INTERNATIONAL MARITIME ORGANIZATION

E

MARITIME SAFETY COMMITTEE
110th session
Agenda item 21

MSC 110/21/Add.3
3 September 2025
Original: ENGLISH

REPORT OF THE MARITIME SAFETY COMMITTEE ON ITS 110TH SESSION

Attached are annexes 15 to 29 to the report of the Maritime Safety Committee on its 110th session (MSC 110/21).

(See documents MSC 110/21/Add.1 for annexes 1 to 13, MSC 110/21/Add.2 for annex 14, and MSC 110/21/Add.4 for annexes 30 to 37)

LIST OF ANNEXES

***

ANNEX 15

RESOLUTION MSC.579(110)
(adopted on 20 June 2025)

ACCESSIBILITY OF INFORMATION ON SEAFARER MEDICAL CERTIFICATES AND MEDICAL PRACTITIONERS RECOGNIZED FOR THE PURPOSE OF CONDUCTING SEAFARER MEDICAL EXAMINATIONS

THE MARITIME SAFETY COMMITTEE,

RECALLING Articles 28(a) and 28(b) of the Convention on the International Maritime Organization with respect to the functions of the Maritime Safety Committee,

RECOGNIZING that regulation I/9 of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 ("the 1978 STCW Convention") requires seafarers serving at sea to hold a valid medical certificate that complies with the medical standards described in section A-I/9 of the Seafarers' Training, Certification and Watchkeeping Code (STCW) Code.

BEARING IN MIND that article VI(1) of the 1978 STCW Convention requires that certificates for masters, officers or ratings shall be issued to those candidates who, to the satisfaction of the Administration, meet the requirements for medical fitness, in accordance with the relevant provisions of the 1978 STCW Convention and Code,

TAKING into consideration regulation I/9.2 of the 1978 STCW Convention which requires that each Party shall ensure that those responsible for assessing the medical fitness of seafarers are medical practitioners recognized by the Party for the purpose of seafarer medical examinations,

RECALLING regulation I/9.6 of the 1978 STCW Convention, which states that, if the period of validity of a medical certificate expires in the course of a voyage, then the medical certificate shall continue in force until the next port of call where a medical practitioner recognized by the Party is available, provided that the period shall not exceed three months,

CONSIDERING that Parties may need access to information on recognized medical practitioners in specific ports,

1 DETERMINES that, in accordance with regulations I/14.1.1 and 14.1.4, requiring companies to ensure that seafarers assigned to their ships hold appropriate certification in accordance with the provisions of the 1978 STCW Convention and as established by Administrations and to ensure that documentation and data relevant to medical fitness of seafarers is maintained and readily accessible, respectively, companies must therefore have the means to verify the validity of a seafarer’s medical certificate;

2 INVITES Parties to recall that section A-I/9, paragraph 4 of the STCW Code requires that a register of recognized medical practitioners shall be maintained and made available upon request, and, in this regard, encourages Parties to consider publishing such information through the official websites of authorized government organizations, which should be made available in English;

3 ALSO INVITES Parties to note the necessity of ensuing the prompt verification of the validity of seafarer medical certificates via the official websites of authorized government organizations, and making this information available in English;

4 REQUESTS the Secretary-General to consider encouraging Parties to provide information, on a voluntary basis on the official websites of authorized government organizations, where Parties can verify the validity of seafarer medical certificates, and providing access to their register of recognized medical practitioners in English through the Global Integrated Shipping Information System (GISIS) portal.

***

ANNEX 16*

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

Preamble

1 The preamble is amended, as follows:

"1 The purpose of this Code is to provide international standards for life-saving appliances required by chapter III of the International Convention for the Safety of Life at Sea (SOLAS), 1974.

2 ~~On and after 1 July 1998,~~ The requirements of this Code ~~will be~~ are mandatory under the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, for ships constructed on or after 1 July 1998. ~~Any future A~~amendments to the Code ~~will be~~ are adopted and brought into force in accordance with the procedure laid down in article VIII of that Convention.

3 Since the LSA Code (resolution MSC.48(66)) entered into force, the Code has been amended as follows:

[Before circulation for adoption, the Secretariat will insert a table listing all amended regulations since the adoption of the Code together with application dates and corresponding resolutions (MSC.1/Circ.1500/Rev.3, annex 1, example regulation 1)]

Regulation	Application date	Adopted by
…	..	..
..	..	..
..	..	

"

CHAPTER II
PERSONAL LIFE-SAVING APPLIANCES

2.2 Lifejackets

2.2.1 General requirements for lifejackets

2 Paragraph 2.2.1.6.2 (as amended by resolution MSC.554(108)) is amended, as follows:

".2 for lifejackets provided on or after 1 January 2026, turn the body of unconscious, face-down persons in the water to a face-up position where the nose and mouth are clear of the water in an average time not exceeding that of the RTD plus 1 s;"

* Tracked changes are created using "strikeout" for deleted text and "grey shading" to highlight all modifications and new insertions, including deleted text.

3 The following new paragraph 2.2.1.18 is added after existing paragraph 2.2.1.17:

"2.2.1.18 for the application of the requirement in paragraph 2.2.1.6.2, the expression "*lifejackets provided on or after 1 January 2026"* means lifejackets, having a contractual delivery date to the ship on or after 1 January 2026 or, in the absence of a contractual delivery date to the ship, actually delivered to the ship on or after 1 January 2026."

CHAPTER IV
PERSONAL LIFE-SAVING APPLIANCES

4.4 General requirements for lifeboats

4.4.7 Lifeboat fittings

4 Paragraph 4.4.7.6.8 (as amended by resolution MSC.554(108)) is amended, as follows:

".8 for those lifeboats installed on or after 1 January 2026, to prevent an accidental release during recovery of the boat, the hook shall not be able to support any load unless the hook is completely reset. In the case of a hook which is capable of releasing the lifeboat or rescue boat with a load on the hook when it is not fully waterborne, the handle or safety pins shall not be able to be returned to the reset (closed) position, and any indicators shall not indicate the release mechanism is reset, unless the hook is completely reset. Additional danger signs shall be posted at each hook station to alert crew members to the proper method of resetting;"

5 Paragraph 4.4.7.6.17 (as amended by resolution MSC.554(108)) is amended, as follows:

".17 for those lifeboats installed on or after 1 January 2026, where a single fall and hook system is used for launching a lifeboat or rescue boat in combination with a suitable painter, the requirements of paragraphs 4.4.7.6.7 and 4.4.7.6.15 need not be applicable; provided that the single fall and hook system does not have the capability to release the lifeboat or rescue boat with a load on the hook when it is not fully waterborne."

6 The following new paragraph 4.4.7.6.18 is added after existing paragraph 4.4.7.6.17:

".18 for the application of the requirements in paragraphs 4.4.7.6.8 and 4.4.7.6.17, the expression "*lifeboats installed on or after 1 January 2026*" means lifeboats having a contractual delivery date to the ship on or after 1 January 2026 or, in the absence of a contractual delivery date to the ship, actually delivered to the ship on or after 1 January 2026."

4.6 Totally enclosed lifeboats

7 Paragraph 4.6.6 (as amended by resolution MSC.535(107)) is amended, as follows:

"**4.6.6 Ventilation means**

(For totally enclosed lifeboats installed on or after 1 January 2029, the following requirements apply)

4.6.6.1 A totally enclosed lifeboat shall be provided with means to achieve a ventilation rate of at least 5 m^3/h per person for the number of persons which the lifeboat is permitted to accommodate and for a period of not less than 24 hours. The ventilation means shall be operable from inside the lifeboat and shall be arranged to ensure that the lifeboat is ventilated without stratification or formation of unventilated pockets.

4.6.6.2 Where the means of ventilation is powered, the source shall not be the radio batteries referred to in paragraph 4.4.6.11; and where dependent on the lifeboat engine, sufficient fuel shall be provided to comply with paragraph 4.4.6.8."

8 Paragraph 4.6.7 (as amended by resolution MSC.535(107)) is amended, as follows:

"**4.6.7 Openings of the ventilation system and their means of closing**

(For totally enclosed lifeboats installed on or after 1 January 2029, the following requirements apply)

4.6.7.1 Each opening of the ventilation means required in paragraph 4.6.6 shall be provided with means of closing. The means of closing shall be operable by a person from inside the lifeboat. Means shall be provided to ensure that the openings can be kept closed before, i.e. while in the stowed position, and during the launching of the lifeboat.

4.6.7.2 Inlet and outlet openings of the ventilation means and their external fittings shall be located and designed in order to minimize the ingress of water through the openings, without using the means of closing required in paragraph 4.6.7.1 and taking into consideration the requirements provided in paragraph 4.6.3.2.

4.6.7.3 For a free-fall lifeboat complying with the requirements of section 4.7, the openings and their means of closing shall be designed to withstand the loads and to prevent ingress of water under the anticipated submerged condition of the lifeboat at the time of free-fall launching.

4.6.7.4 For a lifeboat with a self-contained air support system complying with the requirements of section 4.8, the openings and their means of closing shall be designed to maintain the pressure required by section 4.8.

4.6.7.5 For a fire-protected lifeboat complying with the requirements of section 4.9, the openings and their means of closing shall be designed to ensure that the capability of protecting persons in the lifeboat is not impaired, under the conditions specified in paragraph 4.9.1."

9 The following new paragraph 4.6.8 is added after existing paragraph 4.6.7:

"4.6.8 For the application of the requirements in paragraphs 4.6.6 and 4.6.7, the expression "*totally enclosed lifeboats installed on or after 1 January 2029"* means totally enclosed lifeboats having a contractual delivery date to the ship on or after 1 January 2029 or, in the absence of a contractual delivery date to the ship, actually delivered to the ship on or after 1 January 2029."

4.7 Free-fall lifeboats

10 The following new paragraph 4.7.7 is inserted after existing paragraph 4.7.6, and existing paragraph 4.7.7 is renumbered as 4.7.8:

"4.7.7 Lifeboat release testing

4.7.7.1 For each free-fall lifeboat installed on or after [1 January 2031], the arrangement to test the release system under load without launching the lifeboat into the water, in accordance with paragraph 4.7.6.4, shall be designed with a safety factor of at least 6 on the basis of the calculated maximum working load with full complement of persons and equipment and the ultimate strength of the materials used for its construction considering static and relevant dynamic loads. Components of this arrangement that are exposed to the marine environment, other than falls and temporarily installed equipment, shall be constructed from materials that are corrosion resistant in the marine environment without the need for coatings or galvanizing.

11 The following new paragraph is inserted after 4.7.7.1 as follows:

4.7.7.2 For the application of the requirements in paragraph 4.7.7.1, the expression "*free-fall lifeboat installed on or after [1 January 2031]"* means a free-fall lifeboat having a contractual delivery date to the ship on or after [1 January 2031] or, in the absence of a contractual delivery date to the ship, actually delivered to the ship on or after [1 January 2031]."

CHAPTER VI

LAUNCHING AND EMBARKATION APPLIANCES

6.1 Launching and embarkation appliances

12 Paragraph 6.1.1.3 is amended, as follows:

"A launching appliance shall not depend on any means other than gravity or stored mechanical power which is independent of the ship' s power supplies to launch the survival craft or rescue boat it serves in the fully loaded and equipped condition and also in the light condition.

Notwithstanding the above, for a rescue boat, installed on or after 1 January 2024 on a cargo ship ~~equipped with a rescue boat~~ which is not one of the ship's survival craft, having a mass not more than 700 kg in fully equipped condition, with engine, but without the crew, the launching appliance of the boat does not need to be fitted with stored mechanical power provided that:

.1 manual hoisting from the stowed position and turning out to the embarkation position is possible by one person;

.2 the force on the crank handle does not exceed 160 N at the maximum crank radius of 350 mm; and

.3 means having sufficient strength such as bowsing line are provided for bringing the rescue boat against the ship's side and holding it alongside so that persons can be safely embarked."

13 The following new text is inserted at the end of existing paragraph 6.1.1.3:

"For the application of the requirements in this paragraph, the expression "*rescue boat installed on or after 1 January 2024"* means a rescue boat having a contractual delivery date to the ship on or after 1 January 2024 or, in the absence of a contractual delivery date to the ship, actually delivered to the ship on or after 1 January 2024."

6.1.2 Launching appliances using falls and a winch

14 Paragraph 6.1.2.8 (as amended by resolution MSC.554(108)) is amended, as follows:

"6.1.2.8 The speed at which the fully loaded survival craft or rescue boat installed on or after 1 January 2026, is lowered to the water shall not be less than that obtained from the formula:

$S = 0.4 + 0.02 \cdot H$ or 1.0, whichever is less

where:

S is the lowering speed in metres per second and

H is the height in metres from the davit head to the waterline with the ship at the lightest seagoing condition."

15 Paragraph 6.1.2.10 (as amended by resolution MSC.554(108)) is amended, as follows:

"6.1.2.10 The maximum lowering speed of a fully loaded survival craft or rescue boat installed on or after 1 January 2026, shall be 1.3 m/s. The Administration may accept a maximum lowering speed other than 1.3 m/s, having regard to the design of the survival craft or rescue boat, the protection of its occupants from excessive forces, and the strength of the launching arrangements taking into account inertia forces during an emergency stop. Means shall be incorporated in the appliance to ensure that this speed is not exceeded."

16 The following new paragraph 6.1.2.14 is added after existing paragraph 6.1.2.13:

"6.1.2.14 For the application of the requirements in paragraphs 6.1.2.8 and 6.1.2.10, the expression "*survival craft or rescue boat installed on or after 1 January 2026"* means a survival craft or a rescue boat having a contractual delivery date to the ship on or after 1 January 2026 or, in the absence of a contractual delivery date to the ship, actually delivered to the ship on or after 1 January 2026."

***

ANNEX 17

DRAFT AMENDMENTS TO THE REQUIREMENTS FOR MAINTENANCE, THOROUGH EXAMINATION, OPERATIONAL TESTING, OVERHAUL AND REPAIR OF LIFEBOATS AND RESCUE BOATS, LAUNCHING APPLIANCES AND RELEASE GEAR (RESOLUTION MSC.402(96))

6 SPECIFIC PROCEDURES FOR INSPECTION, MAINTENANCE, THOROUGH EXAMINATION, OPERATIONAL TESTING, OVERHAUL AND REPAIR

6.2 Annual thorough examination and operational test

1 Paragraph 6.2.3 (as modified by resolution MSC.559(108)) is replaced by the following:

"6.2.3 For lifeboats (including free-fall lifeboats), rescue boats and fast rescue boats, the following items shall be thoroughly examined and checked for satisfactory condition and operation:

.1 condition of the boat structure, including fixed and loose equipment (including a visual examination of the external boundaries of the void spaces, as far as practicable);

.2 engine and propulsion system;

.3 sprinkler system, where fitted;

.4 air supply system, where fitted;

.5 manoeuvring system;

.6 power supply system;

.7 bailing system;

.8 fender/skate arrangements;

.9 rescue boat righting system, where fitted; ~~and~~

.10 ventilation system, where fitted; and

.11 arrangement to test the release system under load without launching the lifeboat into the water (free-fall lifeboats only)."

2 Paragraph 6.2.7 is replaced by the following:

"6.2.7 The operational test of the free-fall lifeboat release function shall be carried out, as follows:

.1 engage the arrangements for the test without launching the lifeboat, as required by paragraphs 4.7.6.4 and 4.7.7 of the LSA Code, as specified in the manufacturer's operating instructions;

.2 if required to be on board, ensure that the operator is properly seated and secured in the seat location from which the release mechanism is to be operated;

.3 operate the release mechanism to release the lifeboat;

.4 reset the lifeboat in the stowed configuration;

.5 repeat the procedures referred to in.2 to.4 above, using the back-up release mechanism, if applicable;

.6 remove the arrangements for the test without launching the lifeboat, as required by paragraphs 4.7.6.4 and 4.7.7 of the LSA Code; and

.7 verify that the lifeboat is in the ready-to-launch stowed configuration."

***

ANNEX 18

DRAFT MSC RESOLUTION

AMENDMENTS TO THE REVISED RECOMMENDATION ON TESTING OF LIFE-SAVING APPLIANCES (RESOLUTION MSC.81(70))

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO that the Assembly, when adopting resolution A.689(17) on *Testing of life-saving appliances*, authorized the Committee to keep the annexed Recommendation on testing of life-saving appliances under review and to adopt, when appropriate, amendments thereto,

RECALLING FURTHER that, since the adoption of resolution A.689(17), the Committee has amended the Recommendation annexed thereto by resolutions MSC.54(66) and MSC.81(70), and by circulars MSC/Circ.596, MSC/Circ.615 and MSC/Circ.809,

RECOGNIZING the need to ensure that the references in the *Revised recommendation on testing of life-saving appliances* (resolution MSC.81(70)) are kept up to date,

TAKING INTO ACCOUNT the amendments to SOLAS chapter III and the LSA Code adopted by resolutions MSC[….(111]) and MSC[….(111]), respectively, with respect to the arrangements to test the release system under load without launching the lifeboat into the water,

1 ADOPTS the *Amendments to the Revised recommendation on testing of life-saving appliances* (resolution MSC.81(70)), set out in the annex to the present resolution;

2 RECOMMENDS Governments to ensure that arrangements to test the release system under load without launching the free-fall lifeboat installed on or after 1 January 2031, conform to the amended prototype, production and installation tests as set out in the annex to the present resolution;

3 INVITES Contracting Governments to the SOLAS Convention to bring the above amendments to the attention of all parties concerned.

