to a safe location.	see 9.3
C-10	The requirements in chapter 5 other than 5.3 and 5.10 of the Code, i.e. the requirements for cargo piping outside the cargo areas, should be applied for piping handling hydrogen for the inner insulation space.	
C-11	Appropriate measures should be taken for atmosphere control of the inner insulation space, e.g. inerting, gas freeing, aerating and purging, etc. (see also A-15).	
C-12	The special requirement A-8 should be applied to the tightness test of the outer shell.	
C-13	The special requirements A-3 and A-4 should be applied to piping handling hydrogen for the inner insulation space.	
C-14	The special requirements A-8 and A-26 should be applied to exposed parts of piping handling hydrogen for the inner insulation space.	
C-15	Special requirement A-7 need not be applied to piping handling hydrogen for the inner insulation space, other than piping penetrating the inner shell, located inside the inner insulation space.	see 9.4
C-16	Notwithstanding special requirement A-22, piping handling hydrogen for an inner insulation space may pass through other inner insulation spaces.	
C-17	The requirements for type C independent tank should be applied to the inner shell.	
C-18	Manholes for access from or to the inner insulation space through the inner shell should not be permitted.	
C-19	Cargo piping connected to the inside of the inner shell should be led directly from the weather deck. No pipe should penetrate the inner shell from or to the inner insulation space.	

9 Explanation of special requirements

9.1 Welding of the outer shell

9.1.1 As mentioned in 7.2, the outer shell is a part of the insulation structure that has the function to contain hydrogen gas in the inner insulation space, but not to contain liquefied hydrogen.

9.1.2 Owing to the high leakage of hydrogen, which is filled in the inner insulation space, it is essential to ensure the reliability of the tightness of the outer shell. This reliability is subject to evaluation and approval by the Administration. To ensure the tightness of the outer shell, equivalent welding requirements for the inner shell, i.e. cargo tank, should be applied to the outer shell as far as practicable. Therefore, all joints of the outer shell should be of the in-plane butt weld full penetration type, referring to paragraph 4.20.1 of the Code. On the other hand, it may not be practicable to use in-plane butt weld for the outer shell owing to the construction procedure and structure. Considering that only gas is filled in the inner insulation space, no liquid pressure is applied on the outer shell. Therefore, using tee welds of the full penetration type is deemed acceptable for those areas, depending on the results of the test carried out with the approval of the welding procedure.

9.1.3 A manhole, when installed on the outer shell, can be sealed by gaskets or by welding. Welding is deemed to be a more reliable method to prevent hydrogen leakage, and removal of the backing rings is typically not possible owing to the construction procedure. Considering that no liquid pressure is applied on manholes and backing rings, there is no significant concern from a strength point of view. Therefore, not removing backing rings is deemed acceptable, unless any conceivable harmful effects, such as fatigue strength, are identified.

9.2 Testing of outer shell

While pressure testing is to be conducted on the outer shell to check for strength, filling the inner insulation space with water is unrealistic because the insulation materials are installed in the inner insulation space. In addition, it is assumed that only gas is stored in the inner insulation space, therefore, a pneumatic pressure test is sufficient to reproduce the operational condition of the outer shell. This special requirement is related to paragraphs 4.20.3.1 and 4.23.6.7 of the Code.

9.3 Pressure of the inner insulation space

Keeping an appropriate pressure of the inner insulation space is essential for preventing the inner and the outer shell from rupturing and buckling.

9.4 Leak detection for piping handling hydrogen for the inner insulation space located inside the inner insulation space

The purpose of special requirement A-7 is to avoid forming a flammable atmosphere. Because the inner insulation space is filled with hydrogen, no additional risk is created by leakage of hydrogen from the places, located inside the inner insulation space, where leakage of hydrogen may occur such as valves, flanges and seals of piping handling hydrogen for the inner insulation space. Thus, special requirement A-7 does not contribute to improve safety for such piping, which is different from the piping for cargo handling. Provision C-15 is necessary to enable the design for control to change atmosphere or for maintenance.

References in part C

1 ISO/TR 15916:2015, Basic consideration for the safety of hydrogen systems (ISO)

2 American Institute of Aeronautics and Astronautics, "Safety Standard for Hydrogen and Hydrogen Systems (Guide to Safety of Hydrogen and Hydrogen Systems)", 2005 (AIAA)

3 NFPA 2: Hydrogen Technologies Code 2016 Edition (NFPA)

Part D
Cargo containment systems of membrane-type cargo tanks maintaining the insulation spaces under vacuum

10 APPLICATION OF THE REQUIREMENTS IN THIS PART

10.1 Definitions

The following definitions apply for the purpose of this part;

.1 the *primary insulation space* is the inter-barrier space as defined in 1.2.30 of the Code; and

.2 the *secondary insulation space* is the space between the secondary barrier and the inner hull.

10.2 Design of the cargo containment system

The safety measures set out in this part should apply to membrane-type cargo containment systems for liquefied hydrogen maintaining the insulation spaces under vacuum, as an equivalent arrangement under paragraph 1.3 of the Code to the inerting requirements specified in paragraph 9.2.1.

Figure 3 illustrates an example of the cargo containment system. The system consists of thin liquid-tight and gas-tight layers (denoted as primary and secondary barriers in figure 3) supported through insulation by the adjacent hull structure. The primary and secondary insulation spaces are filled with insulation materials, and maintained under vacuum during the normal operation of the containment system.

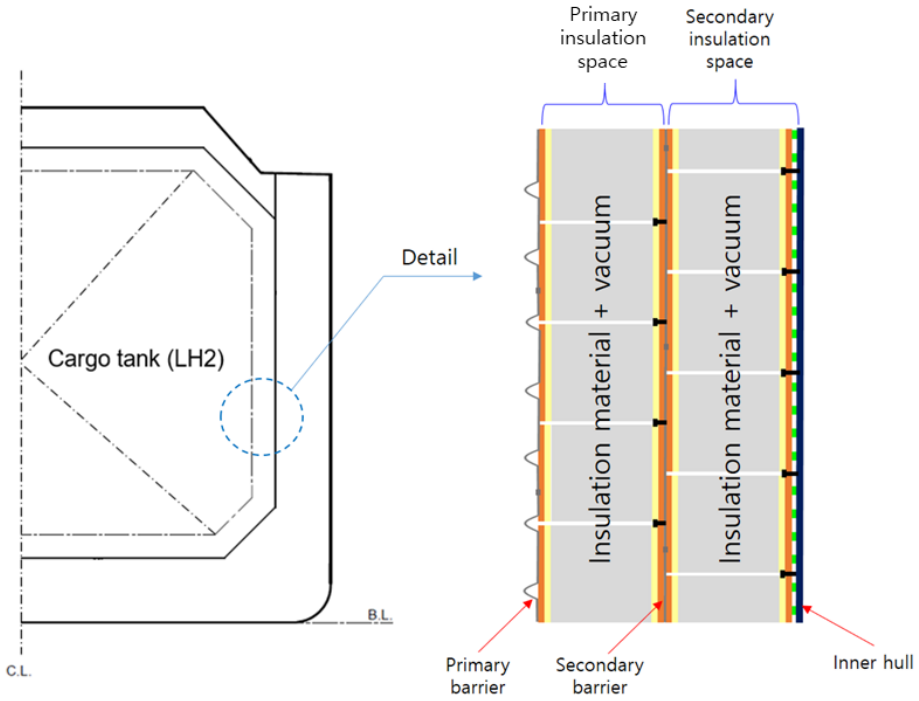

Figure 3: Illustration of a membrane LH_2 cargo containment system maintaining the insulation spaces under vacuum

11 ADDITIONAL REQUIREMENTS

Instead of filling the insulation spaces with dry inert gas, the cargo containment system creates and maintains vacuum in the spaces. Therefore, additional safety requirements should be provided for:

.1 structural integrity of the inner hull, primary and secondary barriers and insulation components in the spaces under vacuum environment;

.2 generation, maintaining, and monitoring of the vacuum; and

.3 emergency cases: cargo leakage into the primary insulation space or loss of vacuum due to air ingress into the insulation spaces.

The additional requirements are prescribed in table 6 and these special requirements should be applied in addition to the requirements in table 2.

Table 6: Special requirements for membrane-type cargo containment systems maintaining the insulation spaces under vacuum

No.	Special requirement	Explanation
D-1	Structural integrity should be verified for all the structural components of the cargo containment system and the inner hull structure considering the vacuum environment of the insulation spaces.	12.1.1

No.	Special requirement	Explanation
D-2	Both the primary and secondary barriers should be made of metallic materials and be liquid-tight and gas-tight. The quality assurance/quality control programme ensuring the continued conformity of the weld procedure qualification, design details, materials, construction, inspection and production testing of components, should be established to the satisfaction of the Administration.	12.1.2
D-3	Tightness test should be conducted for both the primary and secondary barriers after installation and during renewal surveys using the test medium specified in the requirement A-8.	12.1.2
D-4	Pressure relief system should be provided for the insulation spaces that may be subject to pressures beyond their design capabilities. The designer should demonstrate adequate capacity of the pressure relief system for the spaces to the satisfaction of the Administration.	12.1.2
D-5	Procedures for the in-service maintenance and monitoring, initial and periodical examination/test for the primary and secondary insulation spaces, should be established to the satisfaction of the Administration.	12.1.3
D-6	The insulation performance of the insulation system should be evaluated to the satisfaction of the Administration considering the anticipated operational conditions, the degree of vacuum, vacuum deterioration over time and the designed tolerance levels in the insulation spaces, based on experiments as necessary.	12.2.1
D-7	The required degree of vacuum in the insulation spaces should be adequate to prevent any damage to the insulation system components due to the condensation and/or solidification of the remaining gas components.	12.2.1
D-8	The degree of vacuum in the insulation spaces should be monitored and maintained within the designed level during the normal operation period. At least one vacuum system should be provided for each tank. The vacuum system should have sufficient capacity to maintain the designed level of vacuum in each insulation space. The vacuum systems are to be considered as an essential auxiliary and at least one of them for each tank should be supplied from the emergency source of electrical power. In addition, a back-up pump should be provided, able to maintain vacuum in the largest space under vacuum.	12.2.2
D-9	In addition to the requirement A-15, appropriate atmosphere handling procedures for the insulation spaces should also be established. It should be verified through testing that the insulation components do not prevent the effective atmosphere control operation for the spaces, including but not limited to gas displacement, evacuation and removal of leaked hydrogen.	12.2.3

No.	Special requirement	Explanation
D-10	Appropriate emergency control procedures should be established to address the possibility of cargo leakage into the primary insulation space. The procedures should include, but not be limited to, leakage detection, handling of leaked hydrogen and measures to restore insulation performance and tightness of the primary barrier.	12.3.1.1
D-11	For the detection and identification of the emergency cases, such as hydrogen leakage into the primary insulation space and loss of vacuum due to air ingress into the insulation spaces, appropriate indicating and detecting instruments should be provided and arranged. They should be sufficiently redundant to the satisfaction of the Administration.	12.3.1
D-12	Pressure control systems for the primary insulation space, such as pressure relief or vacuum pumping systems, should be explosion-proof and be able to discharge cryogenic hydrogen to a safe location with sufficient capacity. Pressure control systems for the primary and secondary insulation spaces should also be designed and arranged to prevent blockage due to the frozen air or loose/damaged insulation material.	12.3.1
D-13	Hydrogen-compatibility of the insulation materials should be verified by test. It should be ensured that the insulation performance of the insulation materials in contact with the leaked hydrogen remains acceptable to the satisfaction of the Administration after repair works are completed.	12.3.1
D-14	The insulation components' low permeability to hydrogen should be demonstrated or adequate measures and operating procedures to avoid any risk of potential damage due to the permeated hydrogen should be provided to the satisfaction of the Administration.	12.3.1.4
D-15	To prevent air intrusion into the insulation spaces, the number of pipes passing through the spaces should be minimized, and furthermore, all the pipe joints connected to the spaces should be weld-type.	12.3.2
D-16	Appropriate measures should be provided to control the incoming air and prevent further ingress when outside air intrudes into the secondary insulation space. The measures should be effective for at least 15 days. When the secondary insulation space is pressurized with an inert gas as one of the measures to prevent further ingress of air, appropriate measures should be adopted taking into account the possibility of condensation of the inert gas within the space, such as maintaining the temperature of the inner boundary of the secondary insulation space above the boiling point of the inert gas.	12.3.2.2
D-17	Insulation system and the inner hull structure's steel grade should be arranged to safely accommodate a degradation or loss of the insulation performance in any one of the insulation spaces.	-

No.	Special requirement	Explanation
D-18	Regarding the relief valve sizing for the cargo tank, the evaluation should include the scenarios of fire or loss of vacuum in any one of the insulation spaces in addition to the special requirement A-24.	-

12 EXPLANATION OF THE SPECIAL REQUIREMENTS

12.1 Structural integrity of the components

12.1.1 Strength assessment under vacuum environment

In addition to the design loads described in the Code, chapter 4, part B, a strength assessment should be carried out for the inner hull structure, primary and secondary barriers and the structural components in the insulation spaces, taking into account the vacuum pressure for the anticipated operating scenarios.

12.1.2 The inner hull, primary and secondary barriers

12.1.2.1 Liquid and gas tightness is required for the inner hull and both the primary and secondary barriers so that the vacuum environment can be maintained during the operation period and also any leaked hydrogen can be contained in the primary insulation space without permeation into the secondary insulation space for at least 15 days.

12.1.2.2 The quality assurance/quality control programme should ensure the continued conformity of the weld procedure qualification, design details, materials, construction, inspection and production testing of components, according to 6.6.5 of the Code. The programme should be developed and established to the satisfaction of the Administration. Tightness test specified in A-8 should be conducted for both the primary and secondary barriers.

12.1.2.3 In addition to 8.2.2 of the Code, the secondary insulation space should be provided with a pressure relief system as well as the inter-barrier space, if the space may be subject to pressures beyond its capability. The capacity of the pressure relief system of the insulation spaces should be adequately determined and demonstrated to the satisfaction of the Administration.

12.1.3 Maintenance, monitoring and examination

Procedures for the in-service maintenance and monitoring, initial and periodical examination/test for the primary and secondary insulation spaces, should be established to the satisfaction of the Administration.

