

**CCS**

## *Circular*

China Classification Society  
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Attain: Relevant departments of the Headquarters of CCS, the Society's surveyors, Plan Approval Centers, related shipowners, ship management companies, shipyards and designers.

### Notice on list of IMO requirements which will enter into force from the first half of this year (1 January 2012 to 30 June 2012)

There are 10 IMO requirements which will enter into force from the first half of this year (1 January 2012 to 30 June 2012), which are mandatory requirements the amendments of SOLAS Convention、MARPOL Convention and other Convention and Code. Please see attached Table 1.

CCS had been authorized by governments of 29 countries or regions to perform statutory surveys for the ships flying their flags at present. CCS will implement the resolutions in Table 1 taking into account the requirements from 29 countries or regions. The relational documents such as CCS circular、surveyor's instruction and IACS US etc. shall be referred by surveyors.

The resolutions in Table 1 can be brown the English version according to the link.

Should you have any question during the implementation of the Circulars, please contact:  
Technical Management Dept. of the Headquarters.

Table 1

<b>No.</b>	<b>Resolution</b>	<b>title</b>	<b>valid from</b>
1	MSC.287(87)	ADOPTION OF THE INTERNATIONAL GOAL-BASED SHIP CONSTRUCTION STANDARDS FOR BULK CARRIERS AND OIL TANKERS	2012-01-01
2	MSC.288(87)	PERFORMANCE STANDARD FOR PROTECTIVE COATINGS FOR CARGO OIL TANKS OF CRUDE OIL TANKERS	2012-01-01
3	MSC.289(87)	PERFORMANCE STANDARD FOR ALTERNATIVE MEANS OF CORROSION PROTECTION FOR CARGO OIL TANKS OF CRUDE OIL TANKERS	2012-01-01
4	MSC.290(87)	ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, AS AMENDED	2012-01-01
5	MSC.291(87)	ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, AS AMENDED	2012-01-01
6	MSC.292(87)	ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CODE FOR FIRE SAFETY SYSTEMS	2012-01-01
7	MSC.293(87)	ADOPTION OF AMENDMENTS TO THE INTERNATIONAL LIFE-SAVING APPLIANCE (LSA) CODE	2012-01-01
8	MSC.294(87)	ADOPTION OF AMENDMENTS TO THE INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG) CODE	2012-01-01
9	MSC.310(88)	ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR SAFE CONTAINERS (CSC), 1972	2012-01-01
10	MEPC.194(61)	AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1997 TO AMEND THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973, AS MODIFIED BY THE PROTOCOL OF 1978 RELATING THERETO (Revised form of Supplement to the IAPP Certificate)	2012-02-01

**ANNEX 7**

**RESOLUTION MSC.293(87)  
(adopted on 21 May 2010)**

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

THE MARITIME SAFETY COMMITTEE,

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

NOTING resolution MSC.48(66), by which it adopted the International Life-Saving Appliance Code (hereinafter referred to as "the LSA Code"), which has become mandatory under chapter III of the International Convention for the Safety of Life at Sea, 1974 (hereinafter referred to as "the Convention"),

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

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

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the LSA Code, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the amendments shall be deemed to have been accepted on 1 July 2011, unless prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;
3. INVITES Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 January 2012 upon their acceptance in accordance with paragraph 2 above;
4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;
5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

ANNEX

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

**CHAPTER IV  
SURVIVAL CRAFT**

In paragraphs 4.2.2.1, 4.2.3.3 and 4.3.3.3, the figure "75 kg" is replaced by the figure "82.5 kg".

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**ANNEX 6**

**RESOLUTION MSC.292(87)  
(adopted on 21 May 2010)**

**ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CODE  
FOR FIRE SAFETY SYSTEMS**

THE MARITIME SAFETY COMMITTEE,

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

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

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

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

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the International Code for Fire Safety Systems, the text of which is set out in the Annex to the present resolution;

2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the amendments shall be deemed to have been accepted on 1 July 2011, unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;

3. INVITES SOLAS Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention the amendments shall enter into force on 1 January 2012 upon their acceptance in accordance with paragraph 2 above;

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

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

## ANNEX

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

#### CHAPTER 1 GENERAL

##### Section 1 – Application

- 1 The following new sentence is added to the end of paragraph 1.2:

"However, amendments to the Code adopted after 1 July 2002 shall apply only to ships the keels of which are laid or which are at a similar stage of construction, on or after the date on which the amendments enter into force, unless expressly provided otherwise."

#### CHAPTER 10 SAMPLE EXTRACTION SMOKE DETECTION SYSTEMS

- 2 The existing text of chapter 10 is replaced by the following:

##### "1 APPLICATION

This chapter details the specification of sample extraction smoke detection systems in cargo spaces as required by chapter II-2 of the Convention. Unless expressly provided otherwise, the requirements of this chapter shall apply to ships constructed on or after 1 January 2012.

##### 2 ENGINEERING SPECIFICATIONS

##### 2.1 General requirements

2.1.1 Wherever in the text of this chapter the word "system" appears, it shall mean "sample extraction smoke detection system".

2.1.1.1 A sample extraction smoke detection system consists of the following main components:

- .1 smoke accumulators: air collection devices installed at the open ends of the sampling pipes in each cargo hold that perform the physical function of collecting air samples for transmission to the control panel through the sampling pipes, and may also act as discharge nozzles for the fixed-gas fire-extinguishing system, if installed;
- .2 sampling pipes: a piping network that connects the smoke accumulators to the control panel, arranged in sections to allow the location of the fire to be readily identified;

- .3 three-way valves: if the system is interconnected to a fixed-gas fire-extinguishing system, three-way valves are used to normally align the sampling pipes to the control panel and, if a fire is detected, the three-way valves are re-aligned to connect the sampling pipes to the fire-extinguishing system discharge manifold and isolate the control panel; and
- .4 control panel: the main element of the system which provides continuous monitoring of the protected spaces for indication of smoke. It typically may include a viewing chamber or smoke sensing units. Extracted air from the protected spaces is drawn through the smoke accumulators and sampling pipes to the viewing chamber, and then to the smoke sensing chamber where the airstream is monitored by electrical smoke detectors. If smoke is sensed, the repeater panel (normally on the bridge) automatically sounds an alarm (not localized). The crew can then determine at the smoke sensing unit which cargo hold is on fire and operate the pertinent three-way valve for discharge of the extinguishing agent.

2.1.2 Any required system shall be capable of continuous operation at all times except that systems operating on a sequential scanning principle may be accepted, provided that the interval between scanning the same position twice gives a maximum allowable interval determined as follows:

The interval (I) should depend on the number of scanning points (N) and the response time of the fans (T), with a 20% allowance:

$$I = 1.2 \times T \times N$$

However, the maximum allowable interval should not exceed 120 s ( $I_{\max} = 120$  s).

2.1.3 The system shall be designed, constructed and installed so as to prevent the leakage of any toxic or flammable substances or fire-extinguishing media into any accommodation space, service space, control station or machinery space.

2.1.4 The system and equipment shall be suitably designed to withstand supply voltage variations and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships and to avoid the possibility of ignition of a flammable gas-air mixture.

2.1.5 The system shall be of a type that can be tested for correct operation and restored to normal surveillance without the renewal of any component.

2.1.6 An alternative power supply for the electrical equipment used in the operation of the system shall be provided.

## **2.2 Component requirements**

2.2.1 The sensing unit shall be certified to operate before the smoke density within the sensing chamber exceeds 6.65% obscuration per metre.

2.2.2 Duplicate sample extraction fans shall be provided. The fans shall be of sufficient capacity to operate with the normal conditions or ventilation in the

protected area and the connected pipe size shall be determined with consideration of fan suction capacity and piping arrangement to satisfy the conditions of paragraph 2.4.2.2. Sampling pipes shall be a minimum of 12 mm internal diameter. The fan suction capacity should be adequate to ensure the response of the most remote area within the required time criteria in paragraph 2.4.2.2. Means to monitor airflow shall be provided in each sampling line.

2.2.3 The control panel shall permit observation of smoke in the individual sampling pipes.

2.2.4 The sampling pipes shall be so designed as to ensure that, as far as practicable, equal quantities of airflow are extracted from each interconnected accumulator.

2.2.5 Sampling pipes shall be provided with an arrangement for periodically purging with compressed air.

2.2.6 The control panel for the smoke detection system shall be tested according to standards EN 54-2 (1997), EN 54-4 (1997) and IEC 60092-504 (2001). Alternative standards may be used as determined by the Administration.

## **2.3 Installation requirements**

### **2.3.1 *Smoke accumulators***

2.3.1.1 At least one smoke accumulator shall be located in every enclosed space for which smoke detection is required. However, where a space is designed to carry oil or refrigerated cargo alternatively with cargoes for which a smoke sampling system is required, means may be provided to isolate the smoke accumulators in such compartments for the system. Such means shall be to the satisfaction of the Administration.