ANNEX

AMENDMENTS TO THE REVISED RECOMMENDATION ON TESTING OF LIFE-SAVING APPLIANCES (RESOLUTION MSC.81(70))

PART 1 – PROTOTYPE TESTS FOR LIFE-SAVING APPLIANCES

6 Lifeboats

6.9 Release mechanism test

1 Paragraph 6.9.7 is modified, as follows:

"6.9.7 The release mechanism should be mounted on a tensile strength testing device. The load should be increased to at least six times the maximum working load of the release mechanism without failure of the release mechanism."

2 A new paragraph 6.9.8 is added after the existing paragraph 6.9.7, as follows:

"6.9.8 The arrangement to test the release system without launching the lifeboat into the water, as required by paragraph 4.7.7 of the LSA Code, should be mounted on a tensile strength testing device. The load should be increased to at least six times the maximum working load with full complement of persons and equipment of the arrangement to test the release system without failure."

7 Rescue boats and fast rescue boats

7.1 Rigid rescue boats

3 Paragraph 7.1.1 is modified, as follows:

"7.1.1 Rigid rescue boats should be subjected to the tests prescribed in 6.2 to 6.12 (except 6.3, 6.4.2, 6.5, 6.6.2, 6.7.1, 6.9.6 to 6.9.8, 6.10.1) and 7.2.4.2."

7.4 Rigid fast rescue boats

4 Paragraph 7.4.1 (as amended by resolution MSC.544(107)) is modified, as follows:

"7.4.1 Rigid fast rescue boats should be subjected to the tests prescribed in 6.2 to 6.12 (except 6.3, 6.4.2, 6.5, 6.6.2, 6.7.1, 6.9.6 to 6.9.8, 6.10.1), 6.14.1 to 6.14.8 (if a rigid fast rescue boat is self-righting), 7.1.2 to 7.1.4, 7.1.6, 7.1.7 (if a rigid fast rescue boat is not self-righting), 7.1.8, 7.1.9 and 7.2.4.2. In the case of open fast rescue boats, the self-righting test should only be done in the light condition, and 6.14.1.1, 6.14.3 to 6.14.5 and 6.14.9 are not applicable. With regard to 6.14.2, a boat fitted with a helmsman's emergency release switch should be considered to be arranged to stop automatically when inverted."

PART 2 – PRODUCTION AND INSTALLATION TESTS

6 LAUNCHING AND STOWAGE ARRANGEMENTS

6.1 Launching appliances using falls and winches

5 Paragraph 6.1.1 is replaced by the following:

"6.1.1 Each launching appliance, except the winch, should be tested with a static load of 2.2 times the working load with the appliance in the full outboard position. For a free-fall lifeboat launching appliance, each launching ramp and its connection to the release mechanism, should be tested with a static load of 2.2 times the working load. The appliance should not be deformed or damaged. Winches with the brakes applied should be tested by applying a static load of 1.5 times the maximum working load. Any cast components of the frame and arm should be hammer-tested to determine that they are sound and without flaw. The arrangement to test the release system under load without launching the free-fall lifeboat into the water should be tested with a load of 2.2 times the calculated maximum working load of the arrangement utilizing properly distributed weights to represent the full complement of persons and equipment. The arrangement should not be deformed or damaged."

***

ANNEX 19

RESOLUTION MSC. 580(110)
(adopted on 27 June 2025)

AMENDMENTS TO THE REVISED RECOMMENDATION ON TESTING OF LIFE-SAVING APPLIANCES (RESOLUTION MSC.81(70))

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO that the Assembly, when adopting resolution A.689(17) on *Testing of life-saving appliances*, authorized the Committee to keep the annexed Recommendation on testing of life-saving appliances under review and to adopt, when appropriate, amendments thereto,

RECALLING FURTHER that, since the adoption of resolution A.689(17), the Committee has amended the Recommendation annexed thereto by resolutions MSC.54(66) and MSC.81(70), and by MSC/Circ.596, MSC/Circ.615 and MSC/Circ.809,

RECOGNIZING the need to ensure that the references in the *Revised recommendation on testing of life-saving appliances* (resolution MSC.81(70)) are kept up to date,

1 ADOPTS the *Amendments to the Revised recommendation on testing of life-saving appliances* (MSC.81(70)), set out in the annex to the present resolution;

2 RECOMMENDS that Governments apply the amendments when testing life-saving appliances, as set out in the annex to the present resolution;

3 INVITES Contracting Governments to the SOLAS Convention to bring the above amendments to the attention of all parties concerned.

ANNEX

AMENDMENTS TO THE REVISED RECOMMENDATION ON TESTING OF LIFE-SAVING APPLIANCES (RESOLUTION MSC.81(70))

PART 1 – PROTOTYPE TEST FOR LIFE-SAVING APPLIANCES

2 Lifejackets

2.2 Buoyancy test

1 Paragraph 2.2 is replaced by the following:

"The buoyancy of the lifejacket should be measured before and after a period of 24 h complete submersion to just below the surface in fresh water. After submerging the lifejacket, care should be taken to ensure that, the air trapped in the lifejacket is removed and stabilization is achieved prior to recording the initial buoyancy. The difference between the initial buoyancy and the final buoyancy should not exceed 5% reduction from the initial buoyancy."

PART 2 – PRODUCTION AND INSTALLATION TESTS

2 Individual buoyancy equipment

2.1 Lifejackets

Production tests

2 Paragraph 2.1.1 is replaced by the following:

"2.1.1 Manufacturers should be required to carry out a buoyancy test as prescribed in paragraph 2.2 of Part 1 on at least 0.5% of each batch of lifejackets produced, subject to a minimum of one from every batch."

Inspections by the Administration

3 Paragraph 2.1.2 is replaced by the following:

"2.1.2 Inspections by a representative of the Administration should be made at intervals of at least one per 6,000 lifejackets produced, subject to a minimum of one inspection per calendar quarter. When the manufacturer's quality control programme results in lifejackets that are consistently free of defects, the rate of inspection may be reduced to one in every 12,000. At least one lifejacket of each type in production should be selected at random by the inspector and subjected to detailed examination including, if necessary, cutting open. The inspector should be satisfied that the buoyancy tests as prescribed in paragraph 2.2 of Part 1 are being conducted appropriately. Otherwise, an additional buoyancy test should be conducted to the inspector's satisfaction."

***

ANNEX 20

DRAFT AMENDMENTS TO SOLAS REGULATIONS IV/5, AND V/4 AND 5

CHAPTER IV
RADIOCOMMUNICATIONS

Part B
Undertakings by Contracting Governments

Regulation 5
Provision of radiocommunication services

1 The following new paragraph is added after the existing paragraph 2:

"3 Each Contracting Government undertakes to use all operational recognized mobile satellite services in their area of responsibility when disseminating maritime safety information and search and rescue related information via the Enhanced Group Call service."

CHAPTER V
SAFETY OF NAVIGATION

Regulation 4
Navigational warnings

2 Regulation 4 is amended, as follows:

"Each Contracting Government shall take all steps necessary to ensure that, when intelligence of any danger is received from whatever reliable source, it shall be promptly brought to the knowledge of those concerned and communicated to other interested Governments, with due regard to regulation IV/5.3*.

* Refer to the *Guidance on the IMO/IHO World-Wide Navigational Warning Service* (resolution A.706(17), as amended)."

Regulation 5
Meteorological services and warnings

3 The chapeau of paragraph 2 is amended, as follows:

"2 In particular, Contracting Governments undertake to carry out, in cooperation, the following meteorological arrangements, with due regard to regulation IV/5.3."

***

ANNEX 21

DRAFT RESOLUTION MSC.509(105)/REV.2

PROVISION OF RADIO SERVICES FOR THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO that the Assembly, at its nineteenth session, adopted resolution A.801(19) on *Provision of radio services for the Global Maritime Distress and Safety System (GMDSS)*, authorizing the Maritime Safety Committee to keep the resolution under review and to adopt amendments thereto, as necessary,

RECALLING FURTHER resolution MSC.509(105), by which it adopted, at its 105th session, a revision of resolution A.801(19), as amended by resolution MSC.199(80), superseding the latter resolutions from 1 January 2024,

RECALLING resolution MSC.509(105)/Rev.1, adopted at its 109th session, which introduced a new annex on Criteria for use when providing a NAVDAT service, superseding resolution MSC.509(105),

TAKING INTO ACCOUNT the amendments to chapters IV and V of the Convention for the Safety of Life at Sea, 1974 ("the Convention"), adopted by resolution MSC.[…(…)],

NOTING, in particular, regulation IV/5 of the Convention concerning the provision of radiocommunication services,

HAVING CONSIDERED, at its […] session, the recommendation made by the Sub-Committee on Navigation, Communications and Search and Rescue at its twelfth session,

1 ADOPTS the revised *Recommendation on provision of radio services for the GMDSS*, the *Criteria for use when providing shore-based digital selective calling (DSC) facilities for use in the GMDSS*, the *Criteria for establishing GMDSS sea areas*, the *Criteria for use when providing a NAVTEX service*, the *Criteria for use when providing a NAVDAT service* and the *Criteria for use when providing an international Enhanced Group Call service in the GMDSS* set out in annexes 1 to 6, respectively, of the present resolution;

2 RECOMMENDS that Governments ensure that provision of radio services for the GMDSS established on or after the date of adoption of the present resolution conforms to criteria not inferior to those set out in the annexes to the present resolution;

3 INVITES Governments to:

.1 provide, either individually or in cooperation with other Governments, the radio services deemed practicable and necessary for the proper operation of the GMDSS; and

.2 inform the Secretary-General of the shore-based facilities to be provided in support of the GMDSS in response to this resolution through the Organization's Global Integrated Shipping Information System (GISIS);

4 REVOKES resolution MSC.509(105)/Rev.1.

ANNEX 1

RECOMMENDATION ON PROVISION OF RADIO SERVICES FOR THE GMDSS

1 Governments should establish such coast stations, individually or in cooperation with other Governments, as are needed to designate a sea area or areas A1 or A2, or both, off their coasts. Each sea area should be established in accordance with the *Criteria for establishing GMDSS sea areas* recommended in annex 3.

2 Governments that do not define sea areas A1 or A2 should establish such coast stations, individually or in cooperation with other Governments, as are needed to designate a sea area (or areas) A3 or A4 in accordance with SOLAS regulations IV/2.1.17 and 2.1.18. Each sea area should be established in accordance with the *Criteria for establishing GMDSS sea areas* recommended in annex 3.

3 Each Government should submit to the Organization information on the sea area or sea areas (A1, A2, A3 and/or A4) designated, radiocommunication services it has established for the GMDSS, and when there are changes to the sea area or areas it has so defined.

4 Governments should make provision for radiocommunication services in each sea area they have defined, so that a ship, while at sea, can receive shore-to-ship radiocommunication and that coast stations can receive ship-to-shore radiocommunication in accordance with the functional requirements set out in SOLAS regulation IV/4.1.

ANNEX 2

CRITERIA FOR USE WHEN PROVIDING SHORE-BASED DIGITAL SELECTIVE CALLING (DSC) FACILITIES FOR USE IN THE GMDSS

1 Governments, individually or in cooperation with other Governments, desiring to provide a high frequency (HF) digital selective calling (DSC) coast station for use in the GMDSS should notify the Organization so it can maintain in the GMDSS Master Plan details of HF coast stations providing HF DSC distress watch. Governments should ensure that such HF DSC coast stations are provided in accordance with appendix 1.

2 Governments, individually or in cooperation with other Governments, desiring to provide a medium frequency (MF) DSC coast station serving, either wholly or in part, a particular sea area A2, should notify the Organization as to the extent of continuous coverage and the extent of coverage from shore. This information should be determined by Governments in accordance with the criteria recommended in annex 3. Governments should ensure that MF DSC coast stations are provided in accordance with appendix 2.

3 Governments, individually or in cooperation with other Governments desiring to provide a very high frequency (VHF) DSC coast station serving, either wholly or in part, a particular sea area A1, should notify the Organization as to the extent of continuous coverage and the extent of coverage from shore. This information should be determined by Governments in accordance with the criteria recommended in annex 3. Governments should ensure that VHF DSC coast stations are provided in accordance with appendix 3.

4 In addition, Report ITU-R M.2027 provides engineering guidance to upgrade shore-based facilities to operate the GMDSS in sea areas A1, A2, A3 and A4.

APPENDIX 1

1 BASIC PRINCIPLES FOR ESTABLISHING HF DSC COAST STATIONS FOR SEA AREAS A3 AND A4

The location of HF DSC coast stations for sea areas A3 and A4 should be based where practicable on the following principles:

.1 each area should have a minimum of two stations to provide the required coverage;

.2 stations should be selected to provide redundant coverage; and

.3 in areas of high traffic density, more than two stations should be provided.

Governments are encouraged to cooperate in order to achieve the above basic principles for establishing HF DSC coast stations and a complete global coverage.

2 CRITERIA FOR THE PROVISION OF HF DSC COAST STATIONS

Stations participating in HF DSC watchkeeping in the GMDSS should:

.1 be affiliated to an RCC and have reliable communications between them;

.2 monitor all HF DSC distress frequencies;

.3 provide as complete a coverage of their area as possible;

.4 be in continuous operation; and

.5 be able to relay distress alerts and communications under an international common procedure as agreed by the Organization.[1]

3 AVAILABILITY AND COVERAGE OF HF DSC COAST STATIONS

The minimum number of HF DSC coast stations indicated in paragraph 1 may need to be adjusted in future in order to:

.1 ensure coast stations can provide a mutual backup in the event of operational failure; and

.2 provide a methodology for predicting coverage to include in the GMDSS Master Plan.

[1] Refer to IAMSAR Manual, Volume II, section 3.6 "Designation of the RCC or RSC responsible for initiating SAR action".

APPENDIX 2

1 BASIC PRINCIPLES FOR ESTABLISHING MF DSC COAST STATIONS FOR SEA AREA A2

The selection of MF DSC coast stations for sea area A2 should be based on the following principles:

.1 each sea area designated as A2 requires a continuous MF guard on the distress frequencies and a sufficient number of coast stations to provide MF coverage in the coastal area of the Government concerned; and

.2 in certain areas, several Governments may collectively provide complete coverage (e.g. the North Sea).

2 CRITERIA FOR THE PROVISION OF MF DSC COAST STATIONS

Stations participating in MF DSC watchkeeping in the GMDSS should:

.1 be affiliated to an RCC and have reliable communications between them;

.2 provide as complete a coverage of their immediate sea area as possible; and

.3 be in continuous operation.

APPENDIX 3

1 BASIC PRINCIPLES FOR ESTABLISHING VHF DSC COAST STATIONS FOR SEA AREA A1

The selection of VHF DSC coast stations for sea area A1 should be based on the following principles:

.1 each sea area designated as A1 requires a continuous VHF guard and should have the minimum number of stations necessary to provide VHF coverage in the coastal area of the Government concerned; and

.2 in certain areas, several Governments may collectively provide complete coverage along their coasts (e.g. the North Sea).

2 CRITERIA FOR THE PROVISION OF VHF DSC COAST STATIONS

Stations participating in VHF DSC watchkeeping in the GMDSS should:

.1 be affiliated to an RCC and have reliable communications between them;

.2 provide as complete a coverage of their immediate sea area as possible; and

.3 be in continuous operation.

ANNEX 3

CRITERIA FOR ESTABLISHING GMDSS SEA AREAS

1 INTRODUCTION

Governments should use the following criteria when establishing sea areas as defined in SOLAS regulation IV/2.

2 SEA AREA A1

2.1 General

The communication range of stations operating in the maritime mobile VHF band is likely to be limited by propagation factors rather than lack of radiated power.

2.2 Guidance criteria

Sea area A1 is that sea area which is within a circle of radius A nautical miles over which the radio propagation path lies substantially over water. The radius A is equal to the transmission distance between a ship's VHF antenna at a height of 4 m above sea level and the antenna of the VHF coast station which lies at the centre of the circle.

2.3 Determination of radius A

2.3.1 The following formula should be used to calculate the range A in nautical miles:

$$A = 2.5\ (\sqrt{H(\text{in metres})} + \sqrt{h(\text{in metres})})$$

H is the height above sea level of the VHF coast station receiving antenna and h is the height above sea level of the ship's transmitting antenna, which is assumed to be 4 m.

2.3.2 The formula given above applies to line-of-sight cases but is not considered adequate for cases where both antennae are at a low level. The VHF range in sea area A1 should be verified by field strength measurements.