12.2 Vacuum control in the insulation spaces

12.2.1 Required degree of vacuum

12.2.1.1 The insulation performance is affected by the degree of vacuum. If the cold vacuum pressure (CVP) is taken into account in the evaluation of the insulation performance, the required degree of vacuum should be determined based on the evaluation conditions. The vacuum insulation evaluation should be specified for the normal range or upper limit of cold vacuum pressure, and loss of vacuum should be defined with respect to this value.

12.2.1.2 Owing to the low temperature of the cargo, the remaining gas components can be condensed and/or solidified. Therefore, the required degree of vacuum should also be determined so as to prevent any damage to the insulation system components by condensation and/or solidification of the remaining gas components in the spaces.

12.2.2 Monitoring and maintaining the degree of vacuum

The degree of vacuum in the insulation spaces should be monitored and maintained within the designed level throughout the normal operation period. Appropriate vacuum systems, such as a vacuum pumping system, should be permanently installed, and they should have sufficient capacity and redundancy to the satisfaction of the Administration.

12.2.3 Atmosphere handling

In addition to the special requirement A-15, an appropriate procedure should also be established for the atmosphere handling within the insulation spaces. Purging with dry inert gas may be conducted before creating a vacuum in the insulation spaces to prevent the formation of a flammable mixture as much as possible. As the insulation spaces are filled with insulation materials, it should be confirmed that they do not disable the gas displacement and evacuation operations for the spaces. In addition, considering the cargo leakage scenario, leaked hydrogen may permeate inside the insulation materials. The methodology of removing the permeated hydrogen should also be prepared and verified to ensure that repair works after the leakage can be safely carried out.

12.3 Emergency control

12.3.1 Cargo leakage into the primary insulation space

12.3.1.1 Appropriate emergency control procedures should be established to address the possibility of cargo leakage into the primary insulation space. The procedures should include, but not be limited to, leakage detection, handling of leaked hydrogen and measures to restore insulation performance and tightness of the primary barrier.

12.3.1.2 Any cargo leakage into the primary insulation space may be detected and identified by hydrogen gas detectors together with monitoring the pressure and temperature changes in the insulation space. Meanwhile, air ingress into the primary or secondary insulation space may be detected and identified by oxygen detectors together with monitoring the pressure changes in the insulation spaces. Appropriate indicating and detecting instruments should be provided and arranged. They should be sufficiently redundant to the satisfaction of the Administration.

12.3.1.3 Cargo hydrogen may leak into the primary insulation space. Therefore, the pressure control systems, such as pressure relief valves or vacuum pumping systems installed for the primary insulation space, should be able to discharge the leaked hydrogen to a safe location. They should also be explosion-proof and be able to handle cryogenic gas.

12.3.1.4 Any leaked hydrogen in the primary insulation space may permeate into the insulation materials and cause damage to the barriers and/or insulation components as it heats up. It can also cause degradation of the insulation performance. Therefore, the insulation components' low permeability to hydrogen should be demonstrated or adequate measures and operating procedures to avoid any risk of potential damage due to the permeated hydrogen should be provided to the satisfaction of the Administration.

12.3.2 Loss of vacuum in the insulation spaces due to air intrusion

12.3.2.1 In case of external leakage on the pipes or valves connected to the primary or secondary insulation spaces, outside air may intrude into the spaces. In the primary insulation space, the air intrusion may not be detected for some time if the amount of ingress is small, because it immediately condenses owing to the extremely low temperature. Therefore, the design should prevent air intrusion into the primary and secondary insulation spaces as much as possible. The number of pipes passing through the spaces should be limited to a minimum and only weld-type pipe joints should be allowed.

12.3.2.2 In the secondary insulation space, appropriate instruments, such as oxygen detectors and pressure indicators, should be installed to detect air ingress into the secondary insulation space. When air ingress is detected, appropriate measures should be adopted to prevent further air ingress and prevent the intruded air from forming a flammable mixture. For this purpose, inert gas circulation may be implemented with a shipboard inert gas generation system or shipboard inert gas storage. The inerting pressure should be managed to prevent further air ingress into the space. In that case, the amount of inert gas should be sufficient for consumption of at least 15 days.

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ANNEX 27

RESOLUTION MSC.598(111)
(adopted on 22 May 2026)

MANDATORY SHIP REPORTING SYSTEM "IN THE ADRIATIC SEA" (ADRIREP)

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO regulation V/11 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, concerning the adoption of mandatory ship reporting systems by the Organization,

RECALLING FURTHER resolution A.858(20), which authorizes the Committee to perform the function of adopting ship reporting systems on behalf of the Organization,

TAKING INTO ACCOUNT the *Guidelines and criteria for ship reporting systems* adopted by resolution MSC.433(98),

HAVING CONSIDERED the recommendations of the Sub-Committee on Navigation, Communications and Search and Rescue, at its twelfth session,

1 ADOPTS, in accordance with SOLAS regulation V/11, the revised mandatory ship reporting system *In the Adriatic Sea* (ADRIREP) described in the annex to the present resolution, which revises in its entirety the existing text of annex 2 to resolution MSC.139(76);

2 DECIDES that the said revised mandatory ship reporting system *In the Adriatic Sea* (ADRIREP) will be implemented at 0000 hours UTC on 1 December 2026;

3 REQUESTS the Secretary-General to bring this resolution and its annex to the attention of Member States and Contracting Governments to the 1974 SOLAS Convention;

4 REVOKES annex 2 to resolution MSC.139(76) as from 0000 hours UTC on 1 December 2026.

ANNEX

DESCRIPTION OF THE MANDATORY SHIP REPORTING SYSTEM "IN THE ADRIATIC SEA" (ADRIREP)

1 CATEGORIES OF SHIPS REQUIRED TO PARTICIPATE IN THE SYSTEM

1.1 Ships of the following categories are required to participate in the system:

.1 all oil tanker ships of 150 gross tonnage and above;

.2 all ships of 10,000 gross tonnage and above; and

.3 all other ships, irrespective of their size, carrying on board hazardous cargo, in bulk or in package.

1.2 For the purpose of this system, the term "hazardous cargo", as defined in resolution MSC.433(98), means:

.1 goods classified in the International Maritime Dangerous Goods (IMDG) Code;

.2 substances classified in chapter 17 of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code) and chapter 19 of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code);

.3 oils as defined in MARPOL Annex I;

.4 noxious liquid substances as defined in MARPOL Annex II;

.5 harmful substances as defined in MARPOL Annex III; and

.6 radioactive materials specified in the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships (INF Code).

2 GEOGRAPHICAL COVERAGE OF THE SYSTEM AND THE NUMBER AND EDITION OF THE REFERENCE CHART USED FOR THE DELINEATION OF THE SYSTEM

2.1 The operational area of the mandatory ship reporting system covers the whole Adriatic Sea, north from the latitude 40° 25'.00 N, as shown in appendix 1, including positions and names of the competent shore-based authorities.

2.2 The reference charts including the operational area of the ADRIREP are the Italian Chart No.435 INT 306 of the Italian Navy Hydrographic Institute (Edition 1993, Datum ED-50) and the Croatian Chart No.101 of the Hydrographic Institute of the Republic of Croatia (First Edition 1998, New Edition 2005, New print 2017, Datum Bessel Ellipsoid).

3 FORMAT AND CONTENTS OF THE REPORT, TIMES AND GEOGRAPHICAL POSITIONS FOR SUBMITTING REPORTS, AUTHORITIES TO WHOM REPORTS SHALL BE SENT, AVAILABLE SERVICES

The formats for reporting are derived from the one attached as appendix to resolution A.851(20).

3.1 Sailing plan

3.1.1 The sailing plan (SP) of ADRIREP shall be sent to the competent authorities in accordance with the format shown in appendix 3.

3.1.2 The SP shall be sent in the following situations:

.1 when crossing northwards the latitude 40° 25'.00 N; and

.2 when leaving a port inside the area covered by the ADRIREP system.

3.1.3 When entering the Adriatic Sea by crossing northwards the parallel 40° 25'.00 N, the ship shall submit the SP to VTS Brindisi, which shall confirm its reception and make this information available to all other competent shore-based authorities.

3.1.4 When leaving a port inside the area covered by the ADRIREP system the ship shall submit the SP to the nearest competent shore-based authority of the country of the port of departure. The authority receiving this report shall confirm its reception and shall make this information available to other competent shore-based authorities.

3.1.5 The SP should be sent using the ship web-user interface of the Maritime Information and Exchange system (SafeSeaNet), established in accordance with Directive 2002/59/EC, as amended, or alternatively reported via radio on VHF channel or any other means of communication as specified for the competent shore-based authority receiving the report.

3.1.6 The sailing plan shall, as required, contain the following information, in order to meet the objectives of the ADRIREP:

- ship's name, call sign, IMO identification number and flag;
- date and time of the report;
- present position;
- course;
- speed;
- port of departure;
- destination and estimated time of arrival;
- route information (reported on a voluntary basis);
- ship's draught;
- information on hazardous cargo;
- ship agent or cargo agent;
- ship's type, deadweight, gross tonnage, length overall and breadth;
- total number of persons on board; and
- any other relevant information (brief details of incident, bunker fuel details, navigational status, SATCOM details, etc.).

3.1.7 In the last section of the SP, in accordance with provisions of SOLAS and MARPOL Conventions, ships shall also report information on any defect, damage, deficiency or limitations as well as, if necessary, information related to a pollution incident or loss of cargo. The possession of this information will enable the operators of the shore-based competent

authority to broadcast safety messages to other ships and to ensure more effective tracking of the trajectories of ships concerned.

3.2 Position report

3.2.1 The position report (PR) is considered as on demand report. This report is provided upon request from the competent shore-based authorities, and it is used to confirm the correctness of data provided in the sailing plan. Any competent shore-based authority of the ADRIREP interacting with the ships may request a PR. In addition, the PR shall be provided by the ship to the nearest competent shore-based authority whenever there are changes to the SP during the ship's voyage in the ADRIREP area.

3.2.2 The report will be requested on VHF channels by the competent shore-based authority in accordance with appendix 2. The ship may provide a response by any means of communication assigned to the competent shore-based authority receiving the report (if agreed).

3.2.3 The competent shore-based authorities can request a PR to confirm any information from the SP. The ship shall provide the PR to update the following designators: G, I, L, O, P, T, W and X. The competent shore-based authority requesting the position report shall confirm its reception and shall make this information available to other competent shore-based authorities.

3.3 Final report

3.3.1 The final report (FR) shall be sent in the following situations:

.1 when entering a port area or an anchorage area under the responsibility of the port within the ADRIREP area; or

.2 when leaving the area of the ADRIREP system (south from the latitude 40° 25'.00 N).

3.3.2 The ship shall submit the FR to the nearest competent shore-based authority of the port of arrival when entering a port inside the area covered by the ADRIREP system. The authority receiving the FR shall confirm the reception and shall make it available to other competent shore-based authorities.

3.3.3 The ship shall submit the FR to VTS Brindisi when leaving the area of the ADRIREP system (south from the latitude 40° 25'.00 N). The VTS Brindisi shall confirm the reception and shall make this information available to other competent shore-based authorities.

3.3.4 The FR should be submitted via the communication means assigned to the competent shore-based authority receiving the report.

3.3.5 The FR shall only include information that the vessel is leaving ADRIREP area and any relevant deviations from the SP.

3.4 Times and geographical position for submitting reports

3.4.1 Sailing the Adriatic Sea northwards

The ship shall submit the SP to the competent shore-based authority (VTS Brindisi) when entering the Adriatic Sea by crossing northwards the parallel 40° 25'.00 N.

3.4.2 Sailing the Adriatic Sea southward

3.4.2.1 The ship shall submit the SP to the nearest competent shore-based authority of the port of departure, when leaving a port inside the area covered by the ADRIREP system.

3.4.2.2 The ship shall submit the PR to the competent shore-based authorities, upon their requests. Any competent shore-based authority of the ADRIREP interacting with the ships may request/receive PRs. In addition, the PR shall be provided by the ship to the nearest competent shore-based authority whenever there are changes to the SP during the ship's voyage in the ADRIREP area.

3.4.2.3 The ship shall submit the FR to the competent shore-based authority (VTS Brindisi) when leaving the Adriatic Sea by crossing southward the parallel 40° 25'.00 N.

3.4.3 Crossing the Adriatic Sea

3.4.3.1 The ship shall submit the SP to the nearest shore-based authority of the port of departure, when departing from the port located in the area covered by the ADRIREP system.

3.4.3.2 The ship shall submit the PR to the competent shore-based authorities, upon their requests. Any competent shore-based authority of the ADRIREP interacting with the ships may request/receive PRs. In addition, the PR shall be provided by the ship to the nearest competent shore-based authority whenever there are changes to the SP during the ship's voyage in the ADRIREP area.

3.4.3.3 The ship shall submit an FR to the nearest competent shore-based authority of the port of arrival, when entering a port inside the area covered by the ADRIREP system.

3.4.4 Special cases

3.4.4.1 The ADRIREP reports for the ships arriving or departing from a port in Bosnia and Herzegovina will be made automatically available to Bosnia and Herzegovina.

3.4.4.2 The ADRIREP reports for the ships leaving the Adriatic Sea by crossing southward the parallel 40° 25'.00 N will be made automatically available to Greece.

3.5 Authorities to whom the reports should be sent

The ships participating in the system shall submit the report to the shore-based authorities as in appendix 2.

3.5.1 Available means of communication

3.5.1.1 Ships participating in the system shall submit reports by electronic means using the SafeSeaNet system, as a primary means of reporting or via the alternative means assigned to the competent shore-based authority, as agreed.

3.5.1.2 The SafeSeaNet Web-user interface for electronic ship reporting shall be used to submit and view ADRIREP reports and to check competent shore-based authority responses to these reports.

3.5.1.3 By using the SafeSeaNet, the ships will have access to information available about their ship and can reuse available information when creating a new report.

3.5.1.4 The SafeSeaNet Web-user interface for electronic ship reporting can be accessed at: https://adrirep.emsa.europa.eu.

4 INFORMATION TO BE PROVIDED TO SHIPS AND PROCEDURES TO BE FOLLOWED

The competent shore-based authority shall confirm the reception of report and make it available to other shore-based authorities of the system.