2.3.1.2 Smoke accumulators shall be located on the overhead or as high as possible in the protected space, and shall be spaced so that no part of the overhead deck area is more than 12 m measured horizontally from an accumulator. Where systems are used in spaces which may be mechanically ventilated, the position of the smoke accumulators shall be considered having regard to the effects of ventilation. At least one additional smoke accumulator is to be provided in the upper part of each exhaust ventilation duct. An adequate filtering system shall be fitted at the additional accumulator to avoid dust contamination.

2.3.1.3 Smoke accumulators shall be positioned where impact or physical damage is unlikely to occur.

2.3.1.4 Sampling pipe networks shall be balanced to ensure compliance with paragraph 2.2.4. The number of accumulators connected to each sampling pipe shall ensure compliance with paragraph 2.4.2.2.

2.3.1.5 Smoke accumulators from more than one enclosed space shall not be connected to the same sampling pipe.

2.3.1.6 In cargo holds where non-gastight "tween deck panels" (movable stowage platforms) are provided, smoke accumulators shall be located in both the upper and lower parts of the holds.



### **2.3.2 Sampling pipes**

2.3.2.1 The sampling pipe arrangements shall be such that the location of the fire can be readily identified.

2.3.2.2 Sampling pipes shall be self-draining and suitably protected from impact or damage from cargo working.

## **2.4 System control requirements**

### **2.4.1 Visual and audible fire signals**

2.4.1.1 The detection of smoke or other products of combustion shall initiate a visual and audible signal at the control panel and indicating units.

2.4.1.2 The control panel shall be located on the navigation bridge or in the fire control station. An indicating unit shall be located on the navigation bridge if the control panel is located in the fire control station.

2.4.1.3 Clear information shall be displayed on or adjacent to the control panel and indicating units designating the spaces covered.

2.4.1.4 Power supplies necessary for the operation of the system shall be monitored for loss of power. Any loss of power shall initiate a visual and audible signal at the control panel and the navigating bridge which shall be distinct from a signal indicating smoke detection.

2.4.1.5 Means to manually acknowledge all alarm and fault signals shall be provided at the control panel. The audible alarm sounders on the control panel and indicating units may be manually silenced. The control panel shall clearly distinguish between normal, alarm, acknowledged alarm, fault and silenced conditions.

2.4.1.6 The system shall be arranged to automatically reset to the normal operating condition after alarm and fault conditions are cleared.

### **2.4.2 Testing**

2.4.2.1 Suitable instructions and component spares shall be provided for the testing and maintenance of the system.

2.4.2.2 After installation, the system shall be functionally tested using smoke generating machines or equivalent as a smoke source. An alarm shall be received at the control unit in not more than 180 s for vehicle decks, and not more than 300 s for container and general cargo holds, after smoke is introduced at the most remote accumulator."

- 3 The following new chapter 16 is added after the existing chapter 15:

## **"CHAPTER 16 FIXED HYDROCARBON GAS DETECTION SYSTEMS**

### **1 APPLICATION**

1.1 This chapter details the specifications for fixed hydrocarbon gas detection systems as required by chapter II-2 of the Convention.

1.2 A combined gas detection system required by regulations II-2/4.5.7.3 and II-2/4.5.10 may be accepted in cases where the system fully complies with the requirement of regulation II-2/2 of the Convention.

### **2 ENGINEERING SPECIFICATIONS**

#### **2.1 General**

2.1.1 The fixed hydrocarbon gas detection system referred to in chapter II-2 of the Convention shall be designed, constructed and tested to the satisfaction of the Administration based on performance standards developed by the Organization\*.

2.1.2 The system shall be comprised of a central unit for gas measurement and analysis and gas sampling pipes in all ballast tanks and void spaces of double-hull and double-bottom spaces adjacent to the cargo tanks, including the forepeak tank and any other tanks and spaces under the bulkhead deck adjacent to cargo tanks.

2.1.3 The system may be integrated with the cargo pump-room gas detection system, provided that the spaces referred to in paragraph 2.1.2 are sampled at the rate required in paragraph 2.2.3.1. Continuous sampling from other locations may also be considered provided the sampling rate is complied with.

#### **2.2 Component requirements**

##### **2.2.1 *Gas sampling lines***

2.2.1.1 Common sampling lines to the detection equipment shall not be fitted, except the lines serving each pair of sampling points as required in paragraph 2.2.1.3.

2.2.1.2 The materials of construction and the dimensions of gas sampling lines shall be such as to prevent restriction. Where non-metallic materials are used, they shall be electrically conductive. The gas sampling lines shall not be made of aluminium.

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Refer to the Guidelines for the design, construction and testing of fixed hydrocarbon gas detection system (MSC.1/Circ.1370).

2.2.1.3 The configuration of gas sampling lines shall be adapted to the design and size of each space. Except as provided in paragraphs 2.2.1.4 and 2.2.1.5, the sampling system shall allow for a minimum of two hydrocarbon gas sampling points, one located on the lower and one on the upper part where sampling is required. When required, the upper gas sampling point shall not be located lower than 1 m from the tank top. The position of the lower located gas sampling point shall be above the height of the girder of bottom shell plating but at least 0.5 m from the bottom of the tank and it shall be provided with means to be closed when clogged. In positioning the fixed sampling points, due regard should also be given to the density of vapours of the oil products intended to be transported and the dilution from space purging or ventilation.

2.2.1.4 For ships with deadweight of less than 50,000 tonnes, the Administration may allow the installation of one sampling location for each tank for practical and/or operational reasons.

2.2.1.5 For ballast tanks in the double-bottom, ballast tanks not intended to be partially filled and void spaces, the upper gas sampling point is not required.

2.2.1.6 Means shall be provided to prevent gas sampling lines from clogging when tanks are ballasted by using compressed air flushing to clean the line after switching from ballast to cargo loaded mode. The system shall have an alarm to indicate if the gas sampling lines are clogged.

## **2.2.2 Gas analysis unit**

2.2.2.1 The gas analysis unit shall be located in a safe space and may be located in areas outside the ship's cargo area; for example, in the cargo control room and/or navigation bridge in addition to the hydraulic room when mounted on the forward bulkhead, provided the following requirements are observed:

- .1 sampling lines shall not run through gas safe spaces, except where permitted under subparagraph .5;
- .2 the hydrocarbon gas sampling pipes shall be equipped with flame arresters. Sample hydrocarbon gas is to be led to the atmosphere with outlets arranged in a safe location, not close to a source of ignitions and not close to the accommodation area air intakes;
- .3 a manual isolating valve, which shall be easily accessible for operation and maintenance, shall be fitted in each of the sampling lines at the bulkhead on the gas safe side;
- .4 the hydrocarbon gas detection equipment including sample piping, sample pumps, solenoids, analysing units etc., shall be located in a reasonably gas-tight cabinet (e.g., fully enclosed steel cabinet with a door with gaskets) which is to be monitored by its own sampling point. At a gas concentration above 30% of the lower flammable limit inside the steel enclosure the entire gas analysing unit is to be automatically shut down; and

- .5 where the enclosure cannot be arranged directly on the bulkhead, sample pipes shall be of steel or other equivalent material and without detachable connections, except for the connection points for isolating valves at the bulkhead and analysing unit, and are to be routed on their shortest ways.

### **2.2.3 Gas detection equipment**

2.2.3.1 The gas detection equipment shall be designed to sample and analyse from each sampling line of each protected space, sequentially at intervals not exceeding 30 min.

2.2.3.2 Means shall be provided to enable measurements with portable instruments, in case the fixed system is out of order or for system calibration. In case the system is out of order, procedures shall be in place to continue to monitor the atmosphere with portable instruments and to record the measurement results.

2.2.3.3 Audible and visual alarms are to be initiated in the cargo control room, navigation bridge and at the analysing unit when the vapour concentration in a given space reaches a pre-set value, which shall not be higher than the equivalent of 30% of the lower flammable limit.

2.2.3.4 The gas detection equipment shall be so designed that it may readily be tested and calibrated."

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**ANNEX 5**

**RESOLUTION MSC.291(87)  
(adopted on 21 May 2010)**

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

THE MARITIME SAFETY COMMITTEE,

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

RECALLING FURTHER article VIII(b) of the International Convention for the Safety of Life at Sea (SOLAS), 1974 (hereinafter referred to as "the Convention"), concerning the amendment procedure applicable to the Annex to the Convention, other than to the provisions of chapter I thereof,

HAVING CONSIDERED, at its eighty-seventh session, amendments to the Convention, proposed and circulated in accordance with article VIII(b)(i) thereof,

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the Convention, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the said amendments shall be deemed to have been accepted on 1 July 2011, unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;
3. INVITES SOLAS Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 January 2012 upon their acceptance in accordance with paragraph 2 above;
4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;
5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

ANNEX

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

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

**Part A-1  
Structure of ships**

- 1 The following new regulation 3-11 is added after regulation 3-10:

**"Regulation 3-11  
Corrosion protection of cargo oil tanks of crude oil tankers**

1 Paragraph 3 shall apply to crude oil tankers\*, as defined in regulation 1 of Annex I to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, of 5,000 tonnes deadweight and above:

- .1 for which the building contract is placed on or after 1 January 2013; or
- .2 in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 July 2013; or
- .3 the delivery of which is on or after 1 January 2016.