3 SEA AREA A2

3.1 General

3.1.1 Consideration of the reception of radio signals in the 2 MHz band indicates that the range is likely to be limited by propagation conditions and atmospheric noise, which are affected by variations in geographical position and time of day, as well as radiated power.

3.1.2 The theoretical distance to be expected from ground-wave propagation can be determined by reference to the "Ground-wave propagation curves for frequencies between 10 kHz and 30 MHz" in the most recent version of Recommendation ITU-R P.368, to be used above seawater and adjusted as necessary to take account of the actual radiated field strength from the transmitting antenna and the minimum field strength necessary for the proper operation of a receiver conforming with the latest performance standard adopted by the Organization.

3.1.3 The determination of the minimum signal level required for satisfactory radio reception in the absence of other unwanted signals necessitates taking account of the noise with which the wanted signal must compete. The latest Recommendation ITU-R P.372 gives the world distribution of values of noise level and of other noise parameters and shows the method of using these in the evaluation of the probable performance of a radio circuit.

3.1.4 In addition, the most recent version of Recommendation ITU-R M.1467 provides guidance to Administrations for predicting sea area A2 by taking into account variations in the propagation conditions.

3.2 Guidance criteria

Sea area A2 is that sea area which is within a circle of radius B nautical miles over which the propagation path lies substantially over water and which is not part of any sea area A1, the centre of the circle being the position of the coast station receiving antenna.

3.3 Determination of radius B

The radius B may be determined for each coast station by reference to the most recent versions of Recommendations ITU-R P.368 and ITU-R P.372 for the performance of a single sideband (J3E) system under the following conditions:

Frequency - 2 182 kHz

Bandwidth - 3 kHz

Propagation - ground wave

Time of day - [2]

Season - [2]

Ship's transmitter power (PEP) - 60 W[3]

Ship's antenna efficiency - 25%

Radio frequency signal over noise (RF S/N) - 9 dB (voice)

Mean transmitter power - 8 dB below peak power

Fading margin - 3 dB

The range of sea area A2 should be verified by field strength measurements.

[2] Administrations should determine time periods and seasons appropriate to their geographic area based on prevailing noise level.

[3] In the absence of field strength measurements, it may be assumed that this range will be obtained by a radio frequency power of 60 watts PEP for full carrier emissions generated by a single sinusoidal oscillation in an antenna of 25% efficiency.

4 SEA AREA A3

Guidance criteria

Sea area A3 means an area, excluding sea areas A1 and A2, within the coverage of a recognized mobile satellite service supported by the ship earth station carried on board in which continuous alerting is available.

5 SEA AREA A4

Guidance criteria

Sea area A4 means an area outside of sea areas A1, A2 and A3.

ANNEX 4

CRITERIA FOR USE WHEN PROVIDING A NAVTEX SERVICE

1 There are two basic areas which must be defined when establishing a NAVTEX service. They are:

Coverage area: An area defined by an arc of a circle having a radius from the transmitter calculated according to the method and criteria given in this annex.

Service area: A unique and precisely defined sea area, wholly contained within the coverage area, for which MSI is provided from a particular NAVTEX transmitter. It is normally defined by a line which takes full account of local propagation conditions and the character and volume of information and maritime traffic patterns in the region.

2 Governments desiring to provide a NAVTEX service should use the following criteria for calculating the coverage area of the NAVTEX transmitter they intend to install, in order to:

.1 determine the most appropriate location for NAVTEX stations having regard to existing or planned stations;

.2 avoid interference with existing or planned NAVTEX stations; and

.3 establish a service area for promulgation to seafarers.

3 The ground-wave coverage may be determined for each coast station by reference to the most recent versions of Recommendations ITU-R P.368 and ITU-R P.372 for the performance of a system under the following conditions:

Frequency - 518 kHz

Bandwidth - 300 Hz

Propagation - ground wave

Time of day - [4]

Season - [4]

Transmitter power - [5]

Antenna efficiency - [5]

Radio frequency signal over noise (RF S/N) in 500 Hz bandwidth - 8 dB[6]

Percentage of time - 90

[4] Administrations should determine time periods in accordance with NAVTEX time transmission table (see NAVTEX Manual) and seasons appropriate to their geographic area based on prevailing noise level.

[5] The range of a NAVTEX transmitter depends on the transmitter power and local propagation conditions. The actual range achieved should be adjusted to the minimum required for adequate reception in the NAVTEX area served, taking into account the needs of ships approaching from other areas. Experience has indicated that the required range of 250 to 400 nautical miles (nm) can generally be attained by transmitter power in the range between 100 and 1,000 W during daylight with a 60% reduction at night. The receiver characteristics, particularly as regards the bandwidth response, must be compatible with that of the NAVTEX transmitter.

[6] Bit error rate 1×10^{-2}.

4 Full coverage of a NAVTEX service area should be verified by field strength measurements.

5 In addition, the most recent version of Recommendation ITU-R M.1467 provides guidance to Administrations for predicting NAVTEX coverage areas by taking into account variations in the propagation conditions.

ANNEX 5

CRITERIA FOR USE WHEN PROVIDING A NAVDAT SERVICE

1 There are two basic areas which must be defined when establishing a NAVDAT service. They are:

***Coverage area*:** An area defined for ground-wave propagation by an arc of a circle having a radius from the coast station calculated according to the method and criteria given in this annex.

***Service area*:** A unique and precisely defined sea area, wholly contained within the coverage area, for which MSI is provided from a particular NAVDAT coast station. It is normally defined by a line which takes full account of local propagation conditions and the character and volume of information and maritime traffic patterns in the region.

2 Governments desiring to provide a NAVDAT service should use the following criteria for calculating the coverage area of the NAVDAT coast station they intend to install, in order to:

.1 determine the most appropriate location for the NAVDAT coast station having regard to existing or planned coast stations;

.2 avoid interference with existing or planned GMDSS coast stations by determining the transmit power level; and

.3 establish a service area for promulgation to seafarers.

3 NAVDAT can be used in the MF and HF maritime frequency bands. In the MF frequency band, the main propagation is on ground wave with some sky wave at night-time. In HF, ground-wave and sky wave propagation modes are both possible.

4 The ground-wave coverage may be determined for each coast station by reference to the most recent version of Recommendations ITU-R P.368 and ITU-R P.372 or by appropriate software coverage calculation for the performance of a system under the following conditions:

Frequency:	500 kHz or 4 226 kHz
Modulation:	4 QAM, 16 QAM or 64 QAM
Bandwidth:	1, 3, 5 or 10 kHz
Propagation	ground wave
Transmitter power:	1 to 4 kW rms (10 to 40 kW pep)
Antenna polarization:	vertical
Antenna efficiency:	30 to 85% (depending on frequency and antenna model)
Minimum radio frequency signal over noise (RF S/N) for BER 10^{-4} relating to modulation:	4 QAM: 11.5 dB 16 QAM: 18.5 dB 64 QAM: 24.5 dB
Percentage of time:	90%

5 This S/N ratio is also affected by the bandwidth used by the receiver (i.e. narrow bandwidth requires less S/N).

6 When calculating the radio coverage, the transmit RF power should use the rms value.

7 During daylight hours, solar radiation penetrates the atmosphere far enough to ionize the lowest "D" layer roughly 60 km above ground. This "D" layer completely absorbs signals on MF frequencies so that they do not carry on upwards out into space. This is the case of a pure ground-wave propagation.

8 With the approach of sunset, the "D" layer absorption decreases rapidly and within a few hours, MF signals continue to move in the upward direction towards the atmosphere. However, MF signals then encounter higher regions of the ionosphere which, instead of absorbing the signal, tend to refract or bend the path of the signal travel. With enough refraction, the signal can be redirected back to the Earth's surface far away from the transmitter site. This is the case of a mixed propagation: ground wave and sky wave. According to this explanation, propagation at night could cause interference between NAVDAT stations.

9 The dominant means of communication in the HF band is skywave ("skip") propagation, in which radio waves directed at an angle into the sky refract back to Earth from layers of ionized atoms in the ionosphere. By this method HF radio waves can travel beyond the horizon, around the curvature of the Earth, and can be received at intercontinental distances. However, suitability of this band for medium or short distance communications is reduced and this characteristic should be considered in the coverage analysis.

10 Full coverage of a NAVDAT service area should be verified by field strength measurements.

ANNEX 6

CRITERIA FOR USE WHEN PROVIDING AN INTERNATIONAL ENHANCED GROUP CALL SERVICE IN THE GMDSS

1 The following criteria should be taken into consideration for the broadcast of maritime safety information (MSI) by MSI providers, and the broadcast of search and rescue (SAR) related information by SAR authorities.

Maritime safety information

2 Contracting Governments should ensure that MSI broadcast via Enhanced Group Call (EGC) is appropriately disseminated through all operational recognized mobile satellite services (RMSS) providing coverage within their areas of responsibility. This will ensure that all ships navigating within those areas receive the information regardless of the type of the EGC equipment installed on board.

3 MSI providers should obtain an authorization from the relevant international organization to access EGC services directly.

SAR-related information

4 Contracting Governments should ensure that SAR-related information is appropriately disseminated through all operational RMSSs providing coverage within the SAR regions under their responsibility. This will ensure that all ships navigating within those areas receive the information regardless of the type of EGC equipment installed on board.

5 SAR authorities requiring to disseminate information through RMSSs should either:

.1 establish arrangements with an existing authorized EGC information provider that can disseminate the information on their behalf; or

.2 obtain an authorization from the IMO EGC Coordinating Panel to access EGC services directly, including through their designated rescue coordination centres (RCCs).

6 Guidance for the dissemination of SAR-related information through the international EGC service is provided in MSC.1/Circ.1659, as may be revised.

Obtaining an authorization to access EGC services directly

7 The processes for authorization, certification and registration of EGC information providers are described in MSC.1/Circ.1635, annex 2. These processes have been established to protect the integrity of the international EGC service and the GMDSS.

***

ANNEX 22

DRAFT AMENDMENTS TO SOLAS CHAPTER V AND APPENDIX

CHAPTER V
SAFETY OF NAVIGATION

Regulation 18
Approval, surveys and performance standards of navigational systems and equipment and voyage data recorder

1 In the footnote to paragraph 18.2, the following new entry is added after "*Recommendation on performance standards for universal shipborne automatic identification system (AIS)* (resolution MSC.570(109));" and before "*Recommendation on performance standards for echo-sounding equipment* (resolution A.224(VII), as amended);":

"*Performance standards for VHF data exchange system (VDES)* (resolution MSC.[…]);".

2 Paragraph 9 is amended as follows:

"9 The automatic identification system (AIS) or VHF data exchange system (VDES) shall be subjected to an annual test. The test shall be conducted by an approved surveyor or an approved testing or servicing facility. The test shall verify the correct programming of the ship's static information, correct data exchange with connected sensors as well as verifying the radio performance by radio frequency measurement and on-air test using e.g. a Vessel Traffic Service (VTS). A copy of the test report shall be retained on board the ship".

Regulation 19
Carriage requirements for shipborne navigational systems and equipment

2 Shipborne navigational equipment and systems

3 Paragraph 2.4 is amended as follows:

"2.4 All ships of 300 gross tonnage and upwards engaged on international voyages and cargo ships of 500 gross tonnage and upwards not engaged on international voyages and passenger ships irrespective of size shall be fitted with an automatic identification system (AIS) or VHF data exchange system (VDES), as follows:

~~.1 ships constructed on or after 1 July 2002;~~

~~.2 ships engaged on international voyages constructed before 1 July 2002:~~

~~.2.1 in the case of passenger ships, not later than 1 July 2003;~~

~~.2.2 in the case of tankers, not later than the first survey for safety equipment* on or after 1 July 2003;~~

~~.2.3 in the case of ships, other than passenger ships and tankers, of 50,000 gross tonnage and upwards, not later than 1 July 2004;~~

~~.2.4 in the case of ships, other than passenger ships and tankers, of 300 gross tonnage and upwards but less than 50,000 gross tonnage, not later than the first safety equipment survey** after 1 July 2004 or by 31 December 2004, whichever occurs earlier; and~~

~~.3 ships not engaged on international voyages constructed before 1 July 2002, not later than 1 July 2008;~~

~~.4 the Administration may exempt ships from the application of the requirements of this paragraph when such ships will be taken permanently out of service within two years after the implementation date specified in sub-paragraph.2 and.3;~~

.~~5~~1 AIS or VDES shall:

.1 provide automatically to appropriately equipped shore stations, other ships and aircraft information, including the ship's identity, type, position, course, speed, navigational status and other safety-related information;

.2 receive automatically such information from similarly fitted ships;

.3 monitor and track ships; and

.4 exchange data with shore-based facilities.

.~~6~~2 the requirements of paragraph 2.4.1~~5~~ shall not be applied to cases where international agreements, rules or standards provide for the protection of navigational information; and

.~~7~~3 AIS or VDES shall be operated taking into account the guidelines adopted by the Organization.* Ships fitted with AIS or VDES shall maintain AIS or VDES in operation at all times except where international agreements, rules or standards provide for the protection on navigational information.

---

* Refer to *Revised guidelines for the onboard operational use of shipborne automatic identification systems (AIS)* (resolution A.1106(29)) and *Guidelines for the operational use of VHF data exchange system (VDES)* (MSC.1/Circ. […])"

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

4 paragraph 4.2 is amended as follows:

"4.2 Ships, irrespective of the date of construction, fitted with an automatic identification system (AIS) or VHF data exchange system (VDES), as defined in regulation 19.2.4, and operated exclusively within sea area A1, as defined in regulation IV/2.1.1~~2~~5, shall not be required to comply with the provisions of this regulation."

APPENDIX

CERTIFICATES

Record of equipment for passenger ship safety (Form P)

5 In section 5 (*Details of navigational systems and equipment*), item 4.1 is amended as follows:

"Automatic identification system (AIS) or VHF data exchange system (VDES)".

Record of equipment for cargo ship safety (Form E)

6 In section 3 (*Details of navigational systems and equipment*), item 4.1 is amended as follows:

"Automatic identification system (AIS) or VHF data exchange system (VDES)".

Record of equipment for cargo ship safety (Form C)

7 In section 5 (*Details of navigational systems and equipment*), item 4.1 is amended as follows:

"Automatic identification system (AIS) or VHF data exchange system (VDES)".

***

ANNEX 23

DRAFT AMENDMENTS TO 1994 HSC CODE

Chapter 13
SHIPBORNE NAVIGATIONAL SYSTEMS AND EQUIPMENT AND VOYAGE DATA RECORDER

13.15 Automatic identification system (AIS)

1 Paragraphs 13.15.1 to 13.15.4 are amended as follows:

"13.15.1 Craft should be provided with an automatic identification system (AIS) or VHF data exchange system (VDES).

13.15.2 AIS or VDES should:

.1 provide automatically to appropriately equipped shore stations, other vessels and aircraft information, including the craft's identity, type, position, course, speed, navigational status and other safety-related information;

.2 receive automatically such information from similarly fitted vessels;

.3 monitor and track vessels; and

.4 exchange data with shore-based facilities.

13.15.3 The requirements of 13.15.2 should not be applied to cases where international agreements, rules or standards provide for the protection of navigational information.

13.15.4 AIS or VDES should be operated taking into account the guidelines developed by the Organization".

ANNEX 1

FORM OF HIGH-SPEED CRAFT SAFETY CERTIFICATE

Record of Equipment for High-Speed Craft Safety Certificate

5 Details of navigational systems and equipment

2 In section 13, the entry is amended as follows:

"13 Automatic identification system (AIS) or VHF data exchange system (VDES)"

***

ANNEX 24

DRAFT AMENDMENTS TO 2000 HSC CODE

CHAPTER 13
NAVIGATIONAL EQUIPMENT

13.15 Automatic identification system

1 Paragraphs 13.15.1 to 13.15.4 are amended as follows:

"13.15.1 Craft shall be provided with an automatic identification system (AIS) or VHF data exchange system (VDES).

13.15.2 AIS or VDES shall:

.1 provide automatically to appropriately equipped shore stations, other vessels and aircraft information, including the craft's identity, type, position, course, speed, navigational status and other safety-related information;

.2 receive automatically such information from similarly fitted vessels;

.3 monitor and track vessels; and

.4 exchange data with shore-based facilities.

13.15.3 The requirements of 13.15.2 shall not apply where international agreements, rules or standards provide for the protection of navigational information.