5 COMMUNICATION REQUIRED FOR THE SYSTEM, FREQUENCIES ON WHICH REPORTS SHOULD BE TRANSMITTED AND INFORMATION TO BE REPORTED

5.1 The ADRIREP ship reporting system is based on electronic reporting using the SafeSeaNet system.

5.2 Alternate (backup) methods of reporting are available if the SafeSeaNet system is not available, as indicated in appendix 2.

5.3 The radio call to the appropriate shore-based authority shall be made on the VHF channel assigned to that authority as per appendix 2. The ships sailing within the system area are obliged to use VHF channels assigned to the appropriate shore-based authority of the system.

5.4 The language used for voice communication shall be English, using the IMO Standard Marine Communications Phrases.

6 RULES AND REGULATIONS IN FORCE IN THE AREA OF THE SYSTEM

The International Regulations for Preventing Collisions at Sea (COLREGs) are applicable throughout the whole area covered by the system.

7 SHORE-BASED FACILITIES TO SUPPORT OPERATION OF THE SYSTEM

.1 VTS Durres (Albania):
- reporting by electronic means (SafeSeaNet)
- email
- telephone
- VHF communication

.2 VTS Croatia (Croatia):
- reporting by electronic means (SafeSeaNet)
- email
- telephone
- VHF communication

.3 VTS Brindisi (Italy):
- reporting by electronic means (SafeSeaNet)
- email
- telephone
- VHF communication

.4 Ancona Coast Guard (Italy):
- reporting by electronic means (SafeSeaNet)
- email
- telephone

- VHF, MF/HF communication

.5 VTS Venezia (Italy):
- reporting by electronic means (SafeSeaNet)
- email
- telephone
- VHF, MF/HF communication

.6 VTS Trieste (Italy):
- reporting by electronic means (SafeSeaNet)
- email
- telephone
- VHF, MF/HF communication

.7 VTS Bari (Italy):
- reporting by electronic means (SafeSeaNet)
- email
- telephone
- VHF, MF/HF communication

.8 Pescara Coast Guard (Italy):
- reporting by electronic means (SafeSeaNet)
- email
- telephone
- VHF, MF/HF communication

.9 Ravenna Coast Guard (Italy):
- reporting by electronic means (SafeSeaNet)
- email
- telephone
- VHF, MF/HF communication

.10 MRCC Bar (Montenegro):
- reporting by electronic means (SafeSeaNet)
- email
- telephone
- VHF communication

.11 MRCC Koper (Slovenia):
- reporting by electronic means (SafeSeaNet)
- email
- telephone
- VHF communication

8 ALTERNATIVE COMMUNICATION IF THE COMMUNICATION FACILITIES OF THE SHORE-BASED AUTHORITIES FAIL

8.1 The system is designed with sufficient system redundancy to cope with normal SafeSeaNet system failure.

8.2 Each shore-based facility is equipped with VHF band communication capabilities, as indicated in appendix 2; in addition to that, in case of failing contacts by VHF, the shore-based authorities can operate and be contacted through phone, Inmarsat-C and MF/HF facilities. In order to ensure the continuous 24-hour activity, the shore-based facilities have been located

and manned with properly trained and dedicated personnel in the respective national MRCCs/MRSCs/VTSs. Should a shore-based authority suffer an irretrievable breakdown and call off itself from the system until the failure is repaired, it could be relieved by one of the adjacent shore-based authorities.

8.3 In case of voice communication, the ships shall provide the information as requested by the competent shore-based authority.

9 MEASURES TO BE TAKEN IF A SHIP FAILS TO COMPLY WITH THE REQUIREMENTS OF THE SYSTEM

The primary objective of the system is to support the safe navigation and the protection of the marine environment through the exchange of information between the ship and the shore. If a ship does not submit reports and can be positively identified, then information will be passed to the competent flag State authorities for investigation and possible prosecution in accordance with national legislation. Information will also be passed to port State control inspectors.

APPENDIX 1

OPERATIONAL AREA OF ADRIREP

APPENDIX 2

CONTACT DETAILS OF ADRIREP AUTHORITIES

Country	Competent shore-based authority name identifier	LOCATION	VHF CHANNEL	Phone	Email
Albania	VTS DURRES	Durres	CH 15 CH 16	+35552706970	kapiteneria.durres@dpdetare.gov.al
Croatia	VTS CROATIA	Dubrovnik, Split, Rijeka	CH 10	+38551 312300	vts3@pomorstvo.hr
Italy	VTS BRINDISI	Brindisi	CH 10	+39 0831 590219	so.cpbrindisi@mit.gov.it
Italy	ANCONA COAST GUARD	Ancona	CH 10	+39 071 502101	so.cpancona@mit.gov.it
Italy	VTS VENEZIA	Venezia	CH 9	+39 041 240 5706	so.cpvenezia@mit.gov.it
Italy	VTS TRIESTE	Trieste	CH 11	+39 040 676616	so.cptrieste@mit.gov.it
Italy	VTS BARI	Bari	CH 14	+39 080 5281544	so.cpbari@mit.gov.it
Italy	PESCARA COAST GUARD	Pescara	CH 14	+39 085 9189800	so.cppescara@mit.gov.it
Italy	RAVENNA COAST GUARD	Ravenna	CH 14	+39 0544 443013	so.cpravenna@mit.gov.it
Montenegro	MRCC BAR	Bar	CH 12	+38267642179	barradio@pomorstvo.me
Slovenia	MRCC KOPER	Koper	CH 12	+38656632106 +38656632107 +38656632108	koper.mrcc@gov.si kp.promet@gov.si

APPENDIX 3

FORMAT OF "ADRIREP" SHIP REPORTING SYSTEM SAILING PLAN

	Message identifier:	- ADRIREP
	Type of report	- SP (Sailing plan) - PR (Position report) - FR (Final report)
A	Ship	- Ship's name, call sign, IMO identification number and flag
B	Date/time (UTC) of the report	- A 6-digit group giving date of month (first 2 digits), hours and minutes (last 4 digits) for example - DDHHMM
C	Present position	- A 4-digit group giving latitude in degrees and minutes suffixed with "N" or "S" and a 5-digit group giving longitude in degrees and minutes suffixed with "E" or "W"
E	Course	- A 3-digit group giving the course in degrees
F	Speed	- A 3-digit group giving a speed in knots (Speed in knots and tenths of knots)
G	Port of departure	- LoCode or name of port of departure
I	Destination and estimated time of arrival	- ETA in UTC expressed as in B above, followed by LoCode or Name of port of destination
L	Route information	To be reported on a voluntary basis by ships sharing their voyage plan in electronic format-
O	Draught of the vessel	- draught expressed by a 4-digit group indicating centimetres
P	Cargo information	- The general category of hazardous cargo as described in resolution MSC.433(98) and shown in paragraph 1.2 of this document
T	Agent	- Ship agent or Cargo agent
U	Size and type	- Ship's type, expressed by 2 digits AIS code - Deadweight, expressed by 6 digits group indicating tonnes - Gross tonnage, expressed by 6 digits group indicating tonnes - Length overall, expressed by 3 digits group indicating meters - Breadth, expressed by 3 digits group indicating meters. Example: U/31/020000T/030000T/150M/045M
W	Total number of persons on board	- The total number of crew and other persons on board
X	Miscellaneous	Any other relevant information, including: - Bunker fuel details (characteristics and estimated quantity) - Navigational Status - SATCOM (ship's satellite communications available) - Brief details of incidents (if any)

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ANNEX 28

RESOLUTION MSC.314(88)/REV.1
(adopted on 22 May 2026)

MANDATORY SHIP REPORTING SYSTEM
"IN THE SOUND BETWEEN DENMARK AND SWEDEN" (SOUNDREP)

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO regulation V/11 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, concerning the adoption of mandatory ship reporting systems by the Organization,

RECALLING FURTHER resolution A.858(20), which authorizes the Committee to perform the function of adopting ship reporting systems on behalf of the Organization,

TAKING INTO ACCOUNT the *Guidelines and criteria for ship reporting systems* adopted by resolution MSC.433(98),

HAVING CONSIDERED the recommendations of the Sub-Committee on Navigation, Communications and Search and Rescue, at its twelfth session,

1 ADOPTS, in accordance with SOLAS regulation V/11, the revised mandatory ship reporting system "In the Sound between Denmark and Sweden" (SOUNDREP), described in the annex to the present resolution, which revises in its entirety the existing text of the annex to resolution MSC.314(88);

2 DECIDES that the said revised mandatory ship reporting system will be implemented at 0000 hours UTC on 1 December 2026;

3 REQUESTS the Secretary-General to bring this resolution and its annex to the attention of Member States and Contracting Governments to the 1974 SOLAS Convention;

4 REVOKES resolution MSC.314(88) as from 0000 hours UTC on 1 December 2026.

ANNEX

DESCRIPTION OF THE MANDATORY SHIP REPORTING SYSTEM "IN THE SOUND BETWEEN DENMARK AND SWEDEN" (SOUNDREP)

1 Categories of ships required to participate in the system

1.1 Ships participating in the ship reporting system:

Ships of 300 gross tonnage and upwards proceeding to or from ports or anchorages in the Sound or passing through the reporting area.

Pursuant to the International Convention for the Safety of Life at Sea (SOLAS), 1974, the mandatory ship reporting system "In the Sound between Denmark and Sweden" (SOUNDREP) does not apply to warships, naval auxiliaries, other ships owned or operated by a Contracting Government and used only on Government non-commercial service. However, such ships are encouraged to participate in the reporting system.

2 Geographical coverage of the system and the number and edition of the reference chart used for delineation of the system

2.1 SOUNDREP is operated by Sound VTS. The call sign is "Sound Traffic".

2.2 The operational area of SOUNDREP covers the northern, central and southern part of the Sound as shown on the chartlet given in appendix 1. The area includes the routeing systems, in the north traffic separation scheme (TSS) "In the Sound" and in the south TSS "Off Falsterbo", both adopted by the Organization.

2.2.1 Report and border line North

Denmark:

(1)	56° 06´.58 N	012° 11´.00 E	(Rågeleje)
(2)	56° 14´.00 N	012° 11´.00 E	(At sea North of Rågeleje)

Sweden:

(3)	56° 18´.08 N	012° 17´.39 E	(At sea West of Kullen)
(4)	56° 18´.08 N	012° 26´.88 E	(Kullen Light House)

2.2.2 Report and border line South

Denmark:

(5)	55° 17´.44 N	012° 27´.28 E	(Stevns Light House)
(6)	55° 10´.00 N	012° 27´.28 E	(At sea South of Stevns)

Sweden:

(7)	55° 10´.00 N	012° 54´.50 E	(At sea South of Falsterbo)

2.2.3 Report and border line East

Sweden:

(7)	55° 10´.00 N	012° 54´.50 E	(At sea South of Falsterbo)
(8)	55° 22´.89 N	013° 01´.93 E	(Fredshög)

2.2.4 Report and border line West

Denmark:

(9)	55° 19´.81 N	012° 27´.30 E	(Mandehoved)
(10)	55° 33´.28 N	012° 35´.53 E	(Aflandshage)

2.2.5 Sector division

The SOUNDREP area is divided into two sectors at latitude 55° 50´.00 N: sector 1 northerly and sector 2 southerly. Each sector has an assigned VHF channel as shown in appendix 2.

2.3 The reference charts (Datum: World Geodetic System 1984 (WGS 84)), which include the operational area of SOUNDREP, are:

.1 Danish charts Nos.102 (7th edition May 2009), 104 (5th edition Aug 2009), 131 (1st edition Nov 2008), 132 (19th edition Aug 2009) and 133 (13th edition Sep 2009); and

.2 Swedish charts Nos.921 (4th edition 2009) and 922 (22nd edition 2009).

3 Format, content of reports, times and geographical positions for submitting reports, authority to whom reports should be sent and available services

3.1 Procedures of reporting

3.1.1 The SOUNDREP report must be initiated (see paragraph 3.1.4) to Sound VTS using VHF voice transmission. However, ships can fulfil most of the reporting requirements of the reporting system by the use of non-verbal means such as Automatic Information System (AIS) class A, as approved by the Organization, and by email or other alternative methods, prior to entering the ship reporting area (see also paragraph 3.4.1, Note (c)). Additional details are given in appendix 3. For contact information see appendix 2.

3.1.2 The use of correct and updated AIS information can accomplish the reporting requirements for designators A (part of), B, C, E, F, I, O, P and W.

3.1.3 Email or other alternative methods prior to entering the ship reporting area, can accomplish the reporting requirements for designators L, T and X. Such non-verbal partly report must also state designator A (see also paragraph 3.4.1, note (c)). Additional details are given in appendix 3. Information on Liability certificates may be presented by the company as defined by SOLAS regulation IX/1.2.

3.1.4 A ship which fulfils the reporting requirements of the SOUNDREP mandatory ship reporting system, by the use of non-verbal means, must as a minimum carry out a VHF voice transmission to communicate the name of the ship (part of designator A) and the report line of entry, to the Sound VTS when actually entering the area. The same procedure must be followed before departing a port or leaving an anchorage in the SOUNDREP area. Additional details are given in appendix 3.

3.1.5 Designators U and Q, if applicable, shall at all times be given using VHF voice transmission to Sound VTS when entering the area. Additional details are given in appendix 3.

3.1.6 To prevent overloading the VHF channels for reporting by verbal voice transmissions and to avoid interference with essential navigational duties, and by this hampering the safety of navigation in the area, a ship unable to accomplish the reporting requirements for designators L, T and X by email or other alternative methods prior to entering the ship reporting area, can report these designators by the use of radio telephone or mobile phone to Sound VTS. Designator A must additionally be included in this part reporting.

3.2 Verbal reporting is not required when a ship is passing the SOUNDREP sector line at latitude 55° 50´.00 N. However, change of VHF frequency is required according to appendix 2.

3.3 Format

The mandatory ship report shall be drafted in accordance with the format shown in appendix 3. The information requested from ships is derived from the Standard Reporting Format shown in paragraph 2 of the appendix to resolution A.851(20).