2 Paragraph 3 shall not apply to combination carriers or chemical tankers as defined in regulations 1 of Annexes I and II, respectively, to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto. For the purpose of this regulation, chemical tankers also include chemical tankers certified to carry oil.

3 All cargo oil tanks of crude oil tankers shall be:

- .1 coated during the construction of the ship in accordance with the Performance standard for protective coatings for cargo oil tanks of crude oil tankers, adopted by the Maritime Safety Committee by resolution MSC.288(87), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than chapter I; or

- .2 protected by alternative means of corrosion protection or utilization of corrosion resistance material to maintain required structural integrity for 25 years in accordance with the Performance standard for alternative means of corrosion protection for cargo oil tanks of crude oil tankers, adopted by the Maritime Safety Committee by resolution MSC.289(87), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than chapter I.
- 4 The Administration may exempt a crude oil tanker from the requirements of paragraph 3 to allow the use of novel prototype alternatives to the coating system specified in paragraph 3.1, for testing, provided they are subject to suitable controls, regular assessment and acknowledgement of the need for immediate remedial action if the system fails or is shown to be failing. Such exemption shall be recorded on an exemption certificate.
- 5 The Administration may exempt a crude oil tanker from the requirements of paragraph 3 if the ship is built to be engaged solely in the carriage of cargoes and cargo handling operations not causing corrosion\*\*. Such exemption and conditions for which it is granted shall be recorded on an exemption certificate.

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\* Refer to items 1.11.1 or 1.11.4 of the Supplement to the International Oil Pollution Prevention Certificate (Form B).

\*\* Refer to the guidelines to be developed by the Organization."

## **CHAPTER II-2**

### **CONSTRUCTION – FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION**

#### **Part A**

#### **General**

#### **Regulation 1 – Application**

2 In paragraph 2.2, in subparagraph .4, the word "and" is deleted; in subparagraph .5 the word "and" is added at the end; and the following new subparagraph .6 is added after the existing subparagraph .5:

".6 regulation 4.5.7.1."

## **Part B**

### **Prevention of fire and explosion**

#### **Regulation 4 – Probability of ignition**

3 The existing paragraph 5.7 is replaced by the following:

##### **"5.7 Gas measurement and detection**

###### **5.7.1 *Portable instrument***

Tankers shall be equipped with at least one portable instrument for measuring oxygen and one for measuring flammable vapour concentrations, together with a sufficient set of spares. Suitable means shall be provided for the calibration of such instruments.

###### **5.7.2 *Arrangements for gas measurement in double-hull spaces and double-bottom spaces***

5.7.2.1 Suitable portable instruments for measuring oxygen and flammable vapour concentrations in double-hull spaces and double-bottom spaces shall be provided. In selecting these instruments, due attention shall be given to their use in combination with the fixed gas sampling line systems referred to in paragraph 5.7.2.2.

5.7.2.2 Where the atmosphere in double-hull spaces cannot be reliably measured using flexible gas sampling hoses, such spaces shall be fitted with permanent gas sampling lines. The configuration of gas sampling lines shall be adapted to the design of such spaces.

5.7.2.3 The materials of construction and dimensions of gas sampling lines shall be such as to prevent restriction. Where plastic materials are used, they shall be electrically conductive.

###### **5.7.3 *Arrangements for fixed hydrocarbon gas detection systems in double-hull and double-bottom spaces of oil tankers***

5.7.3.1 In addition to the requirements in paragraphs 5.7.1 and 5.7.2, oil tankers of 20,000 tonnes deadweight and above, constructed on or after 1 January 2012, shall be provided with a fixed hydrocarbon gas detection system complying with the Fire Safety Systems Code for measuring hydrocarbon gas concentrations in all ballast tanks and void spaces of double-hull and double-bottom spaces adjacent to the cargo tanks, including the forepeak tank and any other tanks and spaces under the bulkhead deck adjacent to cargo tanks.

5.7.3.2 Oil tankers provided with constant operative inerting systems for such spaces need not be equipped with fixed hydrocarbon gas detection equipment.

5.7.3.3 Notwithstanding the above, cargo pump-rooms subject to the provisions of paragraph 5.10 need not comply with the requirements of this paragraph."

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**ANNEX 4**

**RESOLUTION MSC.290(87)  
(adopted on 21 May 2010)**

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

THE MARITIME SAFETY COMMITTEE,

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

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

RECALLING FURTHER that among the strategic directions of the Organization relating to developing and maintaining a comprehensive framework for safe, secure, efficient and environmentally sound shipping is the establishment of goal-based standards for the design and construction of new ships,

CONSIDERING that ships should be designed and constructed for a specified design life to be safe and environmentally friendly, so that, if properly operated and maintained under specified operating and environmental conditions, they can remain safe throughout their service life,

HAVING CONSIDERED, at its eighty-seventh session, amendments to the Convention, proposed and circulated in accordance with article VIII(b)(i) thereof,

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the Convention, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the said amendments shall be deemed to have been accepted on 1 July 2011, unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;
3. INVITES SOLAS Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention the amendments shall enter into force on 1 January 2012 upon their acceptance in accordance with paragraph 2 above;
4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;
5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization which are not Contracting Governments to the Convention;

6. RESOLVES to review the progress towards the implementation of SOLAS regulation II-1/3-10 in 2014 and, if proven necessary, to adjust the time periods set forth in paragraph 1 of the regulation.

## ANNEX

**AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, AS AMENDED****CHAPTER II-1  
CONSTRUCTION – STRUCTURE, SUBDIVISION AND STABILITY,  
MACHINERY AND ELECTRICAL INSTALLATIONS****Part A  
General****Regulation 2 – Definitions**

- 1 The following new paragraph 28 is added after the existing paragraph 27:

"28 *Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers* means the International Goal-Based Ship Construction Standards for Bulk Carriers and Oil Tankers, adopted by the Maritime Safety Committee by resolution MSC.287(87), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the annex other than chapter I thereof."

**Part A-1  
Structure of ships**

- 2 The following new regulation 3-10 is added after the existing regulation 3-9:

**"Regulation 3-10  
Goal-based ship construction standards for bulk carriers and oil tankers**

1 This regulation shall apply to oil tankers of 150 m in length and above and to bulk carriers of 150 m in length and above, constructed with single deck, top-side tanks and hopper side tanks in cargo spaces, excluding ore carriers and combination carriers:

- .1 for which the building contract is placed on or after 1 July 2016;
- .2 in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 July 2017; or
- .3 the delivery of which is on or after 1 July 2020.

2 Ships shall be designed and constructed for a specified design life to be safe and environmentally friendly, when properly operated and maintained under the specified operating and environmental conditions, in intact and specified damage conditions, throughout their life.

2.1 *Safe and environmentally friendly* means the ship shall have adequate strength, integrity and stability to minimize the risk of loss of the ship or pollution to the marine environment due to structural failure, including collapse, resulting in flooding or loss of watertight integrity.

2.2 *Environmentally friendly* also includes the ship being constructed of materials for environmentally acceptable recycling.

2.3 *Safety* also includes the ship's structure, fittings and arrangements providing for safe access, escape, inspection and proper maintenance and facilitating safe operation.

2.4 *Specified operating and environmental conditions* are defined by the intended operating area for the ship throughout its life and cover the conditions, including intermediate conditions, arising from cargo and ballast operations in port, waterways and at sea.

2.5 *Specified design life* is the nominal period that the ship is assumed to be exposed to operating and/or environmental conditions and/or the corrosive environment and is used for selecting appropriate ship design parameters. However, the ship's actual service life may be longer or shorter depending on the actual operating conditions and maintenance of the ship throughout its life cycle.

3 The requirements of paragraphs 2 to 2.5 shall be achieved through satisfying applicable structural requirements of an organization which is recognized by the Administration in accordance with the provisions of regulation XI-1/1, or national standards of the Administration, conforming to the functional requirements of the Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers.

4 A Ship Construction File with specific information on how the functional requirements of the Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers have been applied in the ship design and construction shall be provided upon delivery of a new ship, and kept on board the ship and/or ashore\* and updated as appropriate throughout the ship's service. The contents of the Ship Construction File shall, at least, conform to the guidelines developed by the Organization.\*

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\* Refer to the Guidelines for the information to be included in a Ship Construction File (MSC.1/Circ.1343)."