13.15.4 AIS or VDES shall be operated taking into account the guidelines adopted by the Organization."

ANNEX 1

FORM OF HIGH-SPEED CRAFT SAFETY CERTIFICATE

Record of Equipment for High-Speed Craft Safety Certificate

5 Details of navigational systems and equipment

2 In section 13, the entry is amended as follows:

"13 Automatic identification system (AIS) or VHF data exchange system (VDES)"

***

ANNEX 25

DRAFT MSC RESOLUTION

INTRODUCTION OF VHF DATA EXCHANGE SYSTEM (VDES) INTO THE IMO REGULATORY FRAMEWORK

THE MARITIME SAFETY COMMITTEE

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

TAKING INTO ACCOUNT resolution MSC.[…] by which the Committee adopted amendments to chapter V and the appendix (Certificates) of the International Convention for the Safety of Life at Sea, 1974 ("the Convention"), introducing the VHF data exchange system (VDES) as an alternative shipborne navigational equipment and system to the automatic identification system (AIS),

TAKING ALSO INTO ACCOUNT resolution MSC.[…] on *Performance standards for VHF data exchange system (VDES)* and MSC.1/Circ.[…] on *Guidelines for the operational use of VHF data exchange system (VDES)*,

RECOGNIZING that AIS is one of the four components of VDES, which allows the existing AIS to coexist with VDES,

RECOGNIZING ALSO that existing AIS requirements, guidelines and recommendations should be considered as also applicable to the AIS component of VDES,

RECOGNIZING FURTHER that any additional functionalities or communication capabilities provided by VDES beyond its AIS component, even if offering similar functions or services to AIS, are not to be considered equivalent to AIS nor a substitute for the AIS equipment required under SOLAS regulations,

HAVING CONSIDERED, at its […] session, the recommendation made by the Sub-Committee on Navigation, Communications and Search and Rescue, at its twelfth session,

1 DECIDES that, in order to facilitate the introduction and implementation of the VHF data exchange system (VDES) into the IMO regulatory framework, references made to the carriage and use of "automatic identification system" or "AIS" in the IMO regulatory framework should also be understood as references to the AIS component of VDES, as defined in resolution MSC.[…] on *Performance standards for VHF data exchange system (VDES)*;

2 INVITES Member States and international organizations to apply the above decision in the implementation and use of VDES.

***

ANNEX 26

DRAFT MSC RESOLUTION

**PERFORMANCE STANDARDS FOR
SHIPBORNE VHF DATA EXCHANGE SYSTEM (VDES)**

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 functions of adopting performance standards and technical specifications, as well as amendments thereto, shall be performed by the Maritime Safety Committee on behalf of the Organization,

RECALLING FURTHER resolution MSC.570(109), by which the Committee adopted revised *Performance standards for a universal automatic identification system (AIS)* to improve the safety of navigation,

TAKING INTO ACCOUNT resolution MSC.[…] by which the Committee adopted amendments to chapter V of the International Convention for the Safety of Life at Sea, 1974 ("the Convention"), introducing VHF data exchange system (VDES) as an alternative shipborne navigational equipment and system to comply with the existing requirements of the automatic identification system (AIS),

TAKING ALSO INTO ACCOUNT MSC.1/Circ.[…] on *Guidelines for the operational use of VHF data exchange system (VDES)*,

RECOGNIZING that AIS is one of the four components of VDES, which allows the existing AIS to coexist with VDES,

HAVING CONSIDERED, at its […] session, the recommendation made by the Sub-Committee on Navigation, Communications and Search and Rescue at its twelfth session,

1 ADOPTS *Performance standards for a shipborne VHF data exchange system (VDES)*, set out in the annex to the present resolution;

2 RECOMMENDS that Governments ensure that shipborne VDES equipment conforms to performance standards not inferior to those specified in the present resolution.

ANNEX

PERFORMANCE STANDARDS FOR SHIPBORNE VHF DATA EXCHANGE SYSTEM (VDES)

1 Scope

1.1 These performance standards specify the requirements for the shipborne VHF data exchange system (VDES) for the use of VDES equipment on board vessels.

1.2 The VDES equipment integrates four components and their functions. These components are the automatic identification system (AIS) component, application-specific messages (ASM) component, terrestrial component of VHF data exchange (VDE-TER) and the satellite component of VHF data exchange (VDE-SAT).

1.3 VDES should be capable of providing information exchange between ships, ships and shore authorities and services, automatically with minimal involvement of the ship's personnel and with a high level of availability and security.[1]

1.4 VDES should be capable of providing the following functions:

.1 exchanging data to improve safety, security and efficiency of navigation and protection of the marine environment;

.2 means for coastal States to request and obtain information about a ship and its cargo and/or passengers;

.3 means for providing Maritime Services in the context of e-navigation; and

.4 means for standardized and automated reporting in accordance with MSC.1/Circ.1595 and MSC.1/Circ.1610, as amended.

1.5 The installations, in addition to meeting the requirements of the Radio Regulations, applicable ITU-R Recommendations and the general requirements set out in resolutions A.694(17) and MSC.191(79), as amended should comply with these performance standards.

2 Equipment functionalities

2.1 The general functions of VDES equipment (see figure 1) are as follows:

.1 The AIS component should not be interfered with by other communication means within the VDES, ensuring accurate AIS position reporting and the provision of safety-related information;

.2 VDES should allow the flexibility to prioritize some applications and, consequently, adapt some parameters of the transmission (robustness or capacity) while minimizing system complexity;

[1] High level of security can be achieved by implementing authentication of data and encryption where necessary.

.3 VDES should give its highest priority to AIS position reporting and safety-related information, followed by second priority to ASM, third priority to VDE-TER and then to VDE-SAT;

.4 The AIS component of VDES should be capable of providing all modes of operation as described in Recommendation ITU-R M.1371;

.5 VDES should be capable of exchanging data between ship-to-ship, ship-to-shore, shore-to-ship, ship-to-satellite and satellite-to-ship;

.6 VDES should be capable of implementing software/firmware updates;

.7 VDES should be capable of separately disabling VDE-SAT, VDE-TER, or ASM;

.8 VDES should be capable of changing its transmission power from the default setting to a low setting (1 W) or stopping transmission except for the AIS component when operations such as loading or discharging dangerous cargo require it; and

.9 VDES should be capable of temporarily disabling VDE-SAT transmission when receiving a message from AIS or VDES shore station within its coverage area.

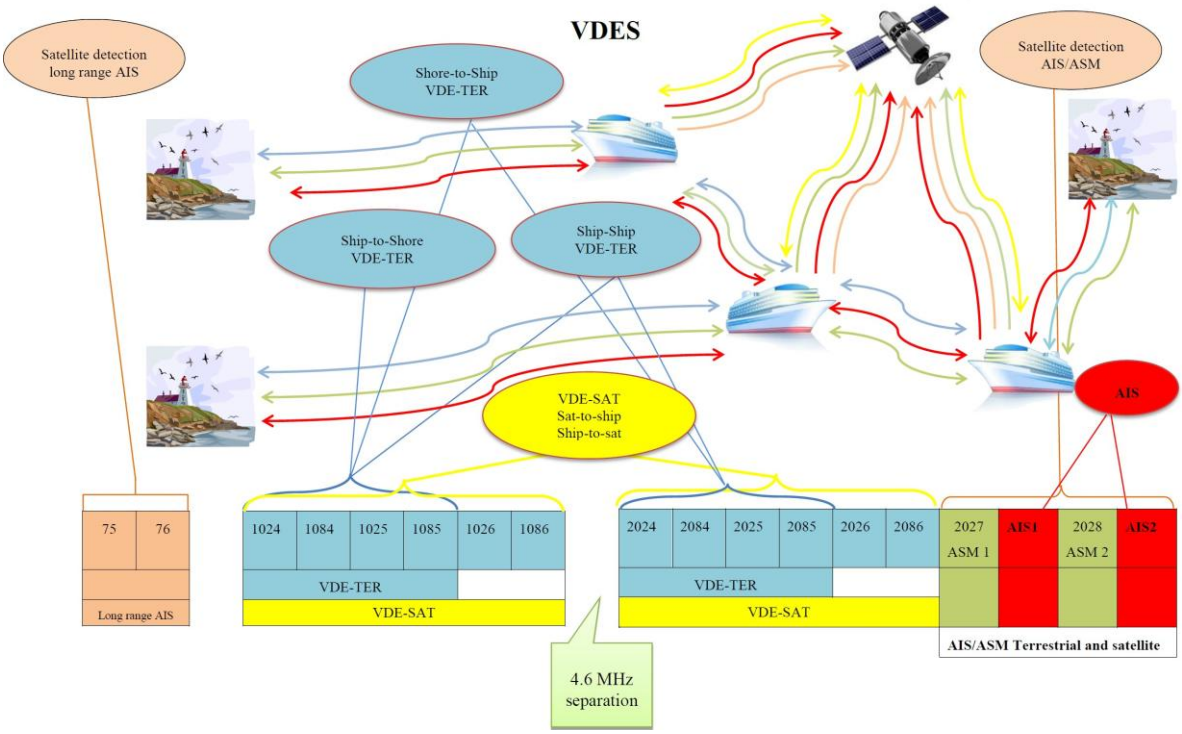


Figure 1: VDES functions

2.2 The AIS component of VDES should comply with the requirements set out in resolution MSC.570(109) and Recommendation ITU-R M.1371.

2.3 The ASM component of VDES should provide a robust and efficient terrestrial data transfer link, enabling the transmission of a wide variety of messages, including application-specific messages currently transmitted by AIS.[2] These messages should be encoded in accordance with Recommendation ITU-R M.1371 annexes on *Application-specific messages* and *Automatic identification system messages,* as well as Recommendation ITU-R M.2092 annex on *Common technical elements of VHF data exchange system* and the technical characteristics should meet the requirements specified in Recommendation ITU-R M.2092 annex on *Technical characteristics of the application-specific message channels for the VHF data exchange system in the VHF maritime band*.

2.4 The VDE-TER function of VDES should provide an efficient terrestrial data transfer link. The technical characteristics should comply with Recommendation ITU-R M.2092 annex on *Common technical elements of VHF data exchange system* and with the annex on *Technical characteristics of VHF data exchange-terrestrial in the maritime mobile band*.

2.5 The VDE-SAT function of VDES should provide an efficient satellite data transfer link. The technical characteristics should meet the requirements specified in Recommendation ITU-R M.2092 annex on *Common technical elements of VHF data exchange system* and with the annex on *Technical characteristics of VHF data exchange-satellite operating in the VHF maritime mobile satellite band*.

3 Capability

3.1 VDES should support the functions of ASM, VDE-TER and VDE-SAT specified in this performance standard in addition to the AIS functions specified in resolution MSC.570(109).

3.2 In addition, VDES should be capable of:

.1 selecting the communication component which is controlled through the user interface;

.2 receiving digital data according to Recommendation ITU-R M.2092 and output through the user interface;

.3 transmitting digital data according to Recommendation ITU-R M.2092 as input via the user interface; and

.4 operating continuously under all modes of operations.

4 User interface

4.1 The human-machine interface should include a keyboard and display for configuration, monitoring and control.

4.2 To enable a user to access, select and display the information on a separate system, the VDES should be provided with at least one interface conforming to an appropriate international marine interface standard.[3]

[2] See SN.1/Circ.289 and those identified by IALA List of reference for ASM.

[3] IEC 61162 series.

5 Identification

5.1 Shipborne VDES stations should be uniquely identified with a unique numerical identifier as defined by the most recent version of Recommendation ITU-R M.585 on *Assignment and use of identities in the maritime mobile services*.

6 Information

6.1 VDES information consists of AIS, ASM and other information

6.2 AIS information is defined by resolution MSC.570(109) and should be exchanged by the AIS component of VDES.

6.3 Other information is information other than AIS and ASM and should be exchanged by VDE-TER and VDE-SAT component of VDES.[4]

7 Security

7.1 Cybersecurity

.1 Since VDES is networked with other navigational/communication equipment or systems on board, appropriate cybersecurity measures conforming to international standards such as IEC 61162-460 and IEC 63154 should be provided.

7.2 Integrity and authentication

.1 VDES should be capable of verifying a digital signature to ensure the integrity of the data and the identity of the sender; and

.2 VDES should be capable of providing authentication of AIS messages.

8 Operational readiness time

The system should be operational within two minutes of being switched on by the user.

9 Power supply

VDES and associated equipment should be powered by the ship's main and emergency sources of electrical energy. In addition, it should be possible to operate VDES and associated equipment from a reserve source of electrical energy.

***

[4] *Guidelines for the operational use of VHF Data Exchange System (VDES)* (MSC.1/Circ.[…]).

ANNEX 27

DRAFT MSC CIRCULAR

GUIDELINES FOR THE OPERATIONAL USE OF SHIPBORNE VHF DATA EXCHANGE SYSTEM (VDES)

1 The Maritime Safety Committee, at its […] session (date), adopted by resolution MSC.[…(..)], amendments to chapter V of the International Convention for the Safety of Life at Sea, 1974 ("the Convention"), introducing VHF data exchange system (VDES) as an alternative shipborne navigational equipment and system to comply with the existing requirements of the automatic identification system (AIS). Relevant performance standards for VDES were also developed and disseminated by resolution MSC.[…(...)].

2 Recognizing that AIS is one of the four components of VDES, which allows the existing AIS to coexist with VDES, with a view to providing a timely guidance for the onboard operational use of VDES, the Committee approved the "Guidelines for the onboard operational use of shipborne VHF data exchange system (VDES)" set out in the annex.

3 Member States are invited to bring these Guidelines to the attention of all concerned, and to take into account the Guidelines when using shipborne VDES for the operational use.

ANNEX

GUIDELINES FOR THE OPERATIONAL USE OF SHIPBORNE VHF DATA EXCHANGE SYSTEM (VDES)

Purpose

1 These guidelines have been developed for the safe and effective use of shipborne VHF Data Exchange System (VDES), in particular to inform the mariner and shore-based station operators about the operational use, limits and potential use of VDES including the international sharing of VDES applications. Consequently, VDES should be operated taking into consideration the information contained within these guidelines.

2 VDES has four components comprising of Automatic Identification System (AIS), Application-Specific Messages (ASM), VHF Data Exchange terrestrial (VDE-TER) and VHF Data Exchange satellite (VDE-SAT).

3 The AIS component of VDES is equivalent to AIS as defined in SOLAS regulation V/19 and should be operated and used in accordance with the *Revised guidelines for the onboard operational use of shipborne automatic identification systems (AIS)* (resolution A.1106(29)).

4 Although VDES is capable of transmitting and receiving digital data on safety/security related information, the frequencies allocated for VDES are not used for distress and safety communication under the Global Maritime Distress and Safety System (GMDSS) that are protected by the ITU Radio Regulations, including appendix 15. Moreover, the frequencies used by VDE-SAT (Earth-to-space and space-to-Earth) are only allocated on a secondary basis. The user should not consider the data and information received by VDES as GMDSS information.

5 VDES itself is a communication equipment and exchanges digital data between other VDES stations. VDES equipment may be connected with other navigational equipment or systems such as radar, Electronic Chart Display and Information System (ECDIS), INS and may also be connected to other equipment such as an onboard computer in order to work as a communication system. Therefore, these guidelines are aimed at users, operators and stakeholders of VDES both on board and ashore for providing guidance to ensure the safe and efficient operational use of VDES as a whole communication system.

6 AIS is a stand-alone system which is also a component of VDES, however any additional functionalities or communication capabilities provided by VDES beyond its AIS component, even if offering similar functions or services to AIS, are not to be considered equivalent to AIS under SOLAS regulations.

CAUTION

Not all ships carry AIS or VDES

The officer of the watch (OOW) should always be aware that other ships, in particular leisure craft, fishing boats and warships, and some coastal shore stations including Vessel Traffic Service (VTS) centres, might not be fitted with VDES even when transmitting AIS information.

The OOW should always be aware that AIS or VDES fitted on other ships, under certain circumstances, may be switched off on the master's professional judgement.

7 The SOLAS Convention requires AIS or VDES to be fitted on certain ships. In addition, specific ship types (e.g. warships, naval auxiliaries and ships owned/operated by Governments) are not required to be fitted with AIS or VDES. Also, small ships (e.g. leisure craft, fishing boats) and certain other ships may be exempt from carrying AIS or VDES. Moreover, ships fitted with AIS or VDES might have the equipment switched off. Users should note that the information provided by AIS or VDES may not be complete and may not accurately represent the location and movement of all shipping in the vicinity. Caution on the inherent limitations of AIS or VDES and their use in collision avoidance should therefore be observed.

Objective of VDES

8 VDES is intended to enhance the safety of life at sea, the safety and efficiency of navigation and the protection of the marine environment by means of exchange of data between maritime stations, ship-to-ship, ship-to-shore, shore-to-ship, ship-to-satellite and satellite-to-ship. Therefore, the purpose of VDES is to exchange digital data between ships, ship to shore directly or via satellite in addition to fulfilling the requirements of AIS. The digital data exchanged by VDES will be processed using applications installed in other equipment or system connected to VDES and portrayed on appropriate displays such as ECDIS.