3.4 Content

A report from a ship to the SOUNDREP by non-verbal means or by voice transmission must contain the following information:

A Name of the ship, call sign and if available IMO identification number and MMSI.

B Date and time

C Position expressed in latitude and longitude

E True course

F Speed

I Destination and ETA

L Route information on the intended route through the Sound

O Maximum present draught

P Cargo; and quantity and IMO class of dangerous goods, if applicable (see note (c) below)

Q Defects and deficiencies or other limitations

T Contact details for the communication of cargo information (see note (c) below)

U Air draught when exceeding 35 metres W Total number of persons on board

X
- Type and estimated quantity of bunker fuel, for ships of 1,000 gross tonnage and above
- One or more Convention certificates of insurance issued by a party to the Conventions and carried on board the ship, providing evidence of existence of insurance for maritime claims, as well as civil liability certificates, as applicable, issued in accordance with:

- the International Convention on Civil Liability for Oil Pollution Damage, 1992, as amended (1992 Civil Liability Convention);
- the International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 (2001 Bunkers Convention); and,
- the Nairobi International Convention on the Removal of Wrecks, 2007 (2007 Nairobi WRC).

Note:

(a) On receipt of a report, operators of the Sound VTS will establish the relation to the ship's position and the information supplied by the facilities available to them.

(b) The master of the ship must forthwith inform the Sound VTS concerned of any change to the information notified, including designator Q.

(c) Information on dangerous cargo and contact details for the communication of cargo information (designator P and T of the reporting format) is only requested when such information has not been notified to the competent authority via SafeSeaNet in an European Union (EU) Member State in accordance with the requirements of Article 13 (for ships leaving or entering an EU port) in Directive 2002/59/EC on establishing Community vessel traffic monitoring and information system and amended by Directive 2009/17/EC, prior to entering the operational SOUNDREP area. Additional details are given in appendix 3.

3.5 Geographical position for submitting reports

3.5.1 Ships entering the SOUNDREP operational area shall submit a report when crossing the entrance lines or on departure from a port or anchorage within the operational area.

3.5.2 Further reports should be made whenever there is a change in navigational status or circumstance, particularly in relation to designator Q the reporting format.

3.6 Crossing traffic

Recognizing that ferries crossing between Helsingør and Helsingborg operate according to published schedules special reporting arrangements can be made on a ship to ship basis. Ferries leaving the ports Helsingør in Denmark and Helsingborg in Sweden operating according to published schedules are normally not requested to report to the Sound VTS.

3.7 Authority

The VTS Authority for the SOUNDREP is Sound VTS with call sign "Sound Traffic". Additional details are given in appendix 2.

4 Information to be provided to ships and procedures to be followed

4.1 Ships are required to keep a continuous listening watch in the area on the relevant VHF sector channel and VHF channel 16.

4.2 Sound VTS will provide information service to shipping about specific and urgent situations, which could cause conflicting traffic movements as well as other information concerning safety of navigation for instance, information about weather, current, ice, water level, navigational problems or other hazards.

4.2.1 If necessary, Sound VTS can provide individual information to a ship particularly in relation to positioning and navigational information or local conditions by using the IMO Standard Marine Communication Phrases (SMCP), section A1/6 for VTS message markers. The message markers can be of ADVICE, WARNING, INFORMATION, QUESTION, ANSWER, REQUEST and INTENTION.

4.2.2 Information of general interest to shipping in the area will be broadcast by Sound VTS on VHF channel as specified by the VTS operator or will be given on request. A broadcast will be preceded by an announcement on VHF channel 16. All ships navigating in the area should listen to the announced broadcast.

4.3 If a ship needs to anchor owing to breakdown, low visibility, adverse weather, changes in the indicated depth of water, etc., Sound VTS can recommend suitable anchorages or other place of refuge within the operational area.

5 Communication required for the SOUNDREP system

5.1 The language used for communication shall be English, using IMO Standard Marine Communication Phrases, where necessary.

5.2 Details of communication and contact information are given in appendix 2.

6 Rules, regulations and recommendation in force in the area of the system

6.1 Regulations for preventing collisions at sea

The International Regulations for Preventing Collisions at Sea (COLREG) are applicable throughout the operational area of SOUNDREP.

6.2 Traffic separation scheme "In the Sound"

The Traffic separation scheme *"*In the Sound*"*, situated to the north in the narrows of the Sound, as adopted by the Organization, and rule 10 of the International Regulations for Preventing Collisions at Sea therefore applies.

6.3 Traffic separation scheme "Off Falsterbo"

The separation scheme "Off Falsterbo" situated in the southern part of the Sound, as adopted by the Organization, and rule 10 of the International Regulations for Preventing Collisions at Sea therefore applies.

6.4 IMO Recommendation on Navigation through the entrances to the Baltic Sea – The Sound

SN.1/Circ.263, section 1.9 and IMO publication on Ships' Routeing, part C, on Amendments to Recommendation on Navigation through the entrances to the Baltic Sea, adopted at MSC 83 in October 2007, recommends for the Sound that loaded oil tankers with a draught of 7 metres or more, loaded chemical tankers and gas carriers, irrespective of size, and ships carrying a shipment of irradiated nuclear fuel, plutonium and high-level radioactive wastes (INF Code

materials), when navigating the Sound between a line connecting Svinbådan Lighthouse and Hornbæk Harbour and a line connecting Skanör Harbour and Aflandshage should use the pilotage services established by the Governments of Denmark and Sweden.

6.5 Mandatory pilotage

Harbours within the SOUNDREP area are covered by provisions about mandatory pilotage for certain ships bound for or coming from Danish and Swedish ports.

6.6 Air draught when exceeding 35 metres

6.6.1 The navigable Drogden channel is located beside a major airport. In order to ensure safety of navigation in the dredged channel of Drogden and to reduce the risk of collision between an aircraft that serves the airport and a ship or other floating equipment, a reporting obligation has been established. Additional details are given in appendix 3, designator U.

6.6.2 The safety procedure that has been established is that for all ships, including ships with a tow, with an air draught exceeding 35 metres, Sound VTS shall notify the air traffic control stating the maximum air draught of the ship or floating equipment. The notification shall be given at least 30 minutes prior to the expected time (UTC) for passage of:

.1 Nordre Røse lighthouse at position 55° 38´.17 N, 012° 41´.21 E; and

.2 light buoy No.9 at position 55° 36´.15 N, 012° 41´.79 E.

6.6.3 Sound VTS will transfer the information to the air traffic control.

7 Shore-based facilities to support the operation of the system

7.1 System capability

7.1.1 The Sound VTS centre is situated at Malmö, Sweden.

7.1.2 The Sound VTS system comprises several remote sensor sites. The sites provide surveillance of the SOUNDREP area using a combination of radar and AIS. An integrated network of ten radar sensors integrated with AIS provides surveillance of the area.

7.1.3 All the sensors mentioned below will be controlled or monitored by the VTS operators.

7.1.4 Recording equipment automatically stores information from all tracks, which can be replayed. In case of incidents, the VTS authority can use records as evidence. VTS operators have access to different ship registers, pilot information and hazardous cargo data.

7.1.5 An integrated database is available for the operators in handling information.

7.2 Radar and other sensors

Information necessary to evaluate the traffic activities within the operational area of SOUNDREP is compiled via remotely controlled sensors comprising:

.1 Sensors for water level and current at Drogden and Flintrännan;

.2 High-resolution radar systems; and

.3 VHF communications systems including DSC call (see appendix 2).

7.3 Radio communication equipment

Redundant VHF system with DSC functionality (see appendix 2).

7.4 AIS facilities

Sound VTS is linked to both the Danish and Swedish national shore-based AIS network and can continually receive messages broadcast by ships with transponders to gain information on their identity and position. The information is displayed as part of the VTS system and covers the ship reporting area.

7.5 Personnel qualifications and training

7.5.1 The VTS centre is staffed with personnel all educated and experienced as officers in charge of navigational watch according to national and international requirements.

7.5.2 Training of VTS personnel will meet the standards recommended by IMO in MSC.1/Circ.1065/Rev.1 on *IALA Standards for training and certification of vessel traffic service (VTS) personnel*.

7.5.3 Refresher training is carried out on a regular basis.

8 Information concerning the applicable procedures if the communication facilities of shore-based Authority fail

8.1 The system is designed with sufficient system redundancy to cope with normal equipment failure.

8.2 In the event of radio communication system failure at the VTS centre, communication will be maintained via a redundant standby VHF system. If the radar system or other essential equipment suffers a breakdown, information of reduced operational capability will be given by Sound VTS or as national navigational warnings.

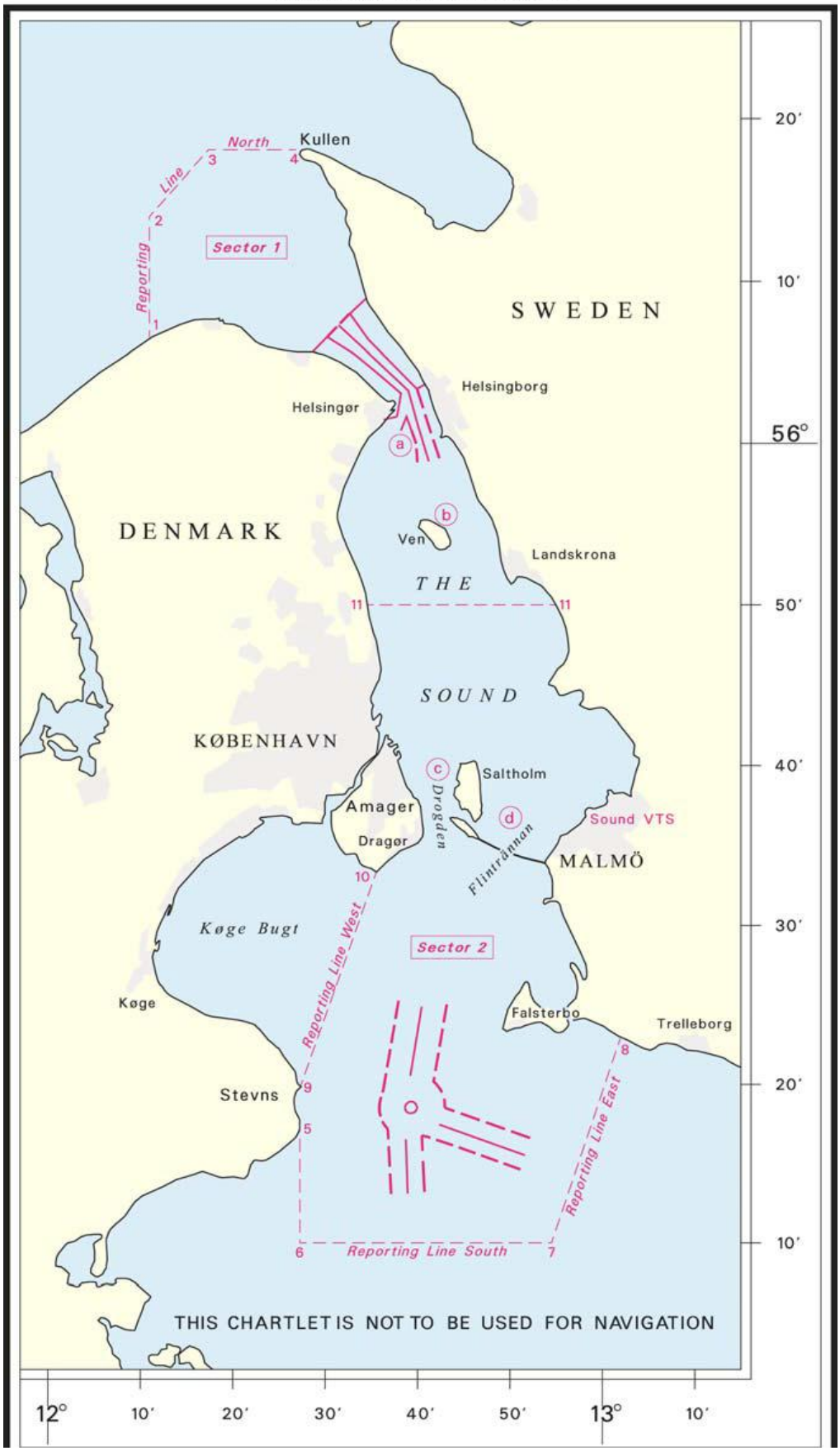
9 Measures to be taken if a ship fails to comply with the requirements of the system

9.1 The objective of the VTS Authority is to facilitate the exchange of information between the shipping and the shore in order to ensure safe passages of the bridges, support safety of navigation and the protection of the marine environment.

9.2 All means will be used to encourage and promote the full participation of ships required to submit reports under SOLAS regulation V/11. If reports are not submitted and the offending ship can be positively identified, then information will be passed to the relevant flag State authority for investigation and possible prosecution in accordance with national legislation. Information will also be made available to port State control inspectors. With regard to Liability certificates, this action should be taken only if the flag State is party to the relevant Conventions.