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**ANNEX 3**

**RESOLUTION MSC.289(87)  
(adopted on 14 May 2010)**

**PERFORMANCE STANDARD FOR ALTERNATIVE MEANS OF CORROSION  
PROTECTION FOR CARGO OIL TANKS OF CRUDE OIL TANKERS**

THE MARITIME SAFETY COMMITTEE,

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

NOTING regulation II-1/3-11 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended (hereinafter referred to as "the Convention") adopted by resolution MSC.291(87), concerning alternative means of corrosion protection for cargo oil tanks of crude oil tankers,

NOTING ALSO that the aforementioned regulation II-1/3-11 provides that the alternative means of corrosion protection referred to therein shall comply with the requirements of the Performance standard for alternative means of corrosion protection for cargo oil tanks of crude oil tankers (hereinafter referred to as "the Performance standard for alternative means of corrosion protection"),

HAVING CONSIDERED, at its eighty-seventh session, the text of the proposed Performance standard for alternative means of corrosion protection,

1. ADOPTS the Performance standard for alternative means of corrosion protection for cargo oil tanks of crude oil tankers, the text of which is set out in the Annex to the present resolution;
2. INVITES Contracting Governments to the Convention to note that the Performance standard for alternative means of corrosion protection will take effect on 1 January 2012 upon entry into force of SOLAS regulation II-1/3-11;
3. NOTES that, under the provisions of chapter II-1 of the SOLAS Convention, amendments to the Performance standard for alternative means of corrosion protection shall be adopted, brought into force and take effect in accordance with the provisions of article VIII of that Convention concerning the amendment procedure applicable to the annex to the Convention other than chapter I;
4. REQUESTS the Secretary-General to transmit certified copies of this resolution and the text of the Performance standard for protective coatings contained in the Annex to all Contracting Governments to the Convention;
5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and the Annex to all Members of the Organization which are not Contracting Governments to the Convention;
6. INVITES Governments to encourage the development of novel technologies aimed at providing for alternative systems and to keep the Organization advised of any positive results;

7. RESOLVES to keep the Performance standard for alternative means of corrosion protection under review and amend it as necessary, in light of experience gained in its application.

## ANNEX

### PERFORMANCE STANDARD FOR ALTERNATIVE MEANS OF CORROSION PROTECTION FOR CARGO OIL TANKS OF OIL TANKERS

#### 1 PURPOSE

This Standard provides technical requirements for the minimum standard for means of corrosion protection or utilization of corrosion resistant material other than protective coating to be used for cargo oil tanks during construction of crude oil tankers.

#### 2 DEFINITION

2.1 *Alternative means* is a means that is not a utilization of protective coating applied according to the Performance standard for protective coating for cargo oil tanks of crude oil tankers (resolution MSC.288(87)).

2.2 *Corrosion resistant steel* is steel whose corrosion resistance performance in the bottom or top of the internal cargo oil tank is tested and approved to satisfy the requirements in this Standard in addition to other relevant requirements for ship material, structure strength and construction.

2.3 *Target useful life* is the target value, in years, of the durability for which the means of corrosion protection or utilization of corrosion resistance material is designed.

#### 3 APPLICATION

3.1 As of the date of the development of this Standard, corrosion resistant "steel" is the only recognized possible means for corrosion protection or utilization of corrosion resistant material to maintain the required structural integrity for 25 years, as an alternative to protective coating. If corrosion resistant steel is to be used as alternative means, it shall comply with the Performance Standard for corrosion resistant steel as set out in the annex.

3.2 When a novel type of alternative means to which the provisions in the annex are not applicable has been developed, and recognized by the Organization, a specific performance standard including testing procedure(s) should be developed by the Organization by adding a new annex to this Standard, taking into account experience gained through field tests for the novel prototype alternative conducted in accordance with SOLAS regulation II-1/3-11.4.

## ANNEX

### PERFORMANCE STANDARD FOR CORROSION RESISTANT STEEL

#### 1 PURPOSE

This Standard provides technical requirements for the minimum standard for corrosion resistant steel to be used for cargo oil tanks during construction of crude oil tankers.

#### 2 GENERAL PRINCIPLES

2.1 The ability of corrosion resistant steel to reach its target useful life depends on the type of steel, application and survey. All these aspects contribute to the good performance of corrosion resistant steel.

##### 2.2 Technical File

2.2.1 Documents and information stipulated in 2.2.3 and 2.2.4 shall be documented in the Technical File. The Technical File shall be verified by the Administration.

2.2.2 The Technical File shall be kept on board and maintained throughout the life of the ship.

##### 2.2.3 *New construction stage*

The Technical File shall contain at least the following items relating to this Standard and shall be delivered by the shipyard at new ship construction stage:

- .1 copy of a Type Approval Certificate;
- .2 technical data, including:
  - .2.1 approved welding methods and welding consumables; and
  - .2.2 repairing methods recommended by the manufacturer (if any); and
- .3 records of the application, including:
  - .3.1 applied actual space and area of each compartment; and
  - .3.2 applied product and its thickness.

##### 2.2.4 *In-service maintenance, repair and partial renewal*

In-service maintenance, repair and renewal activities shall be recorded in the Technical File.



### **3 CORROSION RESISTANT STEEL STANDARD**

#### **3.1 Performance standard**

This Standard is based on specifications and requirements which intend to provide a target useful life of 25 years, which is considered to be the time period, from initial application, over which the thickness diminution of the steel is intended to be less than the diminution allowance and watertight integrity is intended to be maintained in cargo oil tanks. The actual useful life will vary, depending on numerous variables including actual conditions encountered in service.

#### **3.2 Standard application**

Corrosion resistant steel for cargo oil tanks applied to the area specified in 3.4 during the construction of crude oil tankers shall at least comply with the requirements in this Standard and this should be considered as a minimum.

#### **3.3 Special application**

3.3.1 This Standard covers corrosion resistant steel requirements for ship's steel structures. It is noted that other independent items are fitted within the tanks to which measures are applied to provide protection against corrosion.

3.3.2 It is recommended that this Standard or the Performance standard for protective coating for cargo oil tanks is applied, to the extent possible, to those portions of permanent means of access provided for inspection within the area specified in 3.4 that are not integral to the ship's structure, such as rails, independent platforms, ladders, etc. Other equivalent methods of providing corrosion protection for the non-integral items may also be used, provided they do not impair the performance of the corrosion resistant steel of the surrounding structure. Access arrangements that are integral to the ship structure, such as increased stiffener depths for walkways, stringers, etc., are to fully comply with this Standard or the Performance standard for protective coating for cargo oil tanks, when located within the areas specified in 3.4.

3.3.3 It is also recommended that supports for piping, measuring devices, etc., be provided with corrosion protection in accordance with the non-integral items indicated in 3.3.2.

#### **3.4 Area of application**

The following areas are the minimum areas that shall be protected according to this Standard:

- .1 Deckhead with complete internal structure, including brackets connecting to longitudinal and transverse bulkheads. In tanks with ring frame girder construction the underdeck transverse framing to be protected down to level of the first tripping bracket below the upper faceplate.
- .2 Longitudinal and transverse bulkheads to be protected to the uppermost means of access level. The uppermost means of access and its supporting brackets to be fully protected.

- .3 On cargo tank bulkheads without an uppermost means of access the protection to extend to 10% of the tanks height at centreline but need not extend more than 3 m down from the deck.
- .4 Flat inner bottom and all structure to height of 0.3 m above inner bottom to be protected.

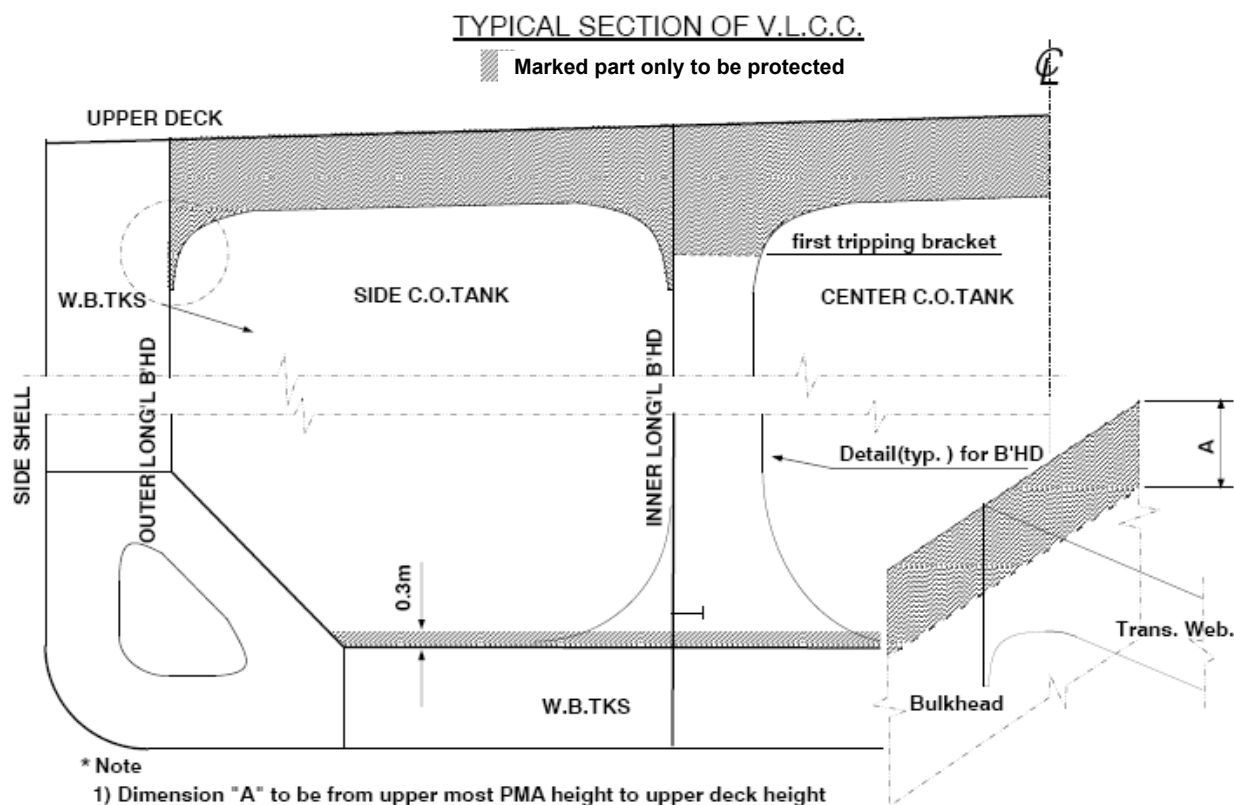


Figure 1

### 3.5 Basic requirements

The requirements for corrosion resistant steel to be applied at ship construction for cargo tanks in crude oil tankers meeting the performance standard specified in 3.1 are to use approved corrosion resistant steels according to the conditions specified in the Type Approval Certificate and the Technical File to protect the area of application indicated in 3.4.