Description of VDES

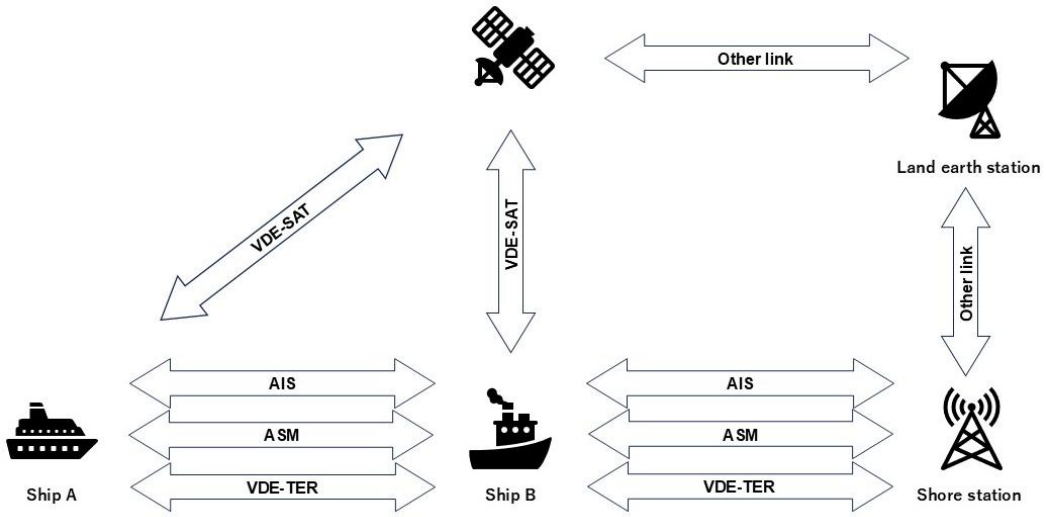


Figure 1 – VDES overview

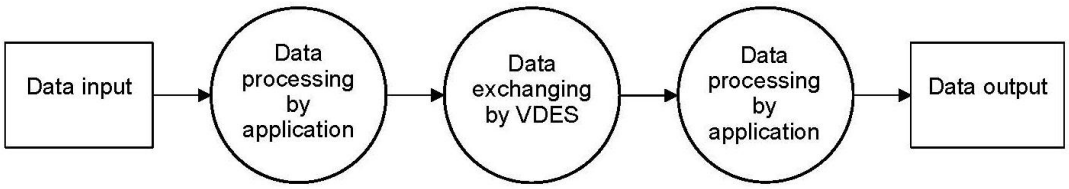


Figure 2 – Data flow using VDES

9 VDES can exchange digital data by automatically selecting one of its four components between ship and ship, ship and shore and ship and satellite (see figure 1). The data exchanged by VDES will be processed by application installed in the external equipment or system for human-to-machine or machine-to-machine communication (See figure 2).

10 VDES should give the highest priority to the AIS position reporting and safety-related information.

11 VDES generally achieves higher data transmission rates than AIS by employing wider bandwidths and advanced modulation methods. In a 100 kHz channel, VDE-TER, specifically, achieves a maximum raw data rate up to 32 times greater than AIS.

12 VDES is able to communicate with other VDES stations within VHF range. However, when advanced modulation methods are used, the range may be reduced. Additionally, when the transmission power of shipborne VDES is set to low (1 W) or disabled (except for AIS), owing to safety reasons such as port or harbour operations, the communication range may be reduced or limited to AIS-only communication.

13 The VDE-SAT has the potential to offer global coverage, contingent on satellite orbits and the number of satellites deployed and earth/ground stations. If VDE-SAT is used, then interference to terrestrial signals needs to be considered in relation to the service area of the VDE-SAT.

Application-Specific Messages (ASM)

14 VDES, like AIS, can send and receive Application-Specific Messages (ASM) using AIS channels (AIS 1 and AIS 2). For ASM, reference should be made to the *Guidance on the use of AIS Application-Specific Messages* (SN.1/Circ.289) and the *Guidance for the presentation and display of AIS Application-Specific Messages information* (SN.1/Circ.290).

15 VDES contains a designated ASM component using designated VHF channels (ASM 1 and ASM 2) with a transmission rate of 19.2 kbps, which is higher than AIS. This ASM component was originally designed to migrate ASM in AIS to ASM component of VDES in order to avoid the overload of AIS VHF Data Link (VDL).

16 Therefore, administrations are encouraged to use VDES ASM when the overload of AIS VDL is observed. However, since not all ships carry VDES even when transmitting AIS information, the administration should take careful consideration before using VDES ASM.

Operational use of VDES

17 The use of VDES is implemented by the operation of the external equipment or system using its applications. Therefore, the ship's crew should be familiarized with the operation of the equipment or system in accordance with regulation I/14 of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and with the International Safety Management (ISM) Code. In addition, the shoreside users should be familiarized with its operation through education and training of the equipment and system.

Human-machine interface

18 Navigational information sent via VDES and presented on a display for navigation-related data should comply with the *Performance standards for the presentation of navigational information on shipborne navigation displays* (resolution MSC.191(79), as amended) and the *Interim guidelines for the harmonized display of navigation information received via communication equipment* (MSC.1/Circ.1593). The symbols used in the display are defined in the G*uidelines for the presentation of navigation-related symbols, terms and abbreviations* (SN.1/Circ.243, as revised), or other relevant international standards,[1] therefore, the user should be familiarized with these symbols.[1]

[1] IHO Publication S-52 – Specifications for Chart Content and Display Aspects of ECDIS and S-101 – Portrayal Catalogue (see appendix 1) and S-98 and IEC 62288/Ed.3.

Messages and applications

19 Messages exchanged through VDES are AIS messages defined in the most recent version of the Recommendation ITU-R M.1371, ASM messages defined in the *Guidance on the use of AIS application-specific messages* (SN.1/Circ.289), or regionally or locally registered by authorities or the International Organization for Marine Aids to Navigation (IALA)[2] and other data or message structure approved by the authorities.

20 In order to ensure the worldwide harmonized implementation of message exchange among VDES, these data or message structure should be approved by the authority and the authority is encouraged to share the data or message structure with its associated application to other authorities.

21 A core capability of VDES is to provide secure AIS functionality by ensuring the integrity and authenticity of transmitted AIS messages. VDES also supports the use of virtual aids to navigation (vAtoN), extending their coverage by utilizing satellite capabilities. In addition to these core functions, VDES can be used as a communication platform for various other services, contributing to improved maritime safety, security and operational efficiency.

22 When a message is related to Maritime Services in the context of e-navigation listed in the *E-navigation strategy implementation plan – update 1* (MSC.1/Circ.1595), the authority is encouraged to contact the domain coordinating body before submitting to the Organization for the coordination with other similar messages in order to avoid the duplication of similar messages.

23 Applications to the messages should be developed in accordance with the *Guideline on software quality assurance and human-centred design for e-navigation* (MSC.1/Circ.1512).

Cybersecurity

24 In order to ensure the appropriate cyber risk management on VDES, the user should understand and comply with the *Guidelines on maritime cyber risk management* (MSC-FAL.1/Circ.3, as revised).

25 In order to secure communication through VDES, it is recommended to utilize digital identities to authenticate and encrypt messages (when necessary), ensuring data integrity and trust between users of the system.

Integrity and Authentication

26 When VDES is used for ensuring the integrity of the data and the identity of the sender by verifying digital signature, the provision of the digital signature should be implemented by the authority.

Reference documents

- International Convention for the Safety of Life at Sea, 1974, chapter V
- *Revised guidelines for the onboard operational use of shipborne automatic identification systems (AIS)* (resolution A.1106(22))

[2] IALA Guideline R0144 and G1095 Harmonized Implementation of Application-Specific Messages (ASM).

- Introduction of VHF data exchange system (VDES) into the IMO regulatory framework (resolution MSC.[….])

- Performance standards for shipborne VHF data exchange system (VDES) (resolution MSC.[….])

- ITU Radio Regulations, appendix 18, table of transmitting frequencies in the VHF maritime mobile band

- Technical characteristic for a VHF data exchange system in the VHF maritime mobile band (The most recent version of Recommendation ITU-R M.2092)

***

ANNEX 28

RESOLUTION MSC.581(110)
(adopted on 27 June 2025)

REVISED RECOMMENDATIONS FOR ENTERING ENCLOSED SPACES ABOARD SHIPS

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO its adoption, by resolution A.864(20), of *the Recommendations for entering enclosed spaces aboard ships*, and by resolution A.1050(27), of the *Revised recommendations for entering enclosed spaces aboard ships*, incorporating therein recommendations for entering cargo spaces, tanks, pump-rooms, fuel tanks, cofferdams, duct keels, ballast tanks and similar enclosed spaces,

RECALLING FURTHER that SOLAS regulation III/19.3.6 requires enclosed space entry and rescue drills, SOLAS regulation XI-1/7 requires the carrying of atmosphere testing instrument for enclosed spaces, and SOLAS chapter IX and the ISM Code require management for the safe operation of ships,

RECALLING that the Maritime Safety Committee is requested to keep the revised recommendations under review and amend them as necessary,

BEING CONCERNED about the continued loss of life resulting from personnel entering shipboard spaces in which the atmosphere is unable to support life, owing to oxygen depletion, oxygen enrichment, toxicity or flammability,

BEING AWARE of the work undertaken in this regard by the International Labour Organization, Governments and segments of the private sector,

RECOGNIZING that organizational leadership plays a crucial role in successful implementation of this guidance by empowering shipboard staff to make the right decisions,

HAVING CONSIDERED, at its […] session, the recommendation made by the Sub-Committee on Carriage of Cargoes and Containers at its tenth session,

1 ADOPTS the *Revised recommendations for entering enclosed spaces aboard ships*, as set out in the annex to the present resolution;

2 INVITES Governments to bring the annexed Revised Recommendations to the attention of shipowners, ship operators, seafarers, port and terminal operators and port workers, urging them to apply them, as appropriate, to all ships and operations;

3 INVITES the Assembly to revoke resolution A.1050(27) and to endorse the action taken by the Maritime Safety Committee.

ANNEX

REVISED RECOMMENDATIONS FOR ENTERING ENCLOSED SPACES ABOARD SHIPS

Preamble

The objective of these recommendations is to encourage the adoption of safety procedures and the development of sound practices aimed at preventing casualties to, and enhancing the safety of, personnel entering or working in enclosed spaces where there may be an oxygen-deficient, oxygen-enriched, flammable and/or toxic atmosphere. Additionally, in the event of an emergency within an enclosed space, these recommendations provide guidance for an appropriate, planned and considered response complying with ship-specific enclosed space rescue plans.

Investigations into the circumstances of enclosed space accidents have shown that a failure to systematically identify the hazards, assess the risks and implement an appropriate entry procedure remains a significant factor in many accidents. Likewise, the complex structure of some spaces on board ships creates problems with appropriate ventilation, illumination and movement within the space. Organizational leadership on ship and shore plays a crucial role in successful implementation of this guidance by empowering shipboard staff to make the right decisions.

These recommendations apply to all types of ships and provide guidance to ship operators, seafarers and shore personnel to work on board ships. It should be noted that on ships where entry into enclosed spaces may be infrequent, for example, on certain passenger ships or small general cargo ships, the dangers may be less apparent, and accordingly there may be a need for increased vigilance.

These recommendations are intended to complement national laws or regulations, accepted standards or particular procedures which may exist for specific trades, ships or types of shipping operations.

It may not be practicable to apply all of these recommendations to all situations; however, when applying these recommendations becomes impracticable, every endeavour should be made to observe the intent of the recommendations, and attention should be paid to the hazards that may be involved in the specific entry and mitigations required to reduce the risks to an acceptable level.

1 INTRODUCTION

The atmosphere in any enclosed space may be oxygen-deficient or oxygen-enriched and/or contain flammable and/or toxic gases or vapours. Such unsafe atmospheres could also subsequently occur in a space previously found to be safe. Unsafe atmospheres are likely to be present in spaces that are connected to a space containing a hazardous atmosphere and may also be present in spaces adjacent to those spaces where a hazard is known or suspected to be present.

1.1 An unsafe atmosphere can also quickly occur in a space previously found to be safe, including cargo holds and tanks where the hatch covers and tank covers have been open for some time. Unsafe atmospheres can occur in frequently visited working areas and stores, such as forecastle head spaces, pump-rooms, compressor rooms, inert gas rooms and other spaces that are adjacent to, or connected to, spaces containing a hazardous atmosphere. These spaces include cargo holds containing cargo that depletes oxygen and/or emits toxic, flammable or explosive gases, or is under fumigation.

1.2 An unsafe atmosphere can also occur in void spaces, cofferdams, pipe tunnels and also in accommodation areas and engine-rooms adjacent to or connected to cargo holds containing hazardous cargo or under fumigation due to a failure in the means of sealing the connection between the cargo space and the adjacent spaces.

1.3 The emission of toxic, flammable or explosive gases from cargo tanks, fuel tanks, slop tanks and sewage tanks can also give rise to a potentially dangerous situation around open access hatches, manholes and ventilators on deck.

2 DEFINITIONS

2.1 *Enclosed space* means a space which may contain a hazardous atmosphere or lack of oxygen and has any of the following characteristics:

.1 limited openings for entry and exit;

.2 inadequate ventilation; or

.3 not designed for continuous human occupancy.

This includes but is not limited to spaces that are diverse in their characteristics such as cargo holds, bilge spaces, ballast and other tanks, pump-rooms, chain lockers and engine crankcases.

2.2 *Connected space* means a space that is connected, by either permanent or temporary means (such as a door), to a source space that may contain a hazardous atmosphere. For clarity, a space separated by a manual door, even if watertight, should be considered as "connected" as it is impossible to tell from outside the space whether it is open or closed or indeed properly sealed. A connected space should be treated as containing a hazardous atmosphere until testing proves otherwise. The nature of the connection may lead to a "trapped hazardous atmosphere".

2.3 *Adjacent space* means a space that shares a common boundary with a compartment that may contain a hazardous atmosphere. Such a space has no openings, temporary or permanent, into the hazardous compartment whatsoever and is designed to be a contiguous barrier. Such a space may only contain a hazardous atmosphere in the event of failure of that barrier. Precautions should relate to the possibility of such a failure.

2.4 *Trapped Hazardous Atmosphere* means a hazardous atmosphere that may be trapped in a connected space in a manner that causes that space’s atmosphere to fill and/or to empty at a different rate to the source space. Such a space, while recognized as containing the same atmosphere, should be treated independently to the source space, and should be assumed to contain a hazardous atmosphere until proved otherwise by testing. For example, a trapped atmosphere may remain even after the cargo in the source space is discharged.

2.5 *Competent person* means a person with an operational level of competency to make an informed assessment of the likelihood of a dangerous atmosphere being present or subsequently arising in the space.

2.6 *Responsible person* means a person in a management level on board a ship (i.e. master, chief mate, chief engineer officer or second engineer officer) of competency and authorized by the shipping company to permit entry into an enclosed space.

2.7 *Attendant* means a person maintains a watch over those entering the enclosed space, to maintain communications with those inside the space and to initiate the emergency procedures in the event of an incident occurring.

2.8 *Enclosed Space Register* means a ship-specific register which lists all enclosed spaces on board the ship, along with their connected spaces and adjacent spaces, their hazards, associated risk mitigations if applicable, and how the atmosphere in these spaces may change depending upon the nature of cargo carried or the content of the space, and which forms a part of the safety management for enclosed spaces.

3 SAFETY MANAGEMENT FOR ENTRY INTO ENCLOSED SPACES

3.1 A safety strategy should be adopted in order to prevent accidents on entry into enclosed spaces in a comprehensive manner by the company, in consultation with the ship. This should include an **Enclosed Space Register**, which should be produced on a ship-by-ship basis to identify enclosed spaces, the hazards of those spaces, assessment of risks under the differing conditions likely to arise in the space and the risk mitigation measures required to be put into place prior to entry. This should also include an assessment of how the atmosphere in these enclosed spaces may be impacted by the contents of the spaces themselves, such as in case a ship stores treated sewage or grey water temporarily in its ballast water tanks, or the contents of connected spaces or adjacent spaces, including cargo, fumigants, fuel oils, slops, oxygen-depleting conditions and the physical or structural arrangement of the space.

3.2 The company should ensure that all relevant information relating to the hazards of the cargo, as submitted by the shipper in accordance with the applicable requirements of SOLAS regulation VI/2, the International Maritime Solid Bulk Cargoes Code (IMSBC Code), the International Maritime Dangerous Goods Code (IMDG Code), the IBC Code and the International Gas Carrier Code (IGC Code), is provided in a format that is understandable to the ship's crew and distributed to those on board who may be exposed to these hazards.

3.3 The company should ensure that the procedures for entering enclosed spaces are included and implemented among the key shipboard operations concerning the safety of the personnel and the ship, in accordance with paragraphs 6.4, 7 and 12.3 of the International Safety Management (ISM) Code.

3.4 The company should ensure that all relevant crew members are given adequate training in the safety management of enclosed spaces as per paragraphs 6.3 and 6.5 of the ISM Code.

3.5 The company should ensure that adequate time has been allowed for any planned enclosed space activity, and that undue time pressure, either explicit or implied, is avoided as this has been found to be a causal factor of many enclosed space accidents.

3.6 The company should elaborate a procedural implementation scheme which provides for comprehensive training in the maintenance, calibration and use of atmospheric testing equipment in such spaces. This training should be recorded, and individual crew members who have been deemed competent in the maintenance, calibration and use of atmospheric testing equipment should be listed.