APPENDIX 1

SOUNDREP Operational Area



APPENDIX 2

CONTACT INFORMATION AND ASSIGNED VHF CHANNELS FOR SECTORS IN THE MANDATORY SHIP REPORTING SYSTEM "IN THE SOUND BETWEEN DENMARK AND SWEDEN" (SOUNDREP)

SOUNDREP, radio call sign:	**"Sound Traffic"**

VHF Channels	Operational use
VHF Channel 73	Sound VTS – Sector 1 North
VHF Channel 71	Sound VTS – Sector 2 South
VHF Channel 79	Sound VTS – Broadcast 1, individual assistance
VHF Channel 68	Sound VTS – Broadcast 2, individual assistance and reserve channel

The Sound VTS operating SOUNDREP is located in Malmö, Sweden:

H24 contact information:

1 Sound VTS is monitoring VHF channels 73, 71 and 16 continuously.
2 Duty officer phone: +46 40 20 43 17 or +46 40 20 43 34
3 Fax: +46 40 20 43 45
4 Email: contact@soundvts.org

Address:

Sound VTS
Hans Michelsensgata 9
Box 855
S-201 80 Malmö Sweden

APPENDIX 3

DRAFTING OF REPORTS TO THE MANDATORY SHIP REPORTING SYSTEM "IN THE SOUND BETWEEN DENMARK AND SWEDEN" (SOUNDREP)

Designator	AIS	Function	Information required
A	Yes, and VHF	Ship	Name of the ship (VHF); call sign and if available IMO identification number and MMSI number (AIS)
B	Yes	Date and time of event	A 6-digit group event giving day of month and hours and minutes in Universal Co-ordinated Time (UTC).
C	Yes	Position	A 5-digit group giving latitude in degrees and minutes, decimal, suffixed with N and a 6-digit group giving longitude in degrees and minutes, decimal, suffixed with E.
E	Yes	True course	A 3-digit group
F	Yes	Speed in knots and tenths of knots	A 3-digit group
I	Yes	Destination and ETA	The name of the next port of call given in UN LOCODE. For details see in IMO SN.1/Circ.244/Rev.1 and; www.unece.org/cefact/locode/service/main.htm. Date and time group expressed as in (B)
L	No	Route information	A brief description of the intended route as planned by the master. Ships navigating in The Sound have options on deciding the route in the following areas (see appendix 1); a) Disken shoal b) Ven island c) Drogden channel d) Flintrännan channel The route information should be given coded by using the following local designators: • DW – Disken, west of • DE – Disken, east of • VW – Ven, west of • VE – Ven, east of • D – Drogden • F – Flintrännan See examples below.
O	Yes	Maximum present draught in metres	A 2-digit or 3-digit group giving the present maximum draught in metres (e.g.: 6.1 or 10.4)
P	Yes	Cargo on board	Cargo; and quantity and IMO class of dangerous goods, if applicable. (see 3.4.1, note c)

Designator	AIS	Function	Information required
Q	VHF	Defects and deficiencies or other limitations	Details of defects and deficiencies affecting the equipment of the ship or any other circumstances affecting normal navigation and manoeuvrability.
T	No	Ship's representative and or owner	Address and particulars from which detailed information on the cargo may be obtained.
U	VHF	Ship's size	Information of maximum air draught when exceeding 35 metres, required for all ships, including ships towing or other floating equipment. This information shall be given by voice transmissions when entering the SOUNDREP area, irrespective of, if the information is also given by, e.g. AIS; details in paragraph 6.6.
W	Yes	Total number of persons on board	State number.
X	No	Miscellaneous	-Type and estimated quantity of bunker fuel, for ships of 1,000 gross tonnage and above. - One or more Convention certificates of insurance issued by a party to the Conventions and carried on board the ship, providing evidence of existence of insurance for maritime claims, as well as civil liability certificates, as applicable, issued in accordance with: • the International Convention on Civil Liability for Oil Pollution Damage, 1992, as amended (1992 Civil Liability Convention); • the International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 (2001 Bunkers Convention); and, • the Nairobi International Convention on the Removal of Wrecks, 2007 (2007 Nairobi WRC).

Examples of routes as given under designator L

A northbound ship leaving Malmö Port planning to sail, east of Ven, TSS In the Sound (UN LOCODE format for Malmö Port is SE MMA):

L: SE MMA, VE

A southbound ship in transit planning to sail TSS In the Sound, east of Disken, west of Ven, Drogden channel and TSS Off Falsterbo:

L: DE, VW, D

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ANNEX 29

RESOLUTION MSC.332(90)/REV.1
(adopted on 22 May 2026)

MANDATORY SHIP REPORTING SYSTEM
"IN THE STOREBÆLT (GREAT BELT) TRAFFIC AREA" (BELTREP)

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO regulation V/11 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, concerning the adoption of mandatory ship reporting systems by the Organization,

RECALLING FURTHER resolution A.858(20), which authorizes the Committee to perform the function of adopting ship reporting systems on behalf of the Organization,

TAKING INTO ACCOUNT the *Guidelines and criteria for ship reporting systems* adopted by resolution MSC.433(98),

HAVING CONSIDERED the recommendations of the Sub-Committee on Navigation, Communications and Search and Rescue, at its twelfth session,

1 ADOPTS, in accordance with SOLAS regulation V/11, the revised mandatory ship reporting system "In the Storebælt (Great Belt) traffic area" (BELTREP), described in the annex to the present resolution, which revises in its entirety the existing text of the annex to resolution MSC.332(90);

2 DECIDES that the said revised mandatory ship reporting system will be implemented at 0000 hours UTC on 1 December 2026;

3 REQUESTS the Secretary-General to bring this resolution and its annex to the attention of Member States and Contracting Governments to the 1974 SOLAS Convention;

4 REVOKES annex 1 to resolution MSC.63(67), and resolution MSC.332(90), as from 0000 hours UTC on 1 December 2026.

ANNEX

DESCRIPTION OF THE MANDATORY SHIP REPORTING SYSTEM "IN THE STOREBÆLT (GREAT BELT) TRAFFIC AREA" (BELTREP)

1 Categories of ships required to participate in the system

1.1 Ships passing through or proceeding to and from ports and anchorages in the BELTREP area are required to participate in the ship reporting system as follows:

.1 ships with a gross tonnage of 50 and above;

.2 all ships with an air draught of 15 m or more; and

.3 pleasure craft with a length less than 15 m or with a gross tonnage less than 50 are exempted from participation.

2 Geographical coverage of the system and the number and edition of the reference chart used for delineation of the system

2.1 The mandatory ship reporting system "In the Storebælt (Great Belt) traffic area" (BELTREP) is operated by Great Belt VTS. The call sign is "Belt Traffic".

2.2 The operational area of BELTREP covers the central and northern part of the Storebælt (Great Belt) and the Hatter Barn area north of Storebælt (Great Belt) at the entrance to the Baltic Sea, as shown below and on the chartlet given in appendix 1-A. The area includes the routeing systems at Hatter Barn, in the Storebælt (Great Belt) area and Langelandsbælt, all adopted by the Organization. The BELTREP area also includes the central part of route Tango. Datum: World Geodetic System 1984 (WGS 84):

2.2.1 Report- and borderline West (RW)

Fyn:	1)	55° 36′.00 N, 010° 38′.00 E (Korshavn)
Samsø:	2)	55° 47′.00 N, 010° 38′.00 E (East coast of Samsø)

2.2.2 Report- and borderline North (RN)

Samsø:	2)	55° 47′.00 N, 010° 38′.00 E (East coast of Samsø)
	3)	56° 00′.00 N, 010° 56′.00 E (At sea near Marthe Flak)
Sjælland:	4)	56° 00′.00 N, 011° 17′.00 E (Sjællands Odde)

2.2.3 Report- and borderline South (RS)

Stigsnæs:	5)	55° 12′.00 N, 011° 15′.40 E (Gulfhavn)
Omø:	6)	55° 08′.40 N, 011° 09′.00 E (Ørespids, Omø)
	7)	55° 05′.00 N, 011° 09′.00 E (At sea south of Ørespids)
Langeland E:	8)	55° 05′.00 N, 010° 56′.10 E (Snøde Øre)

2.2.4 Report- and borderline Southwest (RSW)

Langeland W:	9)	55° 00′.00 N, 010° 48′.70 E (South of Korsebølle Rev)
Thurø Rev:	10)	55° 01′.20 N, 010° 44′.00 E (Thurø Rev Light buoy)

2.2.5 Sector division

The BELTREP area is divided into two sectors at latitude 11) 55°35′.00 N; sector 1 northerly and sector 2 southerly. Each sector has an assigned VHF channel as shown in appendix 2.

2.3 The reference charts (Datum: World Geodetic System 1984, WGS 84), which include the operational area of BELTREP, are Danish charts nos. 112 (15th edition 2010), 128 (10th edition 2009), 141 (21st edition 2010), 142 (18th edition 2010), 143 (19th edition 2009) and 160 (7th edition 2007).

3 Format, content of reports, times and geographical positions for submitting reports, authority by whom reports should be sent and available services

3.1 *Procedures of reporting*

3.1.1 All BELTREP reports must be made to Great Belt VTS using VHF voice transmissions. However, ships are encouraged to fulfil certain reporting requirements of the reporting system by the use of correct and updated Automatic Identification System (AIS) information class A, as approved by the Organization, and by non-verbal means such as email or similar, prior to entering the ship reporting area. Details are given in appendix 3.

3.1.2 The use of correct and updated AIS information can accomplish the reporting requirements for designators A, B, C, E, F, G and I, O and W. Details are given in appendix 3.

3.1.3 To minimize the time reporting on the VHF radio channels and to avoid interference with essential navigational duties, ships are encouraged to forward the reporting requirements for designators L, P, T and X by email or similar prior to entering the ship reporting area. Such non-verbal partial reports must also state designators A and H. Reporting designators L, P, T and X prior to entry using mobile phone is also accepted as a means of communication. Details are given in sub-paragraph 3.5 and appendix 3. Information on liability certificates may be presented by the company as defined by SOLAS regulation IX/1.2.

3.1.4 A ship which fulfils the reporting requirements of the BELTREP mandatory ship reporting system by the use of correct and updated AIS information and prior non-verbal means must, as a minimum, carry out a VHF voice transmission to communicate the name of the ship (part of designator A), air draught and deadweight tonnage (designator U) and the report line of entry to the Great Belt VTS when actually entering the area. The same procedure must be followed before departing a port or leaving an anchorage in the BELTREP area. Details are given in appendix 3.

3.1.5 Designator Q or R, if applicable, shall at all times be given using VHF voice transmission to Great Belt VTS. Details are given in appendix 3.

3.2 Verbal reporting is not required when a ship passes the BELTREP sector line at latitude 55° 35′.00 N. However, sector change of VHF frequency is required according to appendix 2.

3.3 *Format*

The mandatory ship report shall be drafted in accordance with the format shown in appendix 3. The information requested from ships is derived from the Standard Reporting Format shown in paragraph 2 of the appendix to resolution A.851(20).

3.4 ***Content***

3.4.1 A report from a ship to BELTREP by AIS, non-verbal means or by voice transmission or combinations thereof must contain the following information; details are given in appendix 3:

A name of the ship, call sign, MMSI and, if available, IMO identification number;

B date and time;

C position expressed in latitude and longitude;

E true course;

F speed;

G and I last port of call, destination and ETA;

H date, time (UTC) and report line of entry into the BELTREP area;

L route information on the intended route through the BELTREP area;

O maximum present draught;

P cargo and, if dangerous goods are present on board, quantity and IMO class. Dangerous goods information must be summarized in total tonnes per IMO class;

Q or R defects, deficiencies, limitations – pollution or dangerous goods lost overboard;

T address for the communication of cargo information;

U air draught, deadweight tonnage;

W total number of persons on board; and

X
- type and estimated quantity of bunker fuel, for ships of 1,000 GT and above. Must be summarized in total tonnes per type.
- One or more Convention certificates of insurance issued by a party to the Conventions and carried on board the ship, providing evidence of existence of insurance for maritime claims, as well as civil liability certificates, as applicable, issued in accordance with:
  - the International Convention on Civil Liability for Oil Pollution Damage, 1992, as amended (1992 Civil Liability Convention);
  - the International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 (2001 Bunkers Convention); and,
  - the Nairobi International Convention on the Removal of Wrecks, 2007 (2007 Nairobi WRC).

Note:

a) The master of the ship must forthwith inform the Great Belt VTS concerned of any change in navigational status or in previous information notified, particularly in relation to designator Q or R.

3.5 *Geographical position for submitting reports*

3.5.1 Ships entering the BELTREP operational area shall submit a report when crossing the report line or on departure from a port or anchorage within the operational area.

3.5.2 Previously forwarded reports can be submitted at any time after entering the Danish Exclusive Economic Zone (EEZ) and until in reach of VHF range of Great Belt VTS at an approximate distance of 20 NM from the BELTREP area. As the Great Belt VTS must be able to timely handle incoming prior reporting, it will not be possible to undertake pre-entry reports within the 20 NM VHF range. The reporting option is then verbal reporting by VHF when crossing the report line of entry. Details of areas are shown on the chartlet in appendix 1-B. The Danish EEZ border lines are shown on nautical charts.

3.5.3 Ships departing a port or leaving an anchorage within the 20 NM range of the BELTREP area or in the BELTREP area, may submit a pre-entry report for designators H, L, P, T and X if transmitted one hour before departure for enabling the Great Belt VTS to timely handle incoming prior reports.

3.6 *Crossing traffic*

3.6.1 Ferries frequently cross route Tango in sector 1, including high-speed ferries. The ferries generally operate according to published schedules; special reporting arrangements can be authorized.

3.7 *Authority*

The Admiral Danish Fleet is the VTS Authority for Great Belt VTS which operates the BELTREP system with call sign "Belt Traffic". Details in appendix 2.

4 Information to be provided to ships and procedures to be followed

4.1 Ships are required to keep a continuous listening watch in the BELTREP area on the relevant VHF sector channels and VHF channel 16.

4.2 Great Belt VTS will provide information service to ships about specific and urgent situations which could cause conflicting traffic movements as well as other information concerning safety of navigation, for instance, information about weather, current, ice, water level, navigational problems or other hazards.

4.2.1 Information of general interest to ships in the area will be broadcast by the Great Belt VTS on VHF channel as specified by the VTS operator or will be given upon request. A broadcast will be preceded by an announcement on VHF channel 16 and sector channels. All ships navigating in the area should listen to the announced broadcast.

4.2.2 If necessary, Great Belt VTS can provide individual information to a ship particularly in relation to positioning or local conditions.

4.2.3 If deemed necessary by the Great Belt VTS or upon request of a ship, navigational assistance can be provided. Great Belt VTS will inform the identifiable ship when the navigational assistance starts and subsequently terminates.

4.2.4 The following IMO Standard Marine Communication Phrases (SMCP), section A1/6, for VTS message markers can be used: ADVICE, WARNING, INFORMATION, QUESTION, ANSWER, REQUEST and INTENTION.

4.3 If a ship needs to anchor owing to breakdown, low visibility, adverse weather, changes in the indicated depth of water, etc., Great Belt VTS can recommend suitable anchorages or other places of refuge within the operational area. The anchorages in the vicinity of the Storebælt (Great Belt) bridges are marked on the nautical charts covering the area and are shown on the chartlet in appendix 1-A.

5 Communication required for the BELTREP system

5.1 The language used for communication shall be English, using IMO Standard Marine Communication Phrases, when deemed necessary by Great Belt VTS.