## 4 APPROVAL

4.1 Corrosion resistant steel shall be tested according to the appendix, or equivalent, for approval. Corrosion resistant steel tested prior to entry into force of this Standard may be accepted, provided that the steel is tested according to the test procedure in the appendix, or equivalent.

4.2 Results from prequalification tests (4.1) of corrosion resistant steel shall be documented, and a Type Approval Certificate shall be issued if found satisfactory by the Administration.

4.3 The Type Approval Certificate shall include following information:

- .1 product name and identification mark and/or number;
- .2 materials, components and corrosion resistance process of the steel;
- .3 steel thickness;
- .4 welding methods and welding consumables; and
- .5 applicable area (upper and/or inner bottom plate).

## **5 INSPECTION AND VERIFICATION REQUIREMENTS**

To ensure compliance with this Standard, the Administration shall carry out survey(s) during the construction process and verify that approved corrosion resistant steel has been applied to the area required.

## APPENDIX

### TEST PROCEDURES FOR QUALIFICATION OF CORROSION RESISTANT STEEL FOR CARGO TANKS IN CRUDE OIL TANKERS

#### 1 Scope

These Procedures provide details of the test procedure referred to in 4.1 of this Standard.

#### 2 Testing

Corrosion resistant steel shall be verified by the following tests.

##### 2.1 *Test on simulated upper deck conditions*

###### 2.1.1 *Test condition*

Tests on simulated upper deck conditions in cargo oil tank (COT) shall satisfy each of the following conditions:

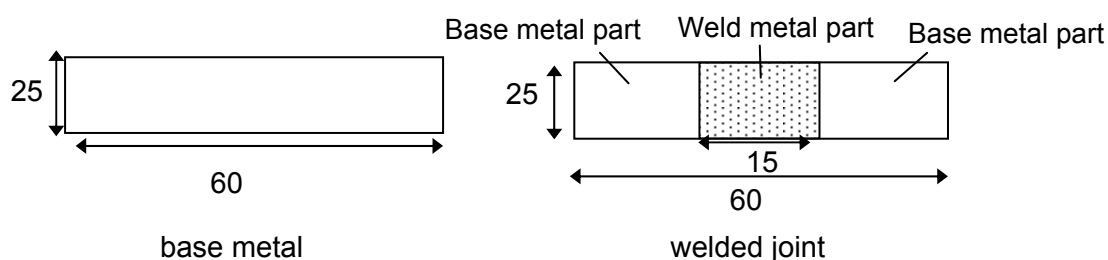
- .1 Corrosion resistant steel and conventional steel shall be tested at the same time.
- .2 The chemical composition of conventional steel shall comply with the requirements of table 1. The mechanical properties of the test specimen should be representative of steel used in its intended shipboard application.

**Table 1 – Chemical composition for conventional steel (%)**

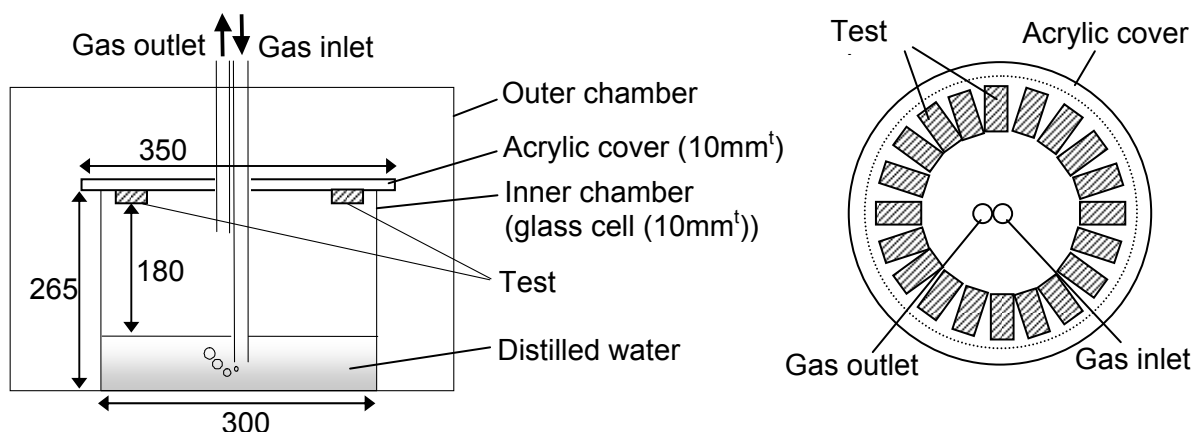
C	Mn	Si	P	S
0.13-0.17	1.00-1.20	0.15-0.35	0.010-0.020	0.002-0.008
Al(acid soluble min)	Nb max.	V max	Ti max	Nb+V+Ti max.
0.015	0.02	0.10	0.02	0.12
Cu max.	Cr max.	Ni max.	Mo max.	Others max.
0.1	0.1	0.1	0.02	0.02 (each)

- .3 The tests for corrosion resistant steel shall be carried out for 21, 49, 77 and 98 days. The tests for conventional steel shall be carried out for 98 days. The tests for welded joints shall be carried out for 98 days.
- .4 There are to be five test pieces for each test period.
- .5 The size of each test piece is  $25 \pm 1$  mm x  $60 \pm 1$  mm x  $5 \pm 0.5$  mm. The surface of the test piece shall be polished with an emery paper #600. The size of the test piece for a welded joint is  $25 \pm 1$  mm x  $60 \pm 1$  mm x  $5 \pm 0.5$  mm, including  $15 \pm 5$  mm width of the weld metal part.
- .6 The surface of the test piece, except for the tested surface, shall be protected from corrosive environment in order not to affect the test results.
- .7 The test apparatus consists of a double chamber, and the temperature of the outer chamber is to be controlled.

- .8 Simulating the condition of the actual upper deck, the test cycle runs with distilled water and simulated COT gas ( $4 \pm 1\% \text{ O}_2$  -  $13 \pm 2\% \text{ CO}_2$  -  $100 \pm 10 \text{ ppm SO}_2$  -  $500 \pm 50 \text{ ppm H}_2\text{S}$  -  $83 \pm 2\% \text{ N}_2$ ). A sufficient distance between the surface of the test piece and the distilled water is to be kept to avoid splashing of distilled water. The minimum gas flow rate is 100 cc per minute for the first 24 h and 20 cc per minute after 24 h.
- .9 The test pieces shall be heated for  $19 \pm 2 \text{ h}$  at  $50 \pm 2^\circ\text{C}$  and  $3 \pm 2 \text{ h}$  at  $25 \pm 2^\circ\text{C}$  and the transition time is to be at least 1 h. The time for 1 cycle is 24 h. The temperature of the distilled water is to be kept at not higher than  $36^\circ\text{C}$ , while the temperature of the test pieces is  $50^\circ\text{C}$ .



**Figure 1 –Test piece of this test**



**Figure 2 – An example of simulated corrosion test apparatus for upper deck**

#### 2.1.2 Test results of base metal

Prior to the testing, the following measured data shall be reported:

- .1 size and weight of the test piece;

and, after the testing, the following measured data shall be reported:

- .2 weight loss (difference between initial weight and weight after testing) of conventional steel ( $W_C$ ) and corrosion resistant steel ( $W_{21}$ ,  $W_{49}$ ,  $W_{77}$  and  $W_{98}$ );

- .3 corrosion loss of conventional steel ( $CL_C$ ) and corrosion resistant steel ( $CL_{21}$ ,  $CL_{49}$ ,  $CL_{77}$  and  $CL_{98}$ ), calculated by the following formulae:

$$CL_C(mm) = \frac{10 \times W_C}{S \times D}$$

$$CL_{21}(mm) = \frac{10 \times W_{21}}{S \times D}$$

$$CL_{49}(mm) = \frac{10 \times W_{49}}{S \times D}$$

$$CL_{77}(mm) = \frac{10 \times W_{77}}{S \times D}$$

$$CL_{98}(mm) = \frac{10 \times W_{98}}{S \times D}$$

whereby:

$W_C$ : weight loss of conventional steel (g) (average of five test pieces)

$W_{21}$ : weight loss of corrosion resistant steel after 21 days (g) (average of five test pieces)

$W_{49}$ : weight loss of corrosion resistant steel after 49 days (g) (average of five test pieces)

$W_{77}$ : weight loss of corrosion resistant steel after 77 days (g) (average of five test pieces)

$W_{98}$ : weight loss of corrosion resistant steel after 98 days (g) (average of five test pieces)

$S$ : surface area ( $cm^2$ )

$D$ : density ( $g/cm^3$ ).