3.6.1 The competent and the responsible persons should be trained in enclosed space hazard recognition, evaluation, measurement, control and elimination, using standards acceptable to the Administration. The competent person should have received adequate training along with sufficient theoretical knowledge and practical experience to make an informed assessment of the likelihood of a dangerous atmosphere being present or subsequently arising in the space. The responsible person should have sufficient knowledge of the procedures to be established and complied with on board and received adequate training, in order to ensure that an enclosed space is safe for entry and occupancy. The attendant should be adequately trained within the safety management system.

3.6.2 All crew members should be trained, as appropriate, in enclosed space safety, including familiarization with onboard procedures for recognizing, evaluating and controlling hazards associated with entry into enclosed spaces.

3.7 The company should identify and provide the necessary equipment such as ventilation devices, atmosphere testing equipment, breathing apparatus and personnel recovery apparatus to facilitate safe entry and rescue from an enclosed space. The equipment provided should be suitable for the intended use. A careful study of the operational profile should be carried out and all necessary equipment should always be on board in operational condition. Consideration should be given to the appropriate use of technology to assist in the hazard identification and mitigation of enclosed space entry. Crew members should be trained in the use of equipment necessary to facilitate rescue from an enclosed space and a record of this training should be maintained.

3.8 The company should ensure that rescue drills from enclosed space identified in their Enclosed Space Register are undertaken regularly as required by SOLAS regulation III/19.3.6 using the equipment provided to facilitate a rescue from an enclosed space. Such drills should focus on different aspects of operations involving enclosed spaces. SOLAS regulation III/19.3.6 requires:

.1 checking and use of personal protective equipment required for entry;

.2 checking and use of communication equipment and procedures;

.3 checking and use of instruments for measuring the atmosphere in enclosed spaces;

.4 checking and use of rescue equipment and procedures; and

.5 instructions in first aid and resuscitation techniques.

3.9 Internal audits by the company and external audits by the Administration of the ship's safety management system should verify that the established procedures[1] are followed and are consistent with the safety strategy referred to in these recommendations.

3.10 The company should establish criteria to manage additional risks involved during simultaneous operations (SIMOPS) where one of the operations includes an enclosed space entry. The criteria should consider the assessment of personnel and resources available in case of an emergency following an enclosed space entry.

[1] Established procedures include resolution A.1050(27) as amended, the IMSBC Code, the BLU Code, the IMDG Code, the IBC Code, the IGC Code, *Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds* (MSC.1/Circ.1264), *Guidelines on tank entry for tankers using nitrogen as an inerting medium* (MSC.1/Circ.1401) and other accepted standards and industry codes of practice, as relevant.

3.11 The company should ensure that single person entry into an enclosed space is not permitted.

4 IDENTIFICATION OF THE HAZARDS AND ASSESSMENT OF RISK

4.1 The company should ensure that a risk assessment is conducted to identify all enclosed spaces on board the ship and that the identified enclosed spaces are recorded in the Enclosed Space Register, which should be maintained on board the ship as well as ashore. This Enclosed Space Register and risk assessment should be kept up to date as appropriate to ensure its continued validity, particularly after loading and during the carriage of cargoes which may adversely affect the safety of the atmosphere within a space. A reassessment should also be made when the contents of the space change, such as in case a ship stores treated sewage or grey water temporarily in its ballast water tanks. The company should consider the use of appropriate technology to assist in the hazard identification and mitigation. The Enclosed Space Register and risk assessment should form the basis of the development of the enclosed space emergency response plan (appendix 1). It is recommended that the enclosed space emergency response plan be reviewed after each drill so that its effectiveness can be assessed and, if necessary, improvements made.

4.2 As entries for enclosed spaces other than cargo spaces may be different, there is a need to record information for the benefit of personnel involved. Every ship should have an Enclosed Space Register, the information within which may form the basis of a risk assessment. The Enclosed Space Register should contain:

.1 physical layout of the space and access and egress points, including of connected spaces, if any;

.2 physical hazards in the space, e.g. vertical ladders, unguarded openings, poor lighting, wet or slippery conditions, excessive heat;

.3 connection to adjacent spaces;

.4 specific hazards within the space, for example, the effect of ballast water treatment method on the atmosphere within ballast tanks;

.5 if used, information related to additional technology, helping to determine enclosed space condition;

.6 information related to fixed and portable ventilation systems including equipment and where the equipment is stored;

.7 estimated time taken to achieve the air changes for safe entry, using forced or natural ventilation;

.8 lighting and means for temporary lighting including intrinsically safe lighting where appropriate;

.9 means for atmosphere testing;

.10 any pertinent information that would assist the risk assessment process;

.11 locking and "Safe to enter"/"Unsafe to enter" signage arrangements; and

.12 the equipment necessary to facilitate emergency rescue from the space.

4.3 In order to ensure safety from the outset, entry and occupancy, a competent person should make an assessment of any potential hazards in the space to be entered, taking into account the characteristics of the previous and current cargo carried with Safety Data Sheets (SDS) and cargo information, ventilation of the space, coating of the space and other relevant factors. Opening of an enclosed space should be subject to a risk assessment, taking into consideration the potential for release of dangerous gases or potential to create an explosive atmosphere: the competent person's assessment should determine the potential for the presence of an oxygen-deficient, oxygen-enriched, flammable or toxic atmosphere, which includes carbon monoxide (CO) and carbon dioxide (CO_2) as well as other toxic or asphyxiant gases. The competent person should bear in mind that the ventilation procedures for an adjacent or connected space may be different from those for the enclosed space itself. The details of the assessment should be recorded in a standard format, and maintained on board the ship.

4.4 The nature of the hazards that may be present should be fully understood by those on board the ship, both crew and shore-based personnel, and those ashore managing the ship.

4.5 The procedures to be followed for testing the atmosphere in the space and for entry should be decided on the basis of the assessment. These will depend on whether the assessment shows that:

.1 there is minimal risk to the health or life of personnel entering the space; or

.2 there is no immediate risk to health or life, but a risk could arise during the course of work in the space; or

.3 a risk to health or life is identified.

4.6 Where the assessment indicates minimal risk to health or life or potential for a risk to arise during the course of work in the space, the precautions described in sections 5 to 8 and 10 should be followed, as appropriate.

4.7 Where the assessment identifies a risk to life or health, if entry is to be made, the additional precautions specified in section 9 should also be followed.

4.8 Throughout the assessment process, there should be an assumption that the space to be entered is considered as hazardous until positively proved to be safe for entry.

5 AUTHORIZATION OF ENTRY

5.1 No person should open or enter an enclosed space unless authorized by the master or a responsible person nominated by the master and the appropriate safety procedures laid down for the particular ship have been followed.

5.2 Entry into enclosed spaces should be planned and the use of an entry permit system, which may include the use of a checklist, should always be used where the assessment identifies any risk to health or life. Prior to the entry of a space, an enclosed space entry permit should be issued by the master or the responsible person nominated by the master, and complied with at all times by the competent person included in the work especially those who enter the space. An example of the enclosed space entry permit is provided in appendix 2. The validity of the permit should be specified based on the risk assessment and should never be longer than eight hours.

5.3 Additional permits may be required depending upon the ship's safety management system (SMS) and the activity being planned within the enclosed space. These permits may include energy isolation permits, electrical isolation permit, hot work permit, working at height permit or the completion of documents such as Job Hazard Analysis.

5.4 Shore personnel should be provided with information on the hazards associated with enclosed spaces that may be present aboard the ship.

6 GENERAL PRECAUTIONS

6.1 Access to enclosed spaces should be carefully managed on ships where shore personnel regularly enter cargo spaces to load and discharge cargoes, especially on bulk carriers ~~and~~ general cargo ships. These recommendations are complementary to the requirements of the International Ship and Port Facility Security (ISPS) Code. It is recommended that a basic schematic plan of the ship's spaces should be placed at the gangway or at other access points of the ship clearly indicating which spaces are safe to enter, and which spaces are not. The plan should outline the enclosed space entry procedures that should be complied with by both ship and shore personnel before any entry is permitted. The use of simple safe to enter and unsafe to enter symbols is recommended. The plan should be time-stamped and dated and amended as necessary by the responsible person. This may also be beneficial on ships where large numbers of shore personnel are being employed on the ship, such as in dry dock or ship repair facilities. An example of a ship's schematic plan is contained in appendix 3.

6.2 Before any personnel are authorized to enter any cargo space containing any cargo, the competent person should carry out a risk assessment of the cargo; identification of the physical characteristics of the cargo space(s) concerned; and the operations to be carried out, and the responsible person should:

.1 where it is necessary for shore personnel to enter any such spaces, conduct a pre-operational risk assessment prior to commencement of cargo operations or arrival of shore personnel. When hazards are identified a joint risk assessment with terminal representatives responsible for operations on board the ship, or with other appropriate shore personnel, should be conducted; and

.2 identify and agree to the precautions required during entry and enclosed space entry permit arrangements to be used.

6.3 Entry doors or access hatches leading to enclosed spaces should at all times be secured against entry unless the spaces have been risk assessed, atmospherically tested as required and declared safe for entry. The ship may use a system of seals similar to those recommended in the ISPS Code. Suitable portable signage, which is easily understandable by the vessel's crew and also by shore personnel engaged on the ship at this time and in the port, indicating the hazards should be posted on entry doors or access hatches leading to an enclosed space. An example of such signage is contained within appendix 3. These signs should be updated when the space becomes safe for entry or when a safe space becomes unsafe.

6.4 A door or hatch cover which is opened to provide natural ventilation of an enclosed space may, wrongly, be taken to be an indication of a safe atmosphere and therefore it is recommended to station an attendant at the entrance or use a mechanical or physical barrier, such as a locked bar or chain positioned across the opening with an attached warning sign, to prevent accidental entry. It is recommended that operations such as these are included in the watch handover activity.

6.5 The master or the responsible person should determine that it is safe to enter an enclosed space by ensuring that:

.1 potential hazards have been identified in the risk assessment and as far as possible isolated or made safe;

.2 the space has been thoroughly ventilated by natural or mechanical means to remove any toxic or flammable gases identified in the hazard identification process gases;

.3 the atmosphere of the space has been tested using certified and calibrated instruments to ascertain that the space contains 20.9% oxygen. If the testing indicates that the level of oxygen is less than 20.9%, or indicates the presence of even low levels of flammable or toxic gases, then the space should be treated as one where the atmosphere is known or suspected to be unsafe, as described in section 9;

.4 the space has been declared safe for entry and properly illuminated;

.5 a suitable system of communication between all parties for use during entry has been agreed and tested, and the evacuation signals have been agreed upon;

.6 personnel entering the space are wearing personal gas detection equipment that has been properly calibrated and is capable of monitoring the levels of oxygen, carbon monoxide and any other gases identified in the risk assessment;

.7 an attendant has been nominated and properly instructed;

.8 rescue and resuscitation equipment has been positioned, tested and ready for immediate use at the entrance to the space and a rescue plan detailing the rescue arrangements has been agreed. Where ship or shore personnel are working in more than one cargo space at the same time, the rescue equipment should be positioned at a designated central location. In the event of an emergency in any one space, all personnel working in other spaces should be instructed to stop work immediately and exit the space;

.9 personnel are provided with the appropriate personal protective equipment for the entry and subsequent tasks; and

.10 the required permits have been issued, authorizing entry.

6.6 The precautions in sub-paragraphs .6 to .8 of paragraph 6.5 above may not be applicable to every situation described in this section. The responsible person authorizing entry should determine whether personal gas detectors, an attendant and the positioning of rescue equipment at the entrance to the space are necessary.

6.7 Only trained and authorized personnel should be assigned the duties of entering, functioning as attendants or acting as members of rescue teams. Ships' crews with rescue and first aid duties should be drilled periodically as required by SOLAS regulation III/19.3.6 in rescue and first aid procedures. Training should include as a minimum:

.1 identification of the hazards likely to be faced during entry into enclosed spaces and whilst within the space, in particular the rapidity with which oxygen may be depleted in a space by corrosion or biological means especially in higher ambient temperatures. The pace at which oxygen gets depleted increases exponentially when ventilation is stopped (fan or other equipment in case of forced ventilation, and closing a vent or damper in case of natural ventilation) or other characteristics or properties of the contents or structure of the space. While higher ambient temperatures can increase the rate of oxygen depletion, it should be assumed that the rate of depletion will always be very rapid, regardless of the ambient temperature;

.2 an explanation of how the pace at which oxygen is depleted will increase exponentially when ventilation is stopped (fan or other equipment in case of forced ventilation, and closing a vent or damper in case of natural ventilation), or when hatch covers are closed;

.3 identification and use of the various sources of information on the hazards associated with individual solid bulk and liquid bulk cargoes, and the precautions to be adopted when entering spaces containing such cargoes, or their residues;

.4 awareness of the fact that when a person or persons in an enclosed space shows signs of adverse health effects, that they should always assume that these effects are due to an oxygen-depleted or toxic atmosphere in the space, and that they should not enter it themselves;

.5 recognition of the signs of adverse health effects caused by exposure to hazards during entry;

.6 knowledge and experience in the use of personal protective equipment required for entry;

.7 rescue, first aid, Cardio Pulmonary Resuscitation (CPR) techniques and evacuation procedures;

.8 knowledge and experience in the use of communication equipment and procedures;

.9 knowledge and experience in the use of instruments for measuring the atmosphere;

.10 knowledge and experience in the use of rescue equipment and procedures;

.11 knowledge of the IMO/WHO/ILO Medical First Aid Guide for Use in Accidents involving Dangerous Goods (MFAG), where appropriate; and

.12 knowledge of use of emergency and the first aid equipment for chemical tankers (IBC Code section 14.3) and for gas carriers (IGC Code section 14.3), where appropriate.

6.8 All equipment used in connection with entry should be in good working condition and inspected and tested prior to use.

6.9 As far as practicable, enclosed space entry should be carried out during hours of daylight or normal working hours of the ship to ensure ready availability of reserve personnel in the event of an emergency.

7 TESTING THE ATMOSPHERE

7.1 The gas detection equipment should be appropriate for the cargo that the ship has carried and is carrying considering information provided in the shipper's declaration, the Safety Data Sheets (SDS), the IMDG Code, the IMSBC Code, International Bulk Chemical Code (IBC Code) and the IGC Code. The gas detection equipment, including devices for testing CO_2, should be capable of operating correctly even in oxygen-depleted atmosphere.

7.2 Appropriate testing of the atmosphere of a space should be carried out with properly calibrated equipment by persons trained in the use of the equipment. The manufacturers' instructions should be strictly followed. Testing of the atmosphere of a space should be carried out before any person enters the space and at regular intervals thereafter until all work is completed. Where appropriate, the testing of the atmosphere of a space should be carried out at as many different levels and areas as is necessary to account for gas stratification, and obtain a representative sample of the atmosphere in the space. In some cases, it may be difficult to test the atmosphere throughout the enclosed space without entering the space (e.g. the bottom landing of a stairway or complex areas of the structure within the space) and this should be taken into account.

7.3 All ships should carry at least two sets of gas detection equipment as required by SOLAS regulation XI-1/7, taking into account the *Guidelines to facilitate the selection of portable atmosphere testing instruments for enclosed spaces as required by SOLAS regulation XI-1/7* (MSC.1/Circ.1477). Any ship which may carry a cargo capable of generating hazardous vapours and which requires regular entry into the cargo space for cleaning or inspection should carry two sets of gas detection equipment in addition to those required by SOLAS regulation XI-1/7 for assessing the risk to personnel entering the space. The use of flexible hoses or fixed sampling lines, which reach remote areas within the enclosed space, may allow for safe testing without the need to enter the space.

7.4 After completion of a suitable risk assessment targeted to the space to be entered steady readings of all of the following should be obtained:

.1 20.9% oxygen by volume;

.2 the level of carbon dioxide has been checked and is less than 0.5% by volume (5,000 ppm);

Note: National requirements may differ when determining the safe atmosphere range for gases stated above.

.3 less than 1% of lower flammable limit (LFL) on a suitably sensitive combustible gas indicator, where the assessment has determined that there is potential for flammable gases or vapours; and

.4 less than 50% of the occupational exposure limit (OEL) of any toxic vapours and gases.

7.5 If these conditions cannot be met, additional ventilation should be applied to the space and retesting should be conducted after a suitable interval. Entry should be allowed only after all the above conditions are met. When the atmosphere remains, or is suspected to be unsafe, then the guidance contained within section 9 should apply.

7.6 Any gas testing should be carried out with ventilation to the enclosed space stopped, and after conditions have stabilized, in order to obtain accurate readings.

7.7 Where the assessment has determined that there is potential for the presence of toxic gases and vapours, appropriate testing should be carried out, using fixed or portable gas or vapour detection and/or monitoring equipment. The readings obtained by this equipment should be below the occupational exposure limits for the toxic gases or vapours given in accepted national or international standards, in accordance with paragraph 7.4. It should be noted that testing for flammability or oxygen content does not provide a suitable means of measuring for toxicity, nor vice versa.