5.2 Ship-to-ship communication of navigational intentions should be carried out on the BELTREP working channels enabling the Great Belt VTS and other ships to be kept informed.

5.3 Details of communication and contact information are given in appendix 2.

6 Rules, regulations and recommendation in force in the area of the system

6.1 *Regulation for preventing collisions at sea*

The International Regulations for Preventing Collisions at Sea (COLREGs) are applicable throughout the operational area of BELTREP.

6.2 *Traffic separation scheme "At Hatter Barn" (TSS-T5)*

6.2.1 The separation scheme, "At Hatter Barn", is situated in Samsø Bælt north of the Storebælt (Great Belt) between the islands of Sjælland and Samsø. It has been adopted by IMO and rule 10 of the International Regulations for Preventing Collisions at Sea applies.

6.2.2 The minimum depth in the traffic separation scheme is 15 metres at mean sea level. Ships with a draught of more than 13 metres should use the deep-water route "Between Hatter Rev and Hatter Barn", which lies north-west of the traffic separation scheme.

6.3 *Deep-water route "Between Hatter Rev and Hatter Barn" (DW-T3)*

6.3.1 The IMO-adopted deep-water route "Between Hatter Rev and Hatter Barn" has a minimum depth of water below mean sea level of 19 metres. Ships which are not obliged by reason of their draught (13 metres or less) to use the deep-water route should use the traffic separation scheme which lies southeast of the deep-water route, where there is a minimum depth of water below mean sea level of 15 metres.

6.3.2 Ships should be aware that other ships sailing in the deep-water route can be constrained by draught and exhibit signals according to COLREGs.

6.4 *Traffic separation scheme "Between Korsoer and Sprogoe" (TSS-T6)*

6.4.1 The traffic separation scheme (TSS) "Between Korsoer and Sprogoe", situated in the narrows of the Eastern Channel in Storebælt (Great Belt) between the islands of Fyn and Sjælland, have been adopted by the IMO, and rule 10 of the International Regulations for Preventing Collisions at Sea applies.

6.4.2 The minimum free water depth in the northbound traffic lane is 17 metres and in the southbound traffic lane, 19 metres, both below mean sea level.

6.4.3 There is a recommended speed limit of 20 knots in the traffic separation scheme.

6.5 *The Great Belt Bridges – Safety regulations*

6.5.1 Passage through the marked spans at the West Bridge (a combined road and rail bridge), is allowed only for ships below 1,000 tonnes deadweight and with an air draught of less than 18.00 metres. This passage has route designator BW.

6.5.2 Passage through the TSS under the East Bridge (a suspension bridge for road traffic), is allowed only for ships with an air draught of less than 65.00 metres. This passage has route designator BE and includes route T.

6.6 *Deep-water route "Off the east coast of Langeland" (DW-T4)*

6.6.1 The deep-water route *"Off the east coast of Langeland"* has a minimum depth of water below mean sea level of 19 metres. Ships with draughts in excess of 10 metres are recommended to use the deep-water route because of navigational difficulties for such ships in following the national recommended route Hotel which lies to the east of the deep-water route.

6.6.2 Ships should be aware that other ships sailing in the deep-water route can be constrained by draught and exhibit signals according to COLREGs.

6.7 *Route Hotel*

6.7.1 East of the deep-water route "Off the east coast of Langeland", the national route H is established, which has a minimum depth of 12 metres below mean sea level. Ships with a draught of 10 metres or less should follow route H.

6.8 *IMO Recommendation on Navigation through the entrances to the Baltic Sea*

6.8.1 The recent amendment of the IMO Recommendation on Navigation through the entrances to the Baltic Sea was adopted by MSC in October 2007 and promulgated in SN.1/Circ.263, section 1.9 and is given in the IMO publication Ships' Routeing, part C. It recommends, among other things, that ships with a draught of 11 metres or more navigating route T or ships, irrespective of size or draught carrying a shipment of irradiated nuclear fuel, plutonium or high-level radioactive wastes (INF-cargoes), should use the pilotage services established locally by the coastal States for passing ships.

6.8.2 Ship masters should, in due time, when planning the passage, carefully note the content as regards route Tango in the IMO Recommendation on Navigation through the entrances to the Baltic Sea.

6.9 *Mandatory pilotage*

6.9.1 Harbours within the BELTREP area are covered by provisions on the subject of mandatory pilotage for certain ships bound for or coming from Danish harbours.

7 Shore-based facilities to support the operation of the system

7.1 *System capability*

7.1.1 The VTS centre is situated at the Naval Logistic Support Regional Centre at Korsør. The VTS system comprises several remote sensor sites. The sites provide surveillance of the VTS area using a combination of radar, radio direction finding, AIS and electro-optic sensors. An integrated network system of eight radar sensors integrated with AIS provides surveillance of the VTS area.

7.1.2 All the sensors mentioned will be controlled or monitored by the VTS operators.

7.1.3 There are a number of operator consoles in the control centre, one of which is intended for system maintenance and diagnostic purposes, which allows these activities to be carried out without disruption of normal operations. The operator can, from each of the consoles, control and display the status of the sensors. The VTS centre will, at all times, be manned with a duty officer and three operators.

7.1.4 Recording equipment automatically stores information from all tracks which can be replayed. In case of incidents, the VTS authority can use records as evidence. VTS operators have access to different ship registers, pilot information and hazardous cargo data.

7.2 *Radar, electro-optic facilities and other sensors*

Information necessary to evaluate the traffic activities within the operational area of BELTREP is compiled via VTS area remote controlled sensors comprising:

- high-resolution radar systems;
- infrared sensor systems;
- daylight TV systems;
- VHF communications systems; and
- DF systems.

7.3 *Radio communication facilities*

Radio communication equipment in the VTS centre consists of six VHF radios, including DSC facilities. The VHF channels used are given in appendix 2.

7.4 *AIS facilities*

BELTREP is linked to the national shore-based AIS network and can continually monitor AIS information on ships such as identity and position. The information is displayed as part of the VTS system and covers the VTS area.

7.5 *Personnel qualifications and training*

7.5.1 The VTS centre is staffed with civilian personnel, all experienced, as officers at a competency level required in the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, chapter II, section A-II/1 or A-II/2.

7.5.2 Training of personnel will meet the standards recommended by IMO. Furthermore, it will comprise an overall study of the navigation safety measures established in Danish waters and, in particular, the operational area of BELTREP, including a study of relevant international and national provisions with respect to safety of navigation. The training also includes real-time training in simulators.

7.5.3 Refresher training is carried out at least every third year.

8 Information concerning the applicable procedures if the communication facilities of the shore-based Authority fail

8.1 The system is designed with sufficient system redundancy to cope with normal equipment failure.

8.2 In the event that the radio communication system or the radar system at the VTS centre breaks down, communication will be maintained via a standby VHF system. To continue the VTS operation in order to avoid collisions in the bridge area, Great Belt VTS has an emergency back-up VTS centre at Sprogø covering sector 2. The VTS emergency centre is equipped with radar, VHF radio sets and CCTV cameras.

8.3 If the radar system or other essential equipment suffers a breakdown, information of reduced operational capability will be given by Great Belt VTS or broadcast as national navigational warnings.

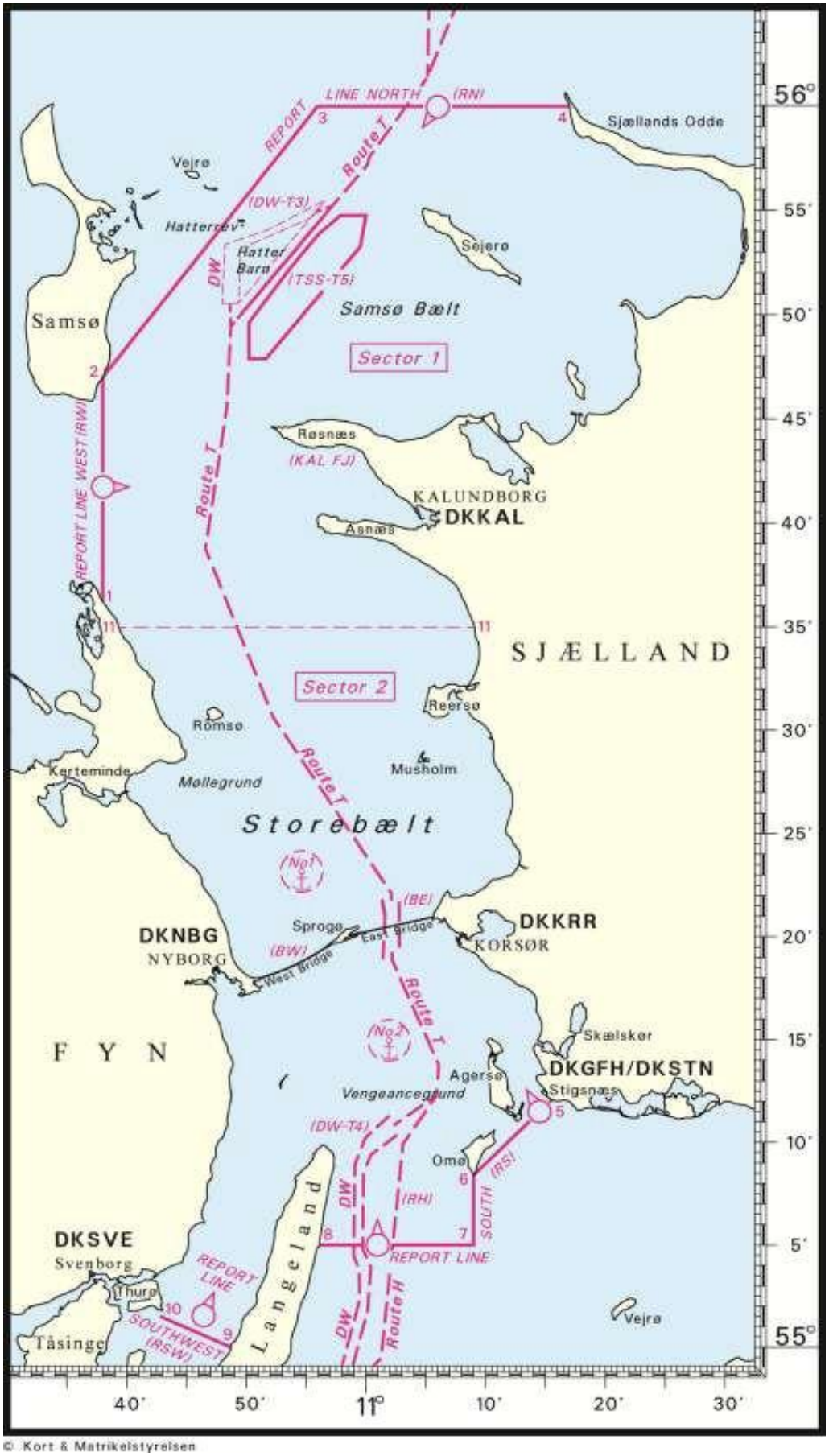
9 Measures to be taken if a ship fails to comply with the requirements of the system

9.1 The objective of Great Belt VTS is to facilitate the exchange of information between the ship and the shore in order to ensure safe passages of the bridges, support safety of navigation and protect the marine environment.

9.2 Great Belt VTS seeks to prevent ship collisions with the bridges crossing Storebælt (Great Belt). If a ship appears to be on a collision course with one of the bridges, Great Belt VTS will arrange for an emergency stop for road and rail traffic on the bridges.

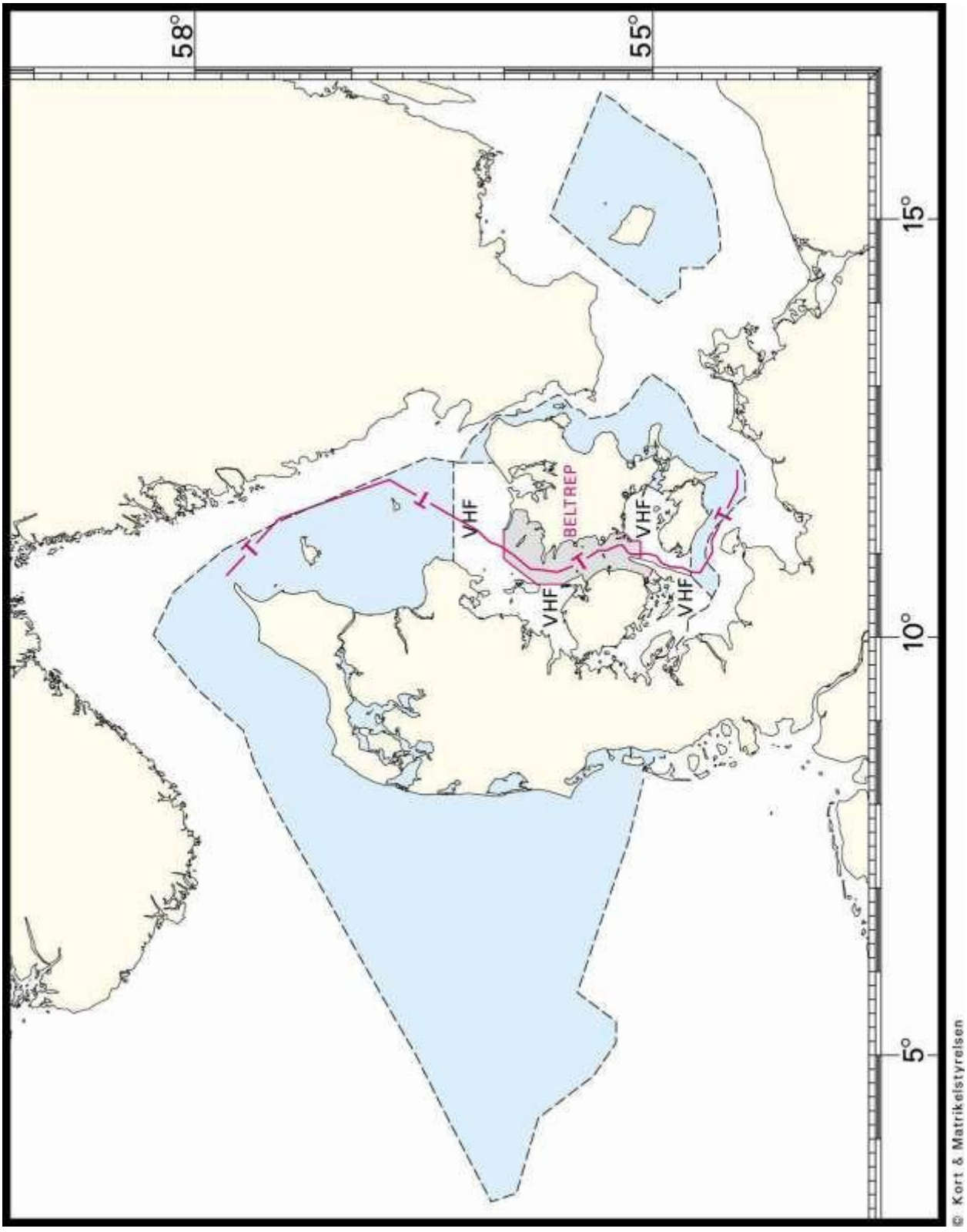
9.3 All means will be used to encourage and promote the full participation of ships required to submit reports under SOLAS regulation V/11. If reports are not submitted or contraventions are made of the safety regulations in sections 6.5.1 and 6.5.2 for passing the bridges and the offending ship can be positively identified, then information will be passed to the relevant flag State Authority for investigation and possible prosecution in accordance with national legislation. Information will also be made available to port State Control inspectors. With regard to liability certificates, this action should be taken only if the flag State is party to the relevant Conventions.