The test is considered to be carried out appropriately if  $CL_C$  is between 0.05 and 0.11 (corrosion rate is between 0.2 and 0.4 mm/year). The concentration of  $H_2S$  in simulated COT gas may be increased for adjusting  $CL_C$ ;

- .4 coefficients A and B of corrosion resistant steel, calculated from the test results for 21, 49, 77 and 98 days by least square method.

Corrosion loss of corrosion resistant steel is described as follows:

$$CL = A \times t^B$$

A(mm) and B: coefficient  
t: test period(days);

- .5 estimated corrosion loss after 25 years (ECL) calculated by the following formula:

$$ECL(mm) = A \times (25 \times 365)^B.$$

#### 2.1.3 *Test results of welded joint*

The surface boundary between base metal and weld metal shall be observed by microscope at 1,000 times magnification.

#### 2.1.4 *Acceptance criteria*

The test results based on provisions of 2.1.2 and 2.1.3 shall satisfy the following criteria:

- .1  $ECL(mm) \leq 2$  (for base metal); and
- .2 no discontinuous surface (e.g., step) between the base metal and weld metal (for welded joint).

#### 2.1.5 *Test report*

The test report shall include the following information:

- .1 name of the manufacturer;
- .2 date of tests;
- .3 chemical composition and corrosion resistant process of steel;
- .4 test results according to 2.1.2 and 2.1.3; and
- .5 judgement according to 2.1.4.

### 2.2 ***Test on simulated inner bottom conditions***

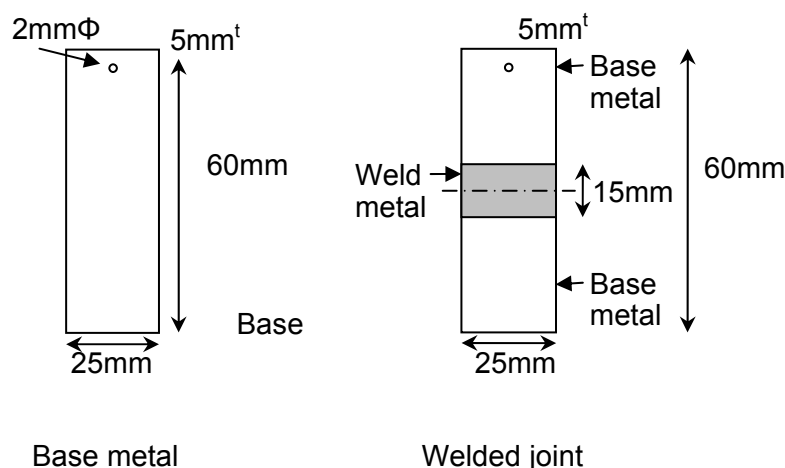
#### 2.2.1 *Test condition*

Tests on simulated inner bottom conditions in cargo oil tanks (COT) should satisfy each of the following conditions:

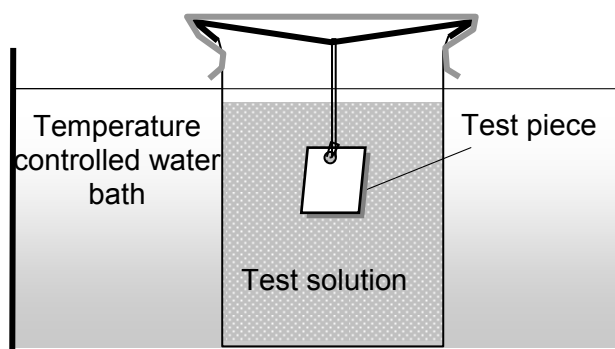
- .1 The test shall be carried out for 72 h for base metal, and 168 h for welded joint.
- .2 There are to be at least five test pieces of corrosion resistant steel for base metal and welded joint, respectively. For comparison, at least five test pieces of base metal of conventional steel should be tested in the same condition.
- .3 The size of each test piece is  $25 \pm 1$  mm x  $60 \pm 1$  mm x  $5 \pm 0.5$  mm for a specimen with base metal only, and is  $25 \pm 1$  mm x  $60 \pm 1$  mm x  $5 \pm 0.5$  mm for a specimen with welded joint including  $15 \pm 5$  mm width of

weld metal part as shown in figure 3. The surface of the test pieces shall be polished with an emery paper #600, except a hole for hanging.

- .4 The samples are hung in a solution from a fishing line (0.3 mm to 0.4 mm in diameter, made of nylon) to avoid crevice-like and/or localized corrosion. An example of a corrosion test configuration is shown in figure 4.
- .5 The test solution contains 10 mass% NaCl and its pH is 0.85 adjusted by HCl solution. The test solution should be changed to a new one every 24 h to minimize pH change of the test solution. The volume of the solution is more than 20 cc/cm<sup>2</sup> (surface area of test piece). The temperature of the test solution is to be kept at 30 ± 2°C.



**Figure 3 – Test piece for this test**



**Figure 4 – Simulated corrosion test apparatus for inner bottom**

#### 2.2.2 Test results of base metal

Prior to the testing, the following data shall be measured and reported:

- .1 size and weight of test piece;

and, after the testing, the following measured data shall be reported:



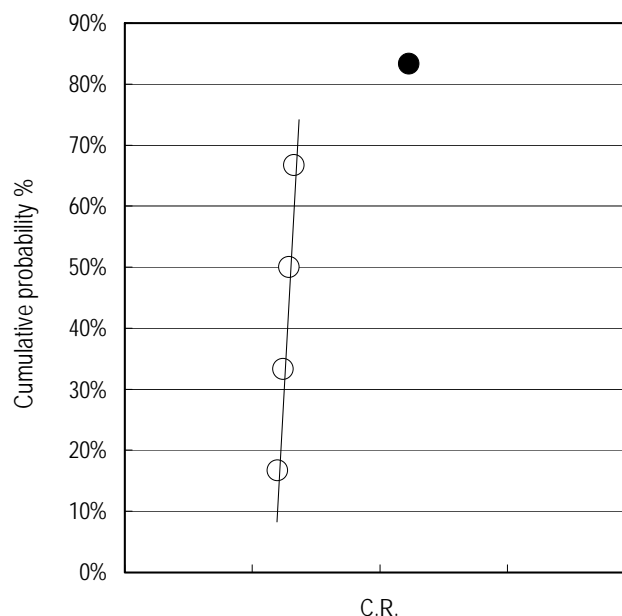
- .2 weight loss (difference between initial weight and weight after testing);
- .3 corrosion rate (*C.R.*) calculated by the following formula:

$$C.R.(mm / year) = \frac{365(days) \times 24(hours) \times W \times 10}{S \times 72(hours) \times D}$$

whereby:

*W*: weight loss(g), *S*: surface area(cm<sup>2</sup>), *D*: density(g/cm<sup>3</sup>);

- .4 to identify specimen which hold crevice and/or localized corrosion, the *C.R.* is to be plotted on a normal distribution statistic chart. *C.R.* data which deviate from the normal statistical distribution must be eliminated from the test results. An example is shown in figure 5 for reference;
- .5 calculation of average of *C.R.*'s data (*C.R.*<sub>ave</sub>):



**Figure 5 – An example of plot of *C.R.*s on a normal distribution chart  
(In this case *C.R.* data • should be abandoned and eliminated.)**

### 2.2.3 Test results of welded joint

The surface boundary between base metal and weld metal shall be observed by microscope at 1,000 times magnification.

### 2.2.4 Acceptance criterion

The test results based on sections 2.2.2 and 2.2.3 shall satisfy the following criteria:

- .1  $C.R._{ave} (mm / year) \leq 1.0$  (for base metal); and
- .2 no discontinuous surface (e.g., step) between the base metal and weld metal (for welded joint).

#### 2.2.5 *Test report*

The test report shall include the following information:

- .1 name of the manufacturer;
- .2 date of tests;
- .3 chemical composition and corrosion resistant process of steel;
- .4 test results according to 2.2.2 and 2.2.3; and
- .5 judgement according to 2.2.4.