7.8 It should be emphasized that the internal structure of the space, cargo, cargo residues and tank coatings may also present situations where oxygen-deficient areas may exist, and should always be suspected, even when an enclosed space has been satisfactorily tested as being suitable for entry. This is particularly the case for spaces where the path of the supply and outlet ventilation is obstructed by structural members or cargo.

8 PRECAUTIONS DURING ENTRY

8.1 The atmosphere should be tested frequently whilst the space is occupied, and persons should be instructed to leave the space should there be any sign of deterioration in the conditions.

8.2 Persons entering enclosed spaces should be provided with calibrated and tested personal gas detection instrument or instruments that monitor the levels of oxygen, carbon dioxide, flammable gases or vapours, toxic gases (including carbon monoxide), and any other gases identified in the risk assessment.

8.3 Ventilation should be maintained while the space is occupied. After a break and before re-entry, the atmosphere must be retested, the results verified as being acceptable then recorded. In the event of failure of the ventilation system, any persons in the space should leave immediately.

8.4 Particular care should be taken when working on piping and valves within the space which may contain hazardous gases, vapours or liquids. If conditions change during the work, increased frequency of testing of the atmosphere should be performed. Examples of changing conditions are as follows – increase or decrease in ambient temperature, the need to use oxygen fuel torches or other welding equipment, the need to use a mobile plant, other activities in the space that may involve development of vapour such as cleaning debris, collecting sediments, painting within the enclosed spaces, changes in the ship's trim and list while working within the enclosed space. Conditions can also deteriorate during work breaks because of changes to the ventilation, the disturbance of bilge contents, sludge or stagnant water, or the leakage of external contaminants into the space. Depending on the result of the testing, a decision should be made as to whether it is safe to continue working.

8.5 In the event of an emergency, under no circumstances should the attendant enter the space before help has arrived and the situation has been evaluated to ensure the safety of those entering the space to undertake rescue operations. Only properly trained and equipped personnel should perform rescue operations in enclosed spaces.

9 ADDITIONAL PRECAUTIONS FOR ENTRY INTO A SPACE WHERE THE ATMOSPHERE IS KNOWN OR SUSPECTED TO BE UNSAFE

9.1 In preparing to enter an enclosed space, every effort should be made to ensure that it is safe to do so in order to undertake the activity required within the space. Entry into enclosed spaces where the atmosphere is known or suspected to be unsafe requires very careful consideration, including an assessment of the hazards, residual risks and mitigations that need to be undertaken. Spaces that have not been tested should be considered unsafe for persons to enter.

9.2 When considering the planned work activity within an enclosed space where the atmosphere is known or suspected to be unsafe, suitably designed and constructed breathing apparatus of positive pressure type should always be worn, and only personnel trained in its use should be allowed to enter the space. Air-purifying respirators, dust masks and canister face masks do not provide a supply of clean air from a source independent of the atmosphere within the space and should not be used. Emergency Escape Breathing Devices (EEBDs) are not suitable to use for entry into enclosed spaces.

9.3 Notwithstanding paragraph 6.5.6, persons entering enclosed spaces that may contain a suspected atmospheric hazard should be provided with calibrated and tested personal gas detector suitable for the gas or gases assessed as likely to occur in the space.

9.4 Rescue harnesses should be worn and unless impractical, lifelines should also be used. A means to facilitate evacuation from the enclosed space should be available and ready for use, as per emergency response plan.

9.5 Appropriate protective clothing should be worn, particularly where there is any risk of toxic substances or chemicals coming into contact with the skin of those entering the space.

9.6 The advice in section 11 concerning actions to be taken in an emergency is particularly relevant in this context.

10 HAZARDS RELATED TO SPECIFIC TYPES OF SHIPS OR CARGO

10.1 Dangerous goods in packaged form

10.1.1 The atmosphere of any space containing dangerous goods may put at risk the health or life of any person making an entry. Dangers may include flammable, toxic, corrosive or asphyxiant gases or vapours, residues on packages and spilled material. The same hazards may be present in spaces adjacent or connected to the cargo spaces. Information on the hazards of specific substances is contained in the IMDG Code, the SDS and the Shipper's Declaration. If there is evidence or suspicion that leakage of dangerous substances has occurred, the precautions specified in these recommendations should be followed.

10.1.2 Personnel required to deal with spillages or to remove defective or damaged packages should be appropriately trained and wear suitable breathing apparatus and protective clothing commensurate with the task.

10.2 Liquid bulk

The industry has produced extensive advice to managers, operators and crews of ships engaged in the bulk carriage of oil, chemicals and liquefied gases, in the form of specialist safety guides. Information contained in the guides on enclosed space entry amplifies these recommendations. In particular, for chemical tankers as defined in SOLAS regulation VII/8, the diversity of bulk liquid chemicals carried in some cargo tanks and the limitations in vapour detection technologies may pose complications that require specific and targeted mitigation.

10.2.1 Safety information

Safety information[2] for the correct handling and carriage of liquid bulk and gas cargoes is set out in the SDS or other cargo information provided by the shipper to the master. Such information should be made available to all ship and shore personnel involved in the handling of the cargo, cargo slops and tank cleaning.

10.2.2 Use of nitrogen as an inert gas[3]

Nitrogen is a colourless and odourless gas that, when used as an inert gas, causes oxygen deficiency in enclosed spaces and at exhaust openings on deck during purging of tanks and void spaces and use in cargo holds. It should be noted that one deep breath of 100% nitrogen gas will prove fatal.

10.3 Solid bulk

On ships carrying solid bulk cargoes, dangerous atmospheres may develop within cargo spaces, connected and adjacent spaces. The hazards may include flammability, toxicity, oxygen depletion, carbon dioxide and/or carbon monoxide generation, or self-heating, as identified in the shipper's declaration and/or in the individual schedules in appendix 1 of the IMSBC Code. Solid bulk cargoes listed in the IMSBC Code should be carried in accordance with the provisions of the Code, including precautions, atmosphere testing, ventilation and other requirements specified. Solid bulk cargoes that are not listed in the IMSBC Code should be carried in accordance with section 1.3 of the Code, including the conditions for carriage and handling as determined by the relevant competent authorities. Grain cargoes and timber cargoes other than those listed in the IMSBC Code[4] may also cause oxygen depletion and toxic gas emissions, primarily carbon dioxide, in cargo holds and connected and adjacent spaces.

10.3.1 Enclosed hold access trunks

10.3.1.1 In certain designs of hold access, a stair arrangement, sometimes referred to as the "Australian Ladder", substitutes for a vertical ladder. On some ships these are contained within enclosed protective structures that are open only at the top and bottom of the hold. When a cargo that presents the risk of a hazardous atmosphere is loaded, this "connected" space will quickly adopt atmospheric attributes similar to that of the source space. The enclosed Australian ladder access should not be used until it has been fully ventilated, tested and confirmed to be safe. It should be noted that such spaces are difficult to ventilate, unless cargo blocking the bottom of the ladder is removed.

10.3.1.2 When hatches are opened to ventilate the above cargo space at discharge, the hazardous atmosphere often gets trapped in the access trunk.

---

2 16.2.3.1 of the IBC Code and 18.3.1 of the IGC Code.

3 Refer to the *Guidelines on tank entry for tankers using nitrogen as an inerting medium* (MSC.1/Circ.1401).

4 Refer to the International Code for the Safe Carriage of Grain in Bulk (resolution MSC.23(59) (amended by resolution MSC.552(108)) and the Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 2011 (resolution A.1048(27)).

10.3.1.3 Where such type of access trunk is fitted on ships, the nature of the hazard should be identified outside the entrance to the space and should be listed in the Enclosed Space Register. When a cargo which may generate a hazardous atmosphere is loaded, the access door/hatch should be locked with a dedicated and unique locking arrangement, distinct from all other such arrangements, from the commencement of loading until the space is certified safe for entry by testing after completion of discharge.

10.3.1.4 Entry of personnel into a cargo hold using a hold vertical ladder should only be permitted when:

.1 the atmosphere in the hold has been tested and found to be safe;

.2 wearing a personal gas detector;

.3 wearing a safety harness; and

.4 an emergency response plan is in place.

10.3.2 Working spaces with connections to cargo holds

In certain designs of general cargo ships, bulk carriers and tankers, doors and ventilation trunks of cargo spaces, as well as pipework connecting to cargo spaces, are connected directly into working spaces such as forecastle workspaces, stores rooms, windlass hydraulics, bow thruster and other machinery rooms. When a certain cargo is stowed in the cargo space, there is a risk that gas or vapours from the cargo will penetrate into the connected working space. These working spaces should be identified as "connected spaces" and consideration should be given to use of certified safe type of electrical equipment for an explosive atmosphere. When the cargo space contains a hazardous atmosphere and, given the propensity for hazardous atmospheres to be trapped in those spaces, these connected spaces should continue to be considered hazardous until the atmosphere is ensured to be gas free by the test.

10.3.3 Oxygen-depleting cargoes and materials

A prominent risk associated with solid bulk cargoes is the potential for a hazardous atmosphere in an enclosed space due to the inherent nature of the cargo, including oxygen depletion and toxic or flammable gas emissions from materials that are flammable or toxic, or are liable to oxidation, self-heating, or to the emissions of toxic gases when wet. The individual schedules for solid bulk cargoes in the IMSBC Code list typical cargoes currently shipped in bulk, together with advice and guidance on their properties and methods of handling. Cargoes which possess a chemical hazard which could give rise to a dangerous situation on a ship are classified in the Code as group B. However, certain cargoes which are classified as group A or group C, including scrap metal, i.e. neither group A&B nor group B, can also possess properties which could give rise to a dangerous situation on a ship, depending on the condition and characteristics of the particular shipment. The cargoes named below are examples of cargoes that have caused many fatal accidents due asphyxiation, explosion and fire in cargo holds and adjacent and connected spaces on bulk carriers and general cargo ships:

.1 Coal;

.2 Wood products – general, including logs, timber, saw logs pulp wood, roundwood

.3 Wood chips and wood pellets;

.4 Metal Sulphide Concentrates, including zinc concentrates, lead concentrates and copper concentrates;

.5 Ferrous;

.6 Seed cake cargoes containing residues of processed oily vegetables including bran pellets, oil cake, palm kernel, copra and other residues as listed in the individual schedules for the different seed cake cargoes in the Code; and

.7 Scrap metal.

Grain cargoes and timber not in a bulk cargo form (stowed in cargo hold one by one) are also liable to cause oxygen depletion and the emission of CO_2 in cargo holds and adjacent spaces, while these cargoes are not covered by the IMSBC Code.

10.4 Hazards related to steel

10.4.1 For scrap steel cargoes or other steel-related spaces such as chain lockers, the process of oxidation will change the composition of the atmosphere by depleting oxygen through the process of rusting. Results of steel-related experiments are given in appendix 4.

10.4.2 The speed of the oxygen depletion varies depending on temperature, moisture content, degree of exposure of steel to air, etc.

10.5 Specific dangers associated with carbon dioxide

10.5.1 When organic cargoes are being transported the oxygen in the air is absorbed into the cargo and through microbiological degradation carbon dioxide is emitted.

10.5.2 The absorption of oxygen and the subsequent emission of carbon dioxide from the organic cargo has the potential to make the hold or connected space unsafe for humans. The process of oxidation of the cargo will produce an atmosphere within the hold or connected space unsafe for humans, especially where carbon dioxide has accumulated to form a concentrated pocket within the enclosed space.

10.5.3 The impact of release of carbon dioxide into the space in relatively low concentrations of 4% is that exposure may lead to serious oxygen depletion. This may result in permanent brain damage, coma, even death. The atmosphere in the space will be harmful to life, not only due to oxygen deficiency but also because of the toxic concentration of carbon dioxide.

10.5.4 Relying on existing tables of oxygen depletion levels and dangers may be inadequate when organic cargoes are being transported, as the oxygen levels in the cargo hold may remain in the region of 17% to 14% when a 4% or more CO_2 level is reached. The adoption of a more appropriate oxygen danger table relevant to the carriage of organic cargoes is vital to raise awareness of the dangers within the industry. See section 10.6.

10.5.5 The speed of the oxygen depletion and the emission of CO_2 will depend on temperature, cargo moisture content and permeability of the space in addition to atmospheric pressure variations.

10.5.6 It should be highlighted that death caused by carbon dioxide can precede death resulting from oxygen deficiency in organic types of cargoes. This issue should be understood by the person carrying out the hazard analysis.

10.5.7 Ships carrying organic solid cargoes in bulk should continue to test for CO_2 prior to entry into enclosed spaces and frequently thereafter, as organic cargoes continue to emit CO_2.

10.5.8 A carbon dioxide or other toxic gas laden atmosphere "looks normal" as there is no sensory indication to cause alarm regarding the dangers within the enclosed space.

10.6 Information on acceptable and unacceptable levels of gases

Appendix 5 provides information on acceptable and unacceptable levels of oxygen, carbon dioxide and carbon monoxide. Other national guidance may exist and should be taken into account as applicable.

10.7 Fumigation

When a ship's cargo is fumigated, the relevant recommendations[5] [6] [7] should be followed. Spaces connected to fumigated spaces should be treated as if fumigant gas could penetrate into them from the adjacent or connected cargo space. Apart from the fatalities due to mistaken, unauthorized or accidental entry into cargo spaces under fumigation, a significant proportion of the fatal accidents that have occurred during in-transit cargo fumigation have resulted from fumigant gas leaking into ships' accommodation areas, including cabins, as well as forecastle head spaces, ballast tanks, other adjacent spaces and on deck. The mishandling of fumigant materials has also caused fires and explosions on ships. Continuous monitoring of the atmosphere of connected and adjacent spaces that are designed for continuous occupation, or are frequently visited working areas, is recommended.

11 ACTION TO BE TAKEN IN THE EVENT OF AN EMERGENCY

11.1 The guidance contained in resolution A.1072(28)[8] should be understood and form the basis of any emergency response plan. In the event of an emergency in an enclosed space the ship's crew should follow the ship-specific enclosed space emergency response plan. In an emergency the ship's crew, or any shore personnel, should **NEVER** perform rescue entering an enclosed space independently, but should always follow the agreed rescue plan.

11.2 The urge to enter an enclosed space where an accident has occurred is immense and should be always resisted. Many enclosed space accidents have been compounded by the good intentions of inadequately equipped ad hoc rescue attempts where the would-be rescuers have themselves become casualties.

11.3 If in port, a simple explanation of the enclosed space procedures placed at the entry to the ship together with an agreed emergency response plan will greatly assist the efficient rescue of any casualties following an enclosed space accident occurring on board the ship. A clear understanding of the response required by ship and shore rescue teams will be most advantageous, even essential.

---

5 MSC/1/Circ.1264 on *Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds* as amended by MSC/1/Circ.1396 *Amendment to the recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds*.

6 MSC/1/Circ.1358 on *Recommendations on the safe use of pesticides in ships*.

7 MSC/1/Circ.1361/Rev.1 on *Revised recommendation on the safe use of pesticides in ships applicable to the fumigation of cargo transport units*.

8 Resolution A.1072(28) on *Revised guidelines for a structure of an integrated system of contingency planning for shipboard emergencies.*

11.4 It is critical that the ship has an enclosed space emergency response plan, which is easily understood, regularly practised, verified as effective and followed precisely. The emergency response plan should form a part of the company SMS.

11.5 Equipment should be provided for the ship's crew to utilize in the event of an enclosed space accident. Such equipment should fall into three main categories:

.1 Equipment to test and verify the enclosed space atmospheric conditions and determine the hazards to life and the mitigations necessary prior to entry;

.2 Equipment to ensure the safety of the rescue party such as self-contained breathing apparatus (SCBA), lifelines, harness, etc.; and

.3 Equipment to facilitate the safe recovery of a casualty, such as recovery hoist, stretchers and resuscitation equipment.

11.6 The rescue of a casualty should be undertaken in a steady, controlled and methodical way. The aim is the safe rescue of the casualty without needlessly endangering the lives of those undertaking the rescue operation.

11.7 An example of an Enclosed Space Emergency Response Plan is contained in appendix 1.

12 CONCLUSION

Failure to systematically identify the hazards of a space and the risks associated with entry can rapidly lead to fatality inside the space. Rigid observance of the principles and procedures outlined above will provide a reliable basis for assessing the risks of entering such spaces and taking the necessary precautions to counter the danger.

APPENDIX 1

EXAMPLE OF AN ENCLOSED SPACE EMERGENCY RESPONSE PLAN

Enclosed Space Emergency Response Plan

Speed is of great importance when responding to an enclosed space rescue situation. However, it should be borne in mind that ill-prepared rescue attempts, without proper equipment and human assistance, can lead to more casualties. The following are steps that should be taken during an enclosed space rescue situation:

.1 alarm has been sounded and information on the specific kind of emergency, including, location of the incident has been announced;

.2 crew muster at their designated muster location;

.3 consult the Enclosed Space Register or Permit to Work, where details of the specific enclosed space in question are given. Pay particular attention to unique details of the enclosed space such as vertical ladders in the space, Australian ladders, access and egress points and any others to make rescue easier;

.4 as per the drill plan, the rescue team should don the self-contained breathing apparatus (SCBA) and prepare to enter the space and await instructions from the on-scene commander;

.5 as time is of essence in enclosed space emergencies, the master should assess whether to alert the telemedical assistance service (TMAS) or to alert other medical assistance at shore to give support for the rescue team on board and give more time for the shore-based rescue resources to arrive to ship;

.6 in case the ship is at sea, possible deviation to a port of refuge should also be considered;

.7 rescue team should have an on-scene commander, who will lead the rescue while one or more members will be assisting the commander;

.8 the on-scene commander assesses the risks and the conditions for the rescue team and briefs on possible dangers present such as oxygen deficiencies, slippery surface, darkness, possible fire;

.9 the on-scene commander should guide the team to act in the quickest but safest manner. Noting also, the actions should not lead to further casualties;

.10 once the casualty has been reached, they should be evacuated from the space in the quickest and safest manner possible. Should there be more than one casualty, due regard should be given to rescue them in the quickest possible manner. However, in most cases, it is only possible to rescue them one after the other. The on-scene commander should decide on the order of rescue of the casualty. The use of a safe stretcher should be considered; and

.11 once the casualty is clear of the danger zone, the first aid team should administer first aid and, if necessary, conduct medical procedures such as CPR to revive the casualty. Shore medical assistance should be consulted.

APPENDIX 2

EXAMPLE OF AN ENCLOSED SPACE ENTRY PERMIT

This permit relates to entry into any enclosed space and should be completed by the master or the responsible person and by any persons working with the space including those entering the space, e.g. competent person and attendant.

General

Location/name of enclosed space

Reason for entry……..

This permit is valid from:_____ hrs Date……

to:_____ hrs Date……

(See Note 1)

Section 1 - Pre-entry preparation

(To be checked by the master or nominated responsible person)

	Yes	No
● Has the space been thoroughly ventilated by mechanical or natural means as appropriate?		
● Has the space been segregated by blanking off or isolating all connecting pipelines or valves and electrical power/equipment?		
● Has the atmosphere in the space been tested and found safe for entry? (See note 12)		
● Pre-entry atmosphere test readings:		
- oxygen %vol 20.9%: By:		
- flammable gas % LFL (less than 1%)		
- toxic gases ppm (less than 50% OEL of the specific gas) Time:		
- CO_2 less than 0.5% by volume (5,000 ppm)		
(See note 3)		
● Have arrangements been made for frequent atmosphere checks to be made while the space is occupied and after work breaks?		
● Have arrangements been made for the space to be continuously ventilated throughout the period of occupation and during work breaks?		
● Are access and illumination adequate?		
● Is the rescue equipment as identified appropriate for the space being entered, e.g. hoist, winch and tripod, ready for deployment?		

	Yes	No
• Is rescue and resuscitation equipment available for immediate use by the entrance to the space?		
• Has an attendant been designated to be in constant attendance at the entrance to the space?		
• Has the officer of the watch (bridge, engine-room, cargo control room) been advised of the planned entry?		
• Has a system of communication between all parties been tested and emergency signals agreed?		
• Are emergency and evacuation procedures established and understood by all personnel involved with the enclosed space entry?		
• Is all equipment used in good working condition and inspected prior to entry?		
• Are personnel properly clothed and equipped?		

Section 2 – Pre-entry checks

(To be checked by each person entering the space)

	Yes	No
● I have received instructions or permission from the master or responsible person nominated by the master to enter the enclosed space		
● Section 1 of this permit has been satisfactorily completed by the master or responsible person nominated by the master		
● I have agreed and understood the communication procedures		
● I have agreed upon a reporting interval of ------minutes		
● Emergency and evacuation procedures have been agreed and are understood		
● I am aware that the space must be vacated immediately in the event of ventilation failure or if atmosphere tests show a change from agreed safe criteria.		

Section 3 – Entry into a space where the atmosphere is known or suspected to be unsafe

(To be checked jointly by the master or responsible person nominated by the master and the person who is to enter the space)

	Yes	No
● Those entering the space are familiar and trained with the use of any breathing apparatus to be used		
● The breathing apparatus has been tested as follows:		
- gauge and capacity of air supply		
- low pressure audible alarm if fitted		
- face mask - under positive pressure and not leaking		

- The means of communication has been tested and emergency signals agreed

- All personnel entering the space have been provided with Personal gas monitors, portable lighting, and, where practicable, rescue harnesses lifelines

Yes No

- Those entering the space are familiar with the personal gas monitor they are wearing and its operation has been checked

Signed upon completion of sections 1, 2 and 3 by:

Master or nominated responsible person	Date	Time
Attendant	Date	Time
Person entering the space	Date	Time

Section 4 – Personnel entry
(To be completed by the responsible person supervising entry)

Names

Time in Time out

Section 5 – Completion of job
(To be completed by the responsible person supervising entry)

• Job completed	Date	Time
• Space secured against entry	Date	Time
• The officer of the watch has been duly informed	Date	Time

Signed upon completion of sections 4 and 5 by:

Responsible person supervising entry ..... Date ..... Time .....

THIS PERMIT IS RENDERED INVALID SHOULD VENTILATION OF THE SPACE STOP OR IF ANY OF THE CONDITIONS NOTED IN THE CHECKLIST CHANGE

Notes:

1 The permit should contain a clear indication as to its maximum period of validity. As a default, the maximum period should be eight hours. If persons exit the space and leave it unattended this voids the Permit and a re-inspection is required.

2 In order to obtain a representative cross section of the space's atmosphere, samples should be taken from several levels and through as many openings as possible. Ventilation should be stopped for about 10 minutes before the pre-entry atmosphere tests are taken, and then recorded.

3 Tests for specific toxic contaminants should be undertaken depending on the nature of the previous contents of the space.

APPENDIX 3

EXAMPLE OF AN ENCLOSED SPACE WARNING SIGNS

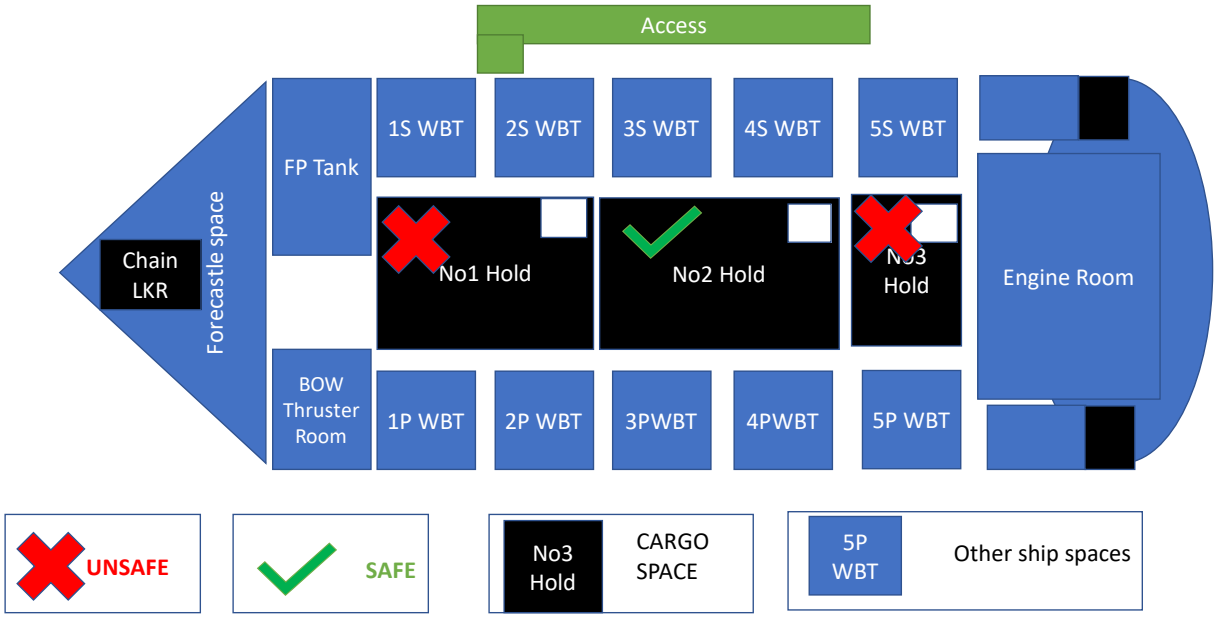
EXAMPLE OF A SIMPLIFIED SHIP SPACE DIAGRAM TO BE PLACED AT THE SHIPS ACCESS POINT

A space which is unsafe to enter, to be displayed at the entry points to the space. The descriptive text can be considered optional and may be displayed in the ship's operational language

A space which is safe to enter and all necessary measures to ensure the safety as required by the ships SMS have been implemented ensuring the safety of those entering it

To be displayed at the access point to the space

The descriptive text can be considered optional and may be displayed in the ship's operational language



Example of a simplified diagram to be placed at the ship's access point to assist shore personnel in identifying safe and unsafe spaces on board the ship.

APPENDIX 4

STEEL-RELATED EXPERIMENTS – TABLE OF FINDINGS

Type of steel-related experiment	Cargo type	Free airspace in hold (μ)	Temp °C	Depletion time in hours to oxygen level of:								
				20%	19.5%	18%	15%	12%	10%	6%	3%	1%
Closed Experiment	Scrap Metal	90%	10°C	0.96	1.45	3.44	8.04	13.84	18.08	28.30	37.38	-
Closed Experiment	Scrap Metal	90%	23°C	0.19	0.30	0.46	0.80	1.21	1.56	2.41	12.67	-
Open Vented	Scrap Metal	90%	10°C	1.26	1.91	4.14	10.33	17.97	24.06	38.84	52.38	75.75
Open Vented	Scrap Metal	90%	23°C	0.59	0.84	1.55	3.12	4.64	5.68	8.03	10.13	12.00
Chain Locker	Anchor Chain	94%	10°C	3.08	4.53	9.13	18.46	30.37	38.48	58.17	77.25	95.83
Chain Locker	Anchor Chain	94%	23°C	1.44	2.05	3.83	8.03	13.25	17.25	27.17	36.50	46.08
Chain Locker Refreshment				**Refreshment time in hours to oxygen level of:**								
Type of steel-related experiment	**Locker type**	**Free airspace in tank (μ)**	**Temp °C**	**3%**	**6%**	**9%**	**12%**	**15%**	**18%**	**19%**	**19.5%**	**20%**
Chain Locker Refreshment	Anchor Chain	94%	10°C	0.09	0.18	0.33	0.52	0.85	1.65	2.45	3.45	6.75
Chain Locker Refreshment	Anchor Chain	94%	23°C	0.15	0.25	0.37	0.53	0.83	1.59	2.04	2.49	3.42
Double Bottom Tank				**Oxygen Depletion time in hours to oxygen level of:**								
Type of steel-related experiment	**Bare Steel %**	**Free airspace in tank (μ)**	**Temp °C**	**20%**	**19.5%**	**19%**	**18%**	**17%**	**16%**	**15%**	**14%**	**13%**
Double Bottom Tank	48.75%	100%	12°C	7.75	15.50	26.33	47.08	88.58	115.67	157.25	198.75	216.13
Double Bottom Tank	48.75%	100%	23°C	0.90	1.65	3.20	9.13	18.43	30.51	45.94	65.72	86.37
Double Bottom Tank	42.56%	100%	23°C	0.91	2.34	4.49	11.74	24.79	42.53	67.14	92.75	126.74
Double Bottom Tank	36.56%	100%	23°C	0.96	2.77	5.66	14.30	28.54	50.00	72.58	99.45	138.20

Double Bottom Tank				Oxygen Depletion time in hours to oxygen level of:								
Type of steel-related experiment	**Bare Steel %**	**Free airspace in tank (µ)**	**Temp °C**	**20%**	**19.5%**	**19%**	**18%**	**17%**	**16%**	**15%**	**14%**	**13%**
Double Bottom Tank	30.47%	100%	23°C	1.21	3.91	7.38	17.03	30.31	51.55	77.32	99.92	135.81
Double Bottom Tank	24.37%	100%	23°C	1.46	4.02	7.86	20.47	41.97	71.03	104.02	137.92	169.86

This table was taken from annex 1 of document CCC 9/8/3.

APPENDIX 5

INFORMATION ON ACCEPTABLE AND UNACCEPTABLE LEVELS OF GASES

Oxygen

The table below has been ascertained from the experimental findings provided in documents CCC 9/8/3, CCC 9/INF.9 and CCC 9/INF.10.

	Oxygen Danger Levels – Organic Cargoes
% O_2	**Danger Levels**
20.9	Oxygen concentration in normal air.
20.73	Workplace Exposure Limit of 35 ppm for CO Level is reached.
20.26	Workplace Exposure Limit of 0.5% for CO_2 Level is reached.
20 to 17	Impaired coordination.
17	Commencement of Equivalent ceiling exposure limit of 3% CO_2 in cargo hold, and extreme danger at 800 ppm CO.
16 to 14	Exposure to 4% CO_2 gas in cargo holds can lead to serious oxygen deprivation resulting in permanent brain damage, coma, even death. Immediately dangerous to life and health at 1200 ppm CO. The time to reach the fatal level and the oxygen prevailing will vary with cargo type and conditions.

Carbon dioxide

The table below has been ascertained from the published guidance from the Occupational Safety and Health Administration (OSHA) (United States Department of Labor) and the American Conference of Governmental Industrial Hygienists (ACGIH) & Minnesota Department of Health recommendations.

Carbon dioxide (CO_2)		Danger levels
[ppm]	[%]	
250 – 400	0.025 - 0.04	Normal background concentrations in outdoor ambient air
400 - 1,000	0.04 - 0.1	Concentrations typical of occupied indoor spaces with good air exchange
1,000 – 2000	0.1 - 0.2	Complaints of drowsiness and poor air quality
2,000 – 5,000	0.2 - 0.5	Headaches, sleepiness and stagnant stuffy air, Poor concentration, loss of attention, increased heart rate and slight nausea may also be present
5,000	0.5	Workplace exposure limit (as 8 hour TWA[9]) in most countries
30,000	3	Ceiling exposure limit (not to be exceeded) for a 10 minute period
40,000	4	Exposure may lead to serious oxygen deprivation resulting in permanent brain damage, coma or death
50,000	5	Strong respiratory stimulation, dizziness, confusion, headache, shortness of breath
80,000	8	Dimmed sight, sweating, tremor, unconsciousness and **possible death**

Carbon monoxide (CO)

Carbon monoxide (CO) is toxic and flammable.[10] It is invisible, colourless, odourless and tasteless and it has no warning properties whilst the cargo space looks normal. When CO is inhaled into the lungs, it combines with the haemoglobin in the blood and haemoglobin is no longer available to transport oxygen. The nervous system, brain, heart and lungs are dramatically affected. Relying on existing tables of oxygen depletion levels and dangers may be inadequate when cargoes that may emit carbon monoxide is carried, as the oxygen levels in the cargo space may remain in the region of 17% to 14% when 1200 ppm or greater CO level is reached. The adoption of a more appropriate carbon monoxide table with additional danger levels at 400 ppm and at 800 ppm where the symptoms are "Headaches, dizziness and nausea in 45 minutes with death in less than two hours", and at 1200 ppm where the conditions are "Immediately dangerous to life or health. Death from carbon monoxide can precede death from oxygen deficiency in organic types of cargo."

***

[9] Time weighted average (TWA): The TWA for the exposure to a chemical can be used when both the chemical concentration and time for exposure varies over time. It is thus used as the average exposure to a contaminant to which workers may be exposed without adverse effect over a period such as in an 8-hour day or 40-hour week (an average work shift). They are usually expressed in units of ppm (volume/volume) or mg/m^3.

[10] For example, according to the IMDG Code, "CARBON MONOXIDE, COMPRESSED" is UN 1016, class 2.3, subsidiary hazard 2.1, "Flammable, toxic, odourless gas. Explosive limits: 12% to 75%. Slightly lighter than air (0.97)."

ANNEX 29

DRAFT AMENDMENTS TO THE ORGANIZATION AND METHOD OF WORK OF THE MARITIME SAFETY COMMITTEE AND THE MARINE ENVIRONMENT PROTECTION COMMITTEE AND THEIR SUBSIDIARY BODIES (MSC-MEPC.1/CIRC.5/REV.6)

Paragraph 5.21 of MSC-MEPC.1/Circ.5/Rev.6 is amended as follows:

"5.21 When appropriate and necessary, working or drafting groups should make full use of the ~~five~~ working days of a session in submitting their reports to ~~the next session of~~ their parent body. In a hybrid session, working or drafting groups should bear in mind, to the greatest extent possible, the difference in time zones in relation to IMO Headquarters as well as the limitation of IMO hybrid meeting capability. In any case, certain flexibility in the conduct of such groups should be secured with due respect to urgency, priority and workload of the Committees and subsidiary bodies. When working and drafting group reports are to be prepared during a session, all efforts should be made to keep them as short as possible."