APPENDIX 1-A



APPENDIX 1-B

PRE-ENTRY REPORTING AREAS – DANISH EEZ



APPENDIX 2

CONTACT INFORMATION AND ASSIGNED VHF CHANNELS FOR SECTORS IN THE MANDATORY SHIP REPORTING SYSTEM "BELTREP"

BELTREP radio call sign:	**"Belt Traffic"**

VHF Channels	**Operational use**
VHF Channel 74	Great Belt VTS – Sector 1 North
VHF Channel 11	Great Belt VTS – Sector 2 South
VHF Channel 10	Great Belt VTS – Broadcast, individual assistance, reserve channel
VHF Channel 16	Great Belt VTS – Continuous monitoring

The Great Belt VTS operating BELTREP is located in Korsør at the bridge area:

H24 contact information:

1 Great Belt VTS is monitoring VHF channels 74, 11 and 16 continuously.
2 Duty officer phone: +45 58 37 68 68
3 Fax: +45 58 37 28 19
4 MMSI: 002190001
5 Email: beltrep@sok.dk Web page: www.beltrep.org

Address:

Great Belt VTS Sylowsvej 8
DK – 4220 Korsør Denmark

APPENDIX 3

DRAFTING OF REPORTS TO THE MANDATORY SHIP REPORTING SYSTEM "BELTREP"

Summary:
Reporting is to be done by VHF, but can also be accomplished partly by the use of AIS and pre-entry non-verbal means as, e.g. email.

- Correct and updated AIS information can accomplish reporting of designators A, B, C, E, F, G and I, O and W.

- Non-verbal means can accomplish reporting of designators (A, H), L, P, T and X.

- VHF must, as a minimum, be used for accomplishing designators A (part of) and U. The scheme below gives the optimal use of reporting combined by AIS, non-verbal and VHF.

1 Designator	2 AIS	3 Non-verbal (e.g. email)	4 VHF	5 Function	6 Information required
A	Yes	Yes	Yes	Ship	1) Name of ship: AIS, non-verb, VHF 2) MMSI: AIS 3) Call sign: AIS – and when available – 4) IMO number: AIS, non-verbal
B	Yes	-	-	Date and time	A 6-digit group event giving day of month and hours and minutes in Universal Coordinated Time (UTC).
C	Yes	-	-	Position	A 5-digit group giving latitude in degrees and minutes, decimal, suffixed with N and a 6-digit group giving longitude in degrees and minutes, decimal, suffixed with E.
E	Yes	-	-	True course	A 3-digit group
F	Yes	-	-	Speed in knots and tenths of knots	A 3-digit group
G and **I**	Yes	-	-	Last port of call Destination and ETA	The name of last port of call and next port of call; both given in UN LOCODE by AIS. For details and procedures see IMO SN.1/Circ.244/Rev.1 and www.unece.org/cefact/locode/service/main.htm. ETA date and time group expressed as in (B)
H	-	Yes	-	Date, time (UTC) and report line of entry into the BELTREP area	This information is only required if reporting designators L, P, T and X are transmitted non-verbally (e.g. email) prior to entry of the BELTREP
					A brief description of the intended route in the BELTREP area as planned by the master and stated by coded designators as given below (see also chartlet in appendix 1-A for references):

1 Designator	2 AIS	3 Non-verbal (e.g. email)	4 VHF	5 Function	6 Information required
L	-	Yes	-	Route information in the BELTREP area	Report lines: RN – *report line North* RW – *report line West* RS – *report line South* RSW – *report line Southwest* Routeing systems: DW-T3 – *Deep-water Hatter* TSS-T5 – *Separation At Hatter Barn* Bridges: BE – *East bridge/Route T* BW – *West bridge* Routeing system: DW-T4 – *Deep-water Langeland* Route: RH – *Route Hotel* Anchorage – Kalundborg Fjord KAL FJ See examples below.
O	Yes	-	-	Maximum present draught in metres	A 2-digit or 3-digit group giving the present maximum draught in metres (e.g. 6.1 or 10.4).
P	-	Yes	-	Cargo on board	Cargo and, if dangerous goods are present on board, quantity and IMO class. Dangerous goods information must be summarized in total tonnes per IMO class when transmitted.
Q or **R**	-	-	Yes	Defects and deficiencies Pollution or dangerous goods overboard	Q: Details of defects and deficiencies affecting the equipment of the ship or any other circumstances affecting normal navigation and manoeuvrability. R: Pollution or dangerous goods lost overboard.
T	-	Yes	-	Ship's representative and/or owner	Address and particulars from which detailed information on the cargo may be obtained.
U	-	-	Yes	Ship's size	Information of maximum air draught and deadweight tonnage, required for all ships, including ship's tow or other floating equipment. This information shall be given by voice transmissions when entering the BELTREP area, irrespective of whether the information has also been given by, e.g. non-verbal means.
W	Yes	-	-	Total number of persons on board	State number

1 Designator	2 AIS	3 Non-verbal (e.g. email)	4 VHF	5 Function	6 Information required
X	-	Yes	-	Miscellaneous	- Type and estimated quantity of bunker fuel, for ships of 1,000 gross tonnage and above. Must be summarized in total tonnes per type when transmitted. - One or more Convention certificates of insurance issued by a party to the Conventions and carried on board the ship, providing evidence of existence of insurance for maritime claims, as well as civil liability certificates, as applicable, issued in accordance with: • the International Convention on Civil Liability for Oil Pollution Damage, 1992, as amended (1992 Civil Liability Convention); • the International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 (2001 Bunkers Convention); and, • the Nairobi International Convention on the Removal of Wrecks, 2007 (2007 Nairobi WRC).

Examples of reporting route, coded in the format as given under designator L

1) A northbound ship leaving the port of Gulfhavn planning to sail north route T via deep-water route "Between Hatter Rev and Hatter Barn" leaving at report line North (UN LOCODE format for Gulfhavn is DK GFH):

L: DK GFH, BE, DW-T3, RN

2) A southbound ship in passage and planning to enter at report line North, sailing through TSS "At Hatter Barn", then route T, route H and leaving at report line South:

L: RN, TSS-T5, BE, RH, RS

3) *A northbound ship entering via deep-water route "Off the east coast of Langeland", route Tango, East Bridge and leaving through report line West, bound for the port of Fredericia:*

L: RS, DW-T4, BE, RW

4) A ship entering at report line North sailing via TSS "At Hatter Barn", route T and then anchoring in Kalundborg fjord:

L: RN, TSS-T5, KAL FJ

***

ANNEX 30

RESOLUTION MSC.599(111)
(adopted on 22 May 2026)

AMENDMENTS TO THE WORLDWIDE RADIONAVIGATION SYSTEM
(RESOLUTION A.1046(27))

THE MARITIME SAFETY COMMITTEE,

RECALLING article 28(b) of the Convention on the International Maritime Organization regarding the functions of the Committee,

RECALLING ALSO resolution A.1046(27), by which the Assembly adopted the *Revised Report on the Study of a Worldwide Radionavigation System*,

RECALLING FURTHER resolution A.915(22), by which the Assembly adopted the *Revised maritime policy and requirements for a future global navigation satellite system (GNSS)*,

RECOGNIZING the need for a worldwide radionavigation system to provide ships with navigational position-fixing throughout the world,

RECOGNIZING ALSO the need for an augmentation system, where required, to provide ships with a higher accuracy than what may be provided by a stand-alone worldwide radionavigation system,

RECOGNIZING FURTHER that radionavigation and augmentation systems share common technical features, however they are different and separate systems,

RECOGNIZING that a radionavigation system as a stand-alone system allows a user equipped with the appropriate receiver to compute a positioning, navigation and timing (PNT) solution,

RECOGNIZING ALSO that an augmentation system cannot alone provide a position, however complements the radionavigation system by enhancing the accuracy of the computed PNT solution and providing integrity warnings,

RECOGNIZING FURTHER that resolution A.915(22), while acknowledging available augmentation techniques which enhance navigation performance, does not address the recognition of augmentation techniques for GNSS,

RECOGNIZING the need to amend the aforementioned revised report, and that by resolution A.1046(27), the Assembly requested the Maritime Safety Committee to keep the above-mentioned revised report under review for adjustment as necessary,

HAVING CONSIDERED the recommendation made by the Sub-Committee on Navigation, Communications and Search and Rescue at its twelfth session,

1 ADOPTS, as the revised IMO policy for the recognition and acceptance of suitable radionavigation systems intended for international use, the revised "Report on the Study of a Worldwide Radionavigation System", as set out in the annex to the present resolution, which revises in its entirety the existing text of the annex to resolution A.1046(27);

2 INVITES Governments to keep the Organization informed of the operational development of any suitable radionavigation systems conforming to the policy referred to above which might be considered by the Organization for use by ships worldwide;

3 INVITES ALSO Governments and organizations providing radionavigation systems to consent to recognition of these systems by the Organization;

4 INVITES FURTHER the Assembly to endorse the action taken by the Maritime Safety Committee.

ANNEX

REPORT ON THE STUDY OF A WORLDWIDE RADIONAVIGATION SYSTEM

1 INTRODUCTION

1.1 Studies on a worldwide radionavigation system have been taking place since 1983. These studies have provided a basis on which chapter V of the 1974 SOLAS Convention has been amended to include a requirement for ships to carry means of receiving transmissions from suitable radionavigation systems throughout their intended voyage.

1.2 It is understood that the worldwide radionavigation system includes global and regional radionavigation systems and may include corresponding augmentation systems.

1.3 The operational requirements for worldwide radionavigation systems and augmentation systems, which may have global or regional coverage, are given in the appendix.

1.4 It is not considered feasible for IMO to fund a worldwide radionavigation system. Existing and planned systems which are being provided and operated by Governments or organizations have therefore been studied, in order to ascertain the conditions under which such systems might be recognized or accepted by IMO.

1.5 The *Revised Maritime Policy and Requirements for a Future Global Navigation Satellite System (GNSS)* (resolution A.915(22)) sets out that IMO will recognize a GNSS as a system which meets the carriage requirements for position-fixing equipment for a Worldwide Radionavigation System (WWRNS).

1.6 Although augmentation systems do not require recognition by IMO, when used by ships for position-fixing, they should also meet the operational requirements set out in the appendix to this document to be accepted by flag Administrations, and should be taken into account by organizations providing these augmentation services.

2 PROCEDURES AND RESPONSIBILITIES CONCERNING THE RECOGNITION OF SYSTEMS

2.1 Procedures and functions of IMO

2.1.1 The recognition by IMO of a radionavigation system would mean that the Organization recognizes that the system is capable of providing adequate position information within its coverage area and that the carriage of receiving equipment for use with the system satisfies the relevant requirements of the 1974 SOLAS Convention.

2.1.2 IMO should not recognize a radionavigation system without the consent of the Government or organization which has provided and is operating the system.

2.1.3 In deciding whether or not to recognize a radionavigation system, IMO should consider whether:

.1 the Government or organization providing and operating the system has stated formally that the system is operational and available for use by merchant shipping;

.2 its continued provision is assured;

.3 it is capable of providing position information within the coverage area declared by the Government or organization operating and providing the system with a performance not less than that given in the appendix;

.4 adequate arrangements have been made for publication of the characteristics and parameters of the system and of its status, including amendments, as necessary; and

.5 adequate arrangements have been made to protect the safety of navigation should it be necessary to introduce changes in the characteristics or parameters of the system that could adversely affect the performance of shipborne receiving equipment.

2.1.4 In deciding, in the light of any changes to a recognized system, whether the system should continue to be recognized, the criteria listed in paragraph 2.1.3 should be applied.

2.2 Responsibilities of Governments or organizations

2.2.1 The provision and operation of a radionavigation system is the responsibility of the Governments or organizations concerned.

2.2.2 Governments or organizations willing to have a radionavigation system recognized by IMO should formally notify IMO that the system is operational and available for use by merchant shipping. The Government or organization should also declare the coverage area of the system and provide as much other information as practicable to assist IMO in its consideration of the factors identified in paragraph 2.1.3.

2.2.3 Governments or organizations that have a system recognized by IMO should not allow changes to the operational characteristics of the system under which the system was recognized without notifying IMO (see resolution A.577(14)).

3 SHIPBORNE RECEIVING EQUIPMENT

3.1 To avoid the necessity of carrying more than one set of receiving equipment on a ship, the shipborne receiving equipment should be suitable for operating either with a worldwide radionavigation system, or with radionavigation systems which cover the area in which the ship trades.

3.2 Shipborne receiving equipment should conform to the relevant performance standards not inferior to those adopted by the Organization.

3.3 Radionavigation systems should make it possible for shipborne receiving equipment automatically to select the appropriate stations for determining the ship's position with the required performance.