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**ANNEX 2**

**RESOLUTION MSC.288(87)  
(adopted on 14 May 2010)**

**PERFORMANCE STANDARD FOR PROTECTIVE COATINGS  
FOR CARGO OIL TANKS OF CRUDE OIL TANKERS**

THE MARITIME SAFETY COMMITTEE,

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

NOTING regulation II-1/3-11 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended (hereinafter referred to as "the Convention") adopted by resolution MSC.291(87), concerning protective coatings for cargo oil tanks of crude oil tankers,

NOTING ALSO that the aforementioned regulation II-1/3-11 provides that the protective coatings referred to therein shall comply with the requirements of the Performance standard for protective coatings for cargo oil tanks of crude oil tankers (hereinafter referred to as "the Performance standard for protective coatings"),

RECOGNIZING that the Performance standard for protective coatings referred to above is not intended to inhibit the development of new or novel technologies which provide for alternative systems,

HAVING CONSIDERED, at its eighty-seventh session, the text of the proposed Performance standard for protective coatings,

1. ADOPTS the Performance standard for protective coatings for cargo oil tanks of crude oil tankers, the text of which is set out in the Annex to the present resolution;
2. INVITES Contracting Governments to the Convention to note that the Performance standard for protective coatings will take effect on 1 January 2012 upon entry into force of SOLAS regulation II-1/3-11;
3. NOTES that, under the provisions of SOLAS regulation II-1/3-11.3.1, amendments to the Performance standard for protective coatings shall be adopted, brought into force and take effect in accordance with the provisions of article VIII of that Convention concerning the amendment procedure applicable to the Annex to the Convention other than chapter I;
4. REQUESTS the Secretary-General to transmit certified copies of this resolution and the text of the Performance standard for protective coatings contained in the Annex to all Contracting Governments to the Convention;
5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and the Annex to all Members of the Organization which are not Contracting Governments to the Convention;

6. INVITES Governments to encourage the development of novel technologies aimed at providing for alternative systems and to keep the Organization advised of any positive results;
7. RESOLVES to keep the Performance standard for protective coatings under review and amend them as necessary, in light of experience gained in its application.

## ANNEX

### PERFORMANCE STANDARD FOR PROTECTIVE COATINGS FOR CARGO OIL TANKS OF CRUDE OIL TANKERS

#### 1 PURPOSE

This Standard provides technical requirements for the minimum standard for protective coatings to be applied in cargo oil tanks during the construction of new crude oil tankers.

#### 2 DEFINITIONS

For the purpose of this Standard, the following definitions apply:

- 2.1 *Crude oil tanker* is as defined in Annex I of MARPOL 73/78.
- 2.2 *Dew point* is the temperature at which air is saturated with moisture.
- 2.3 *DFT* is dry film thickness.
- 2.4 *Dust* is loose particulate matter present on a surface prepared for painting, arising from blast-cleaning or other surface preparation processes, or resulting from the action of the environment.
- 2.5 *Edge grinding* is the treatment of the edge before secondary surface preparation.
- 2.6 "*GOOD*" *condition* is the condition with minor spot rusting as defined in resolution A.744(18) for assessing the ballast tank coatings for tankers.
- 2.7 *Hard coating* is a coating that chemically converts during its curing process or a non-convertible air drying coating which may be used for maintenance purposes. This can be either inorganic or organic.
- 2.8 *NDFT* is the nominal dry film thickness. 90/10 practice means that 90% of all thickness measurements shall be greater than or equal to NDFT and none of the remaining 10% measurements shall be below 0.9 x NDFT.
- 2.9 *Primer coat* is the first coat of the coating system applied in the shipyard after shop primer application.
- 2.10 *Shop primer* is the prefabrication primer coating applied to steel plates, often in automatic plants (and before the first coat of a coating system).
- 2.11 *Stripe coating* is painting of edges, welds, hard to reach areas, etc., to ensure good paint adhesion and proper paint thickness in critical areas.
- 2.12 *Target useful life* is the target value, in years, of the durability for which the coating system is designed.
- 2.13 *Technical Data Sheet* is the paint manufacturer's Product Data Sheet which contains detailed technical instruction and information relevant to the coating and its application.

### **3 GENERAL PRINCIPLES**

3.1 The ability of the coating system to reach its target useful life depends on the type of coating system, steel preparation, operating environment, application and coating inspection and maintenance. All these aspects contribute to the good performance of the coating system.

3.2 Inspection of surface preparation and coating processes shall be agreed upon between the shipowner, the shipyard and the coating manufacturer and presented to the Administration for review. Clear evidence of these inspections shall be reported and included in the Coating Technical File (CTF) (see subsection 3.4).

3.3 When considering the Standard provided in section 4, the following is to be taken into account:

- .1 it is essential that specifications, procedures and the various different steps in the coating application process (including, but not limited to, surface preparation) are strictly applied by the shipbuilder in order to prevent premature decay and/or deterioration of the coating system;
- .2 the coating performance can be improved by adopting measures at the ship design stage such as reducing scallops, using rolled profiles, avoiding complex geometric configurations and ensuring that the structural configuration permits easy access for tools and to facilitate cleaning, drainage and drying of the space to be coated; and
- .3 the coating performance standard provided in this document is based on experience from manufacturers, shipyards and ship operators; it is not intended to exclude suitable alternative coating systems, providing a performance at least equivalent to that specified in this Standard is demonstrated. Acceptance criteria for alternative systems are provided in section 8.

#### **3.4 Coating Technical File (CTF)**

3.4.1 Specification of the cargo oil tank coating system applied, record of the shipyard's and shipowner's coating work, detailed criteria for coating selection, job specifications, inspection, maintenance and repair shall be included in the Coating Technical File required by resolution MSC.215(82).

##### **3.4.2 *New construction stage***

The Coating Technical File shall contain at least the following items relating to this Standard and shall be delivered by the shipyard at new ship construction stage:

- .1 copy of Statement of Compliance or Type Approval Certificate;
- .2 copy of Technical Data Sheet, including:
  - .2.1 product name and identification mark and/or number;
  - .2.2 materials, components and composition of the coating system, colours;

- .2.3 minimum and maximum dry film thickness;
- .2.4 application methods, tools and/or machines;
- .2.5 condition of surface to be coated (de-rusting grade, cleanness, profile, etc.); and
- .2.6 environmental limitations (temperature and humidity);
- .3 shipyard work records of coating application, including:
  - .3.1 applied actual areas (in square metres) of coating in each cargo oil tank;
  - .3.2 applied coating system;
  - .3.3 time of coating, thickness, number of layers, etc.;
  - .3.4 ambient conditions during coating; and
  - .3.5 details of surface preparation;
- .4 procedures for inspection and repair of coating system during ship construction;
- .5 coating log issued by the coating inspector – stating that the coating was applied in accordance with the specifications to the satisfaction of the coating supplier representative and specifying deviations from the specifications (see annex 2);
- .6 shipyard's verified inspection report, including:
  - .6.1 completion date of inspection;
  - .6.2 result of inspection;
  - .6.3 remarks (if given); and
  - .6.4 inspector signature; and
- .7 procedures for in-service maintenance and repair of coating systems.\*

### 3.4.3 ***In-service maintenance and repair***

In-service maintenance and repair activities shall be recorded in the Coating Technical File in accordance with the relevant section of the Guidelines for coating maintenance and repair.

3.4.4 The Coating Technical File shall be kept on board and maintained throughout the life of the ship.

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\* Guidelines to be developed by the Organization.

### **3.5 Health and safety**

The shipyard is responsible for implementation of national regulations to ensure the health and safety of individuals and to minimize the risk of fire and explosion.

## **4 COATING STANDARD**

### **4.1 Performance standard**

This Standard is based on specifications and requirements to provide a target useful coating life of 15 years, which is considered to be the time period, from initial application, over which the coating system is intended to remain in "GOOD" condition. The actual useful life will vary, depending on numerous variables including actual conditions encountered in service.

### **4.2 Standard application**

Protective coatings for cargo oil tanks applied during the construction of new crude oil tankers shall at least comply with the requirements in this Standard.

### **4.3 Coating system**

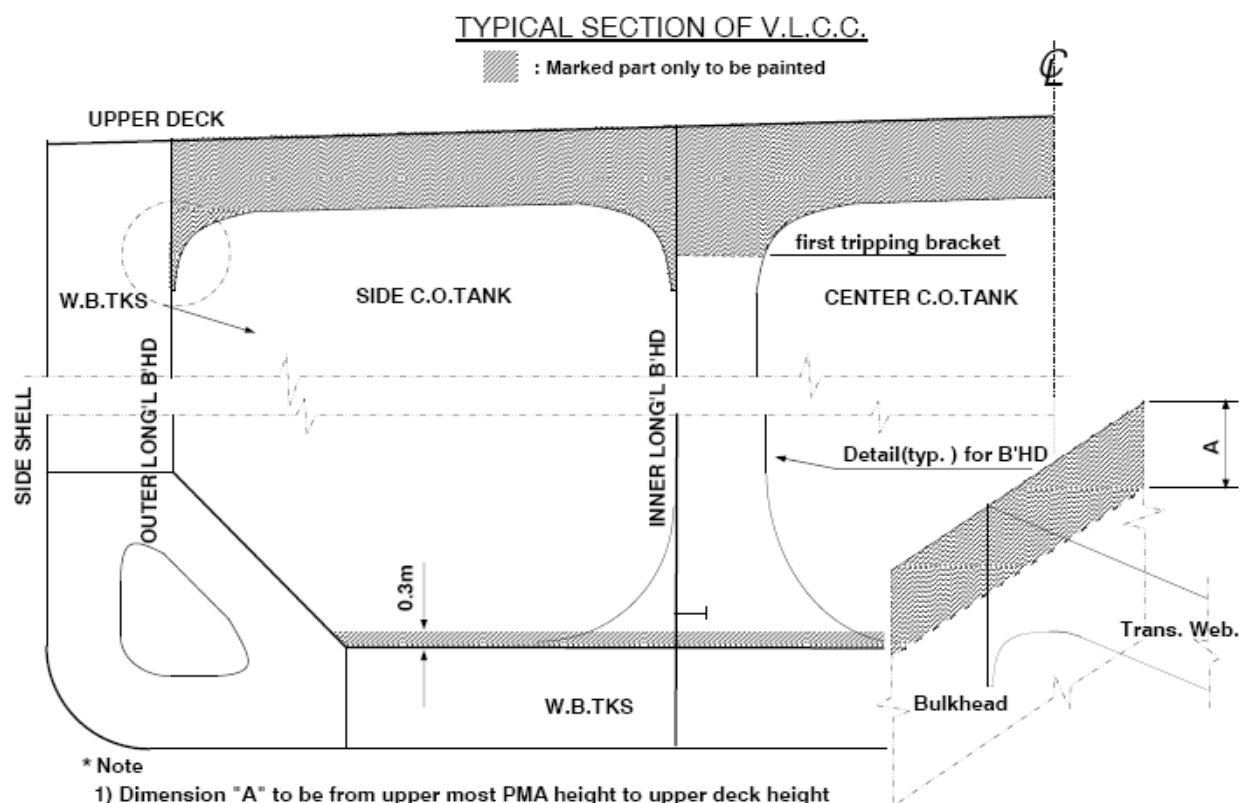
An epoxy-based system meeting test and physical properties (table 1.1.3) shall be documented, and a Type Approval Certificate or Statement of Compliance shall be provided.

### **4.4 Area of application**

The following areas are the minimum areas that shall be protected according to this Standard:

- .1 Deckhead with complete internal structure, including brackets connecting to longitudinal and transverse bulkheads. In tanks with ring frame girder construction the underdeck transverse framing to be coated down to level of the first tripping bracket below the upper faceplate.
- .2 Longitudinal and transverse bulkheads to be coated to the uppermost means of access level. The uppermost means of access and its supporting brackets to be fully coated.
- .3 On cargo tank bulkheads without an uppermost means of access the coating to extend to 10% of the tanks height at centreline but need not extend more than 3 m down from the deck.
- .4 Flat inner bottom and all structure to height of 0.3 m above inner bottom to be coated.





**Figure 1**

## 4.5 Special application

4.5.1 This Standard covers protective coating requirements for steel structure within cargo oil tanks. It is noted that there are other independent items that are fitted within the cargo oil tanks and to which coatings are applied to provide protection against corrosion.

4.5.2 It is recommended that this Standard is applied, to the extent practicable, to those portions of means of access provided for inspection within the areas specified in subsection 4.4 that are not integral to the ship structure, such as rails, independent platforms, ladders, etc. Other equivalent methods of providing corrosion protection for non-integral items may also be used, provided they do not impair the performance of the coatings of the surrounding structure. Access arrangements that are integral to the ship structure, such as stiffener depths for walkways, stringers, etc., are to fully comply with this Standard when located within the coated areas.

4.5.3 It is also recommended that supports for piping, measuring devices, etc., be coated as a minimum in accordance with the non-integral items indicated in paragraph 4.5.2.

## 4.6 Basic coating requirements

4.6.1 The requirements for protective coating systems to be applied at ship construction for the cargo oil tanks of crude oil tankers meeting the performance standard specified in paragraph 4.1 are listed in table 1.

4.6.2 Coating manufacturers shall provide a specification of the protective coating system to satisfy the requirements of table 1 and the operating environment.

4.6.3 The Administration shall verify the Technical Data Sheet and Statement of Compliance or Type Approval Certificate for the protective coating system.

4.6.4 The shipyard shall apply the protective coating in accordance with the verified Technical Data Sheet and its own verified application procedures.

4.7 The referenced standards listed in this Standard are acceptable to the Organization. Test equipment, test methods, preparation methods and/or test results shall conform to performance standards not inferior to those acceptable to the Organization.

**Table 1 – Basic coating system requirements for cargo oil tanks of crude oil tankers**

	Characteristic	Requirement
<b>1</b>	<b>Design of coating system</b>	
.1	Selection of the coating system	<p>The selection of the coating system shall be considered by the parties involved with respect to the service conditions and planned maintenance. The following aspects, among other things shall be considered:</p> <ul style="list-style-type: none"> <li>.1 location of space relative to heated surfaces;</li> <li>.2 frequency of cargo operations;</li> <li>.3 required surface conditions;</li> <li>.4 required surface cleanliness and dryness;</li> <li>.5 supplementary cathodic protections, if any (where coating is supplemented by cathodic protection, the coating shall be compatible with the cathodic protection system);</li> <li>.6 permeability of the coating and resistance to inert gas and acids; and</li> <li>.7 appropriate mechanical properties (flexibility, impact resistance).</li> </ul> <p>The coating manufacturer shall supply products with documented satisfactory performance records and technical data sheets. The manufacturer shall also be capable of rendering adequate technical assistance. Performance records, technical data sheet and any manufacturer's technical assistance provided shall be recorded in the Coating Technical File.</p> <p>Coatings for application underneath sun-heated decks or on bulkheads forming boundaries of heated spaces shall be able to withstand repeated heating and/or cooling without becoming brittle.</p>
.2	Coating type	<p>Epoxy-based systems.</p> <p>Other coating systems with performance according to the test procedure in the annex.</p> <p>A multi-coat system with each coat of a contrasting colour is recommended.</p> <p>The top coat shall be of a light colour to facilitate in-service inspection.</p> <p>Consideration should be given to the use of enhanced coatings in way of suction bellmouths and heating coil downcomers.</p> <p>Consideration should be given to the use of supplementary cathodic protection where there may be galvanic issues.</p>

	Characteristic	Requirement
.3	Coating test	<p>Epoxy-based systems tested prior to the date of entry into force of this Standard in a laboratory by a method corresponding to the test procedure in annex 1 or equivalent, which as a minimum meets the requirements for rusting and blistering, or which have documented field exposure for 5 years with a final coating condition of not less than "GOOD", may be accepted.</p> <p>For epoxy-based systems approved on or after entry into force of this Standard, testing according to the procedure in annex 1, or equivalent, is required.</p>
.4	Job specification	<p>There shall be a minimum of two stripe coats and two spray coats, except that the second stripe coat, by way of welded seams only, may be reduced in scope where it is proven that the NDFT can be met by the coats applied in order to avoid unnecessary over thickness. Any reduction in scope of the second stripe coat shall be fully detailed in the CTF.</p> <p>Stripe coat shall be applied by brush or roller. Roller shall be used for scallops, ratholes, etc., only.</p> <p>Each main coating layer shall be appropriately cured before application of the next coat, in accordance with the coating manufacturer's recommendations.</p> <p>Job specifications shall include the dry-to-recoat times and walk-on time given by the manufacturer.</p> <p>Surface contaminants such as rust, grease, dust, salt, oil, etc., shall be removed prior to painting. The method to be according to the paint manufacturer's recommendations. Abrasive inclusions embedded in the coating shall be removed.</p>
.5	NDFT (nominal total dry film thickness) <sup>1</sup>	<p>NDFT 320 µm with 90/10 rule for epoxy-based systems; other systems to the coating manufacturer's specifications.</p> <p>Maximum total dry film thickness according to the manufacturer's detailed specifications.</p> <p>Care shall be taken to avoid increasing the DFT in an exaggerated way. Wet film thickness shall be regularly checked during application.</p> <p>Thinners shall be limited to those types and quantities recommended by the manufacturer.</p>

<sup>1</sup> Type of gauge and calibration in accordance with SSPC-PA2:2004 Paint Application Specification No.2.

	Characteristic	Requirement
<b>2 PSP (Primary surface preparation)</b>		
.1	Blasting and profile <sup>2,3</sup>	<p>Sa 2½; with profiles between 30-75 µm.</p> <p>Blasting shall not be carried out when:</p> <ul style="list-style-type: none"> <li>.1 the relative humidity is above 85%; or</li> <li>.2 the surface temperature of steel is less than 3°C above the dew point.</li> </ul> <p>Checking of the steel surface cleanliness and roughness profile shall be carried out at the end of the surface preparation and before the application of the primer, and in accordance with the coating manufacturer's recommendations.</p>
.2	Water soluble salt limit equivalent to NaCl <sup>4</sup>	≤ 50 mg/m <sup>