3.4 Shipborne receiving equipment should be provided with at least one output[1] from which position and augmentation information can be supplied in a standard form to other equipment.

[1] Refer to the recommendation of the International Electrotechnical Commission, in particular, IEC publication 61162, *Digital interface for Navigational Equipment within a ship*.

APPENDIX

OPERATIONAL REQUIREMENTS

1 INTRODUCTION

1.1 The operational requirements for worldwide radionavigation and augmentation systems should be general in nature and capable of being met by a number of systems. All systems should be capable of being used by an unlimited number of ships.

1.2 The requirements may be met by individual radionavigation systems or by a combination of such systems, including the combination of stand-alone global or regional navigation satellite systems and augmentation systems.

1.3 For the purpose of these requirements, the term *radionavigation system* refers to a stand-alone radionavigation system or a combination of a radionavigation system and an augmentation system.

1.4 The radionavigation system should be considered available when it provides the required integrity for the given accuracy level.

2 NAVIGATION IN OCEAN WATERS

2.1 Where a radionavigation system is used to assist in the navigation of ships in ocean waters, the system should provide positional information with an error not greater than 100 m with a probability of 95%. This degree of accuracy is suitable for purposes of general navigation and provision of position information in the GMDSS.

2.2 In view of the fact that merchant fleets operate worldwide, the information provided by a radionavigation system must be suitable for use for general navigation by ships engaged on international voyages in any ocean waters within the system's coverage area.

2.3 Taking into account the radio frequency environment, the coverage of the radionavigation system should be adequate to provide position-fixing throughout this phase of navigation.

2.4 The radionavigation system should permit an update rate of the computed position data not less than once every 2 s[2].

2.5 Signal availability should exceed 99.8%.

2.6 An integrity warning of radionavigation system malfunction, non-availability or discontinuity should be provided to users as soon as practicable by maritime safety information (MSI) systems.

2.7 Augmentation systems may also provide notification of radionavigation system integrity or malfunction. However, these should not override, or replace the requirement for, integrity warnings provided to users by MSI systems in accordance with paragraph 2.6 above.

[2] This applies to the computed and displayed position data, but not to the update rate of any correction data, which may remain valid for 30s or more.

3 NAVIGATION IN HARBOUR ENTRANCES, HARBOUR APPROACHES AND COASTAL WATERS[3]

3.1 Where a radionavigation system is used to assist in the navigation of ships in such waters, the system should provide positional information with an error not greater than 10 m with a probability of 95%.

3.2 Taking into account the radio frequency environment, the coverage of the radionavigation system should be adequate to provide position-fixing throughout this phase of navigation.

3.3 The radionavigation system should permit an update rate of the computed position data not less than once every 2 s[3].

3.4 Signal availability should exceed 99.8%.

3.5 When the radionavigation system is available, the service continuity should be ≥99.97% over a period of 15 minutes.

3.6 An integrity warning of radionavigation system malfunction, non-availability or discontinuity should be provided to users within 10 s.

3.7 The radionavigation system should be considered available when it provides the required integrity for the given accuracy level.

***

[3] SOLAS regulation V/13 requires each contracting Government to provide, as it deems practical and necessary either individually or in cooperation with other contracting Governments, such aids to navigation as the volume of traffic justifies and the degree of risk requires.

ANNEX 31

RESOLUTION MSC.379(93)/REV.1
(adopted on 22 May 2026)

PERFORMANCE STANDARDS FOR
SHIPBORNE BEIDOU SATELLITE NAVIGATION SYSTEM (BDS)
RECEIVER EQUIPMENT

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 that, in accordance with resolution A.1046(27), containing the IMO policy for the recognition and acceptance of suitable radionavigation systems intended for international use, the BeiDou satellite navigation system (BDS) had been recognized as a component of the worldwide radionavigation system (SN.1/Circ.329),

NOTING that shipborne receiving equipment for the worldwide radionavigation system should be designed to satisfy the detailed requirements of the particular system concerned,

RECOGNIZING the need to revise the performance standards for shipborne BDS receiver equipment (resolution MSC.379(93)) in order to ensure the operational reliability of such equipment and taking into account the technological progress and experience gained,

HAVING CONSIDERED the recommendation made by the Sub-Committee on Navigation, Communications and Search and Rescue, at its twelfth session,

1 ADOPTS the revised *Performance standards for shipborne BeiDou Satellite Navigation System (BDS) receiver equipment*, set out in the annex to the present resolution;

2 RECOMMENDS that Governments ensure that BDS receiver equipment:

.1 if installed on or after 31 July 2028, conforms to performance standards not inferior to those specified in the annex to the present resolution; and

.2 if installed before 31 July 2028, conforms to performance standards specified in resolution MSC.379(93);

3 AGREES that, for the purpose of this resolution, the expression *installed on or after 31 July 2028* means:

.1 for ships for which the building contract is placed on or after 31 July 2028, or in the absence of the contract, the keels of which are laid or which are at a similar stage of construction on or after 31 July 2028, any installation date on the ship; or

.2 for ships other than those specified in sub-paragraph .1 above, a contractual delivery date for the equipment or, in the absence of a contractual delivery date, the actual delivery date of the equipment to the ship on or after 31 July 2028.

ANNEX

PERFORMANCE STANDARDS FOR SHIPBORNE BEIDOU SATELLITE NAVIGATION SYSTEM (BDS) RECEIVER EQUIPMENT

1 Introduction

1.1 As a global navigation satellite system compatible with other navigation satellite systems worldwide, the BDS is a system independently developed and operated by China and is comprised of three major components: space constellation, ground control segment and user terminals. The space constellation consists of three geosynchronous earth orbit (GEO) satellites and 24 medium-earth orbit (MEO) satellites and three inclined geosynchronous satellite orbit (IGSO) satellites. The GEO satellites are positioned at longitudes of 080° E, 110.5° E, 140° E, respectively. The MEO satellites are operating in an orbit with an altitude of 21,528 km and an inclination of 55°, which are evenly distributed in three orbital planes. The IGSO satellites are operating in an orbit with an altitude of 35,786 km and an inclination of 55°, which are evenly distributed in three inclined geosynchronous orbital planes. The subsatellite track for the three IGSO satellites are coincided while the longitude of the intersection point is at 118° E. This geometry ensures that a minimum of four satellites are visible to users worldwide with a position dilution of precision (PDOP) ≤ 6.

1.2 The BDS Open Service (OS) provides positioning, navigation and timing services, free of direct user charges. Meanwhile, BDS is capable of providing Satellite-based Augmentation Service (SBAS) and Precise Point Positioning (PPP) Service for maritime within its coverage area. The BDS receiver equipment should be capable of receiving and processing the OS signal.

1.3 BDS transmits five OS navigation signals. Each satellite transmits B1I (1561.098 MHz) and B3I (1268.520 MHz) signals. The MEO and IGSO satellites transmit B1C (1575.42 MHz), B2a (1176.45 MHz), and B2b (1207.14 MHz) signals. The OS can be used on one (B1I or B1C), two (B1C and B2a or B1I and B3I) or three frequencies.

1.4 BDS SBAS provides the Single-Frequency (SF) service through BDSBAS-B1C (1575.42 MHz) signal and the Dual-Frequency Multi-Constellation (DFMC) service through BDSBAS-B2a (1176.45 MHz) signal for users by the BDS GEO satellites in China and surrounding areas.

1.5 BDS PPP Service signal PPP-B2b(1207.14 MHz) is transmitted by the BDS GEO satellites, with the PPP-B2b signal I-component serving as the data broadcasting channel for correction parameters, such as satellite precise orbit and clock offset parameters of BDS and other GNSS, and provides PPP services for users in China and surrounding areas, with the precise position service accuracy at the decimetre level.

1.6 BDS receiver equipment intended for navigational purposes on ships with a speed not exceeding 70 knots, in addition to the general requirements specified in resolution A.694(17)[1], should comply with the following minimum performance requirements.

[1] Refer to publication IEC 60945.

1.7 The standards cover the basic requirements of position fixing, determination of course over ground (COG), speed over ground (SOG) and timing, either for navigation purposes or as input to other functions. The standards do not cover other computational facilities, which may be in the equipment, nor do they cover the requirements for other systems that may take input from the BDS receiver.

2 BDS receiver equipment

2.1 The term "BDS receiver equipment" as used in the performance standards includes all the components and units necessary for the system to properly perform its intended functions. The BDS receiver equipment should include the following minimum facilities:

.1 antenna capable of receiving BDS signals;

.2 BDS receiver and processor;

.3 means of accessing the computed latitude/longitude position;

.4 data control and interface; and

.5 position display and, if required, other forms of output.

If BDS forms part of an approved Integrated Navigation System (INS), requirements of paragraphs 2.1.3, 2.1.4 and 2.1.5 may be provided within the INS.

2.2 The antenna design should be suitable for fitting at a position on the ship which ensures a clear view of the satellite constellation, taking into consideration any obstructions that might exist on the ship.

3 Performance standards for BDS receiver equipment

The BDS receiver equipment should:

.1 be capable of receiving and processing the BDS positioning and velocity, and timing signals by using a single-frequency or a dual-frequency receiver, and should use the ionospheric model broadcast to the receiver by the constellation to generate ionospheric corrections：

.1 a BDS single-frequency receiver should use the B1I or B1C signal alone and correct ionospheric propagation effects with the ionospheric model broadcast to the receiver by the satellite; or

.2 a BDS dual-frequency receiver should use either the B1C and B2a frequencies or the B1I and B3I frequencies and, using dual-frequency processing, correct ionospheric propagation effects.

.2 provide position information in latitude and longitude in degrees, minutes and thousandths of minutes[2];

[2] BeiDou uses BeiDou Coordinate System (BDCS) which is a realization of the International Terrestrial Reference Frame (ITRF) system and differs from WGS 84 by less than 5 cm world-wide. BDCS is consistent with the definition of the China Geodetic Coordinate System 2000 (CGCS2000). BDCS and CGCS2000 have the same ellipsoid parameters. Conversion to WGS 84 is not needed for maritime navigation.

.3 provide time referenced to universal time coordinated UTC (NTSC)[3];

.4 be provided with at least two outputs from which position information, UTC, COG, SOG and alarms can be supplied to other equipment. The output of position information should be based on the WGS 84 datum and should be in accordance with international standards[4]. The output of UTC, COG, SOG and alarms should be consistent with the requirements of paragraphs 3.15 and 3.17 below;

.5 have static accuracy such that, for PDOP $\leqslant$ 6, the position of the antenna is determined to within:

.1 10 m horizontal (95%) and 22 m vertical (95%) for single-frequency operations on the B1I or B1C frequency; and

.2 9 m horizontal (95%) and 10 m vertical (95%) for dual-frequency operation on B1C and B2a or B1I and B3I operation;

.6 have dynamic accuracy equivalent to the static accuracy specified in paragraph 3.5 above under the normal sea states and motion experienced in ships[5];

.7 have position information in latitude and longitude in degrees, minutes and thousandths of minutes with a position resolution equal to or better than 0.001 minute of latitude and longitude;

.8 be capable of selecting automatically the appropriate satellite-transmitted signals to determine the ship's position and velocity, and time with the required accuracy and update rate;

.9 be capable of acquiring satellite signals with input signals having carrier levels in the range of -133dBm to -119dBm. Once the satellite signals have been acquired, the equipment should continue to operate satisfactorily with satellite signals having carrier levels down to -136dBm;

.10 be capable of operating satisfactorily under normal interference conditions consistent with the requirements of resolution A.694(17);

.11 be capable of acquiring position, velocity and time to the required accuracy within five minutes where there is no valid almanac data;

.12 be capable of acquiring position, velocity and time to the required accuracy within one minute where there is valid almanac data;

.13 be capable of reacquiring position, velocity and time to the required accuracy within one minute when there has been a service interruption of 60 seconds or less;

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3 China National Time Service Centre.

4 Publication IEC 61162.

5 Refer to resolution A.694(17), publications IEC 6721-3-6 and IEC 60945.

.14 generate and output to a display and digital interface[6] a new position solution at least once every one second for conventional craft and at least once every 0.5 second for high-speed craft;

.15 provide the COG, SOG and UTC outputs, with a validity mark aligned with that on the position output. The accuracy requirements for COG and SOG should not be inferior to the relevant performance standards for heading[7] and speed and distance measuring equipment (SDME)[8] and the accuracy should be obtained under the various dynamic conditions that could be experienced on board ships;

.16 provide at least one normally closed contact, which should indicate failure of the BDS receiver equipment;

.17 have a bidirectional interface to facilitate communication so that alarms can be transferred to external systems and so that audible alarms from the BDS receiver can be acknowledged from external systems; the interface should comply with the relevant international standards[6]; and

.18 if applicable, have the facilities to process differential BDS (DBDS) data fed to it in accordance with the standards of ITU-R[9] and the appropriate RTCM standard and provide indication of the reception of DBDS signals and whether they are being applied to the ship's position.

4 Integrity checking, failure warnings and status indications

4.1 The BDS receiver equipment should also indicate whether the performance of BDS is outside the bounds of requirements for general navigation in the ocean, coastal, port approach and restricted waters, and inland waterway phases of the voyage as specified in either resolution A.1046(27) or appendix 2 to resolution A.915(22) and any subsequent amendments, as appropriate.

4.2 The BDS receiver equipment should, as a minimum:

.1 provide a warning within five seconds of loss of position or if a new position based on the information provided by the BDS constellation has not been calculated for more than one second for conventional craft and 0.5 second for high-speed craft. Under such conditions the last known position and the time of last valid fix, with the explicit indication of the state allowing for no ambiguity, should be output until normal operation is resumed;

.2 use Receiver Autonomous Integrity Monitoring (RAIM) to provide integrity performance appropriate to the operation being undertaken; and

.3 provide a self-test function.

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6 Publication IEC 61162.

7 Resolution A.424(XI) for conventional craft and resolution A.821(19) for high-speed craft.

8 Resolution A.824(19), as amended by resolution MSC.96(72).

9 ITU-R Recommendation M.823.

5 Protection

Precautions should be taken to ensure that no permanent damage can result from an accidental short circuit or grounding of the antenna or any of its input or output connections or any of the BDS receiver equipment inputs or outputs for a duration of five minutes.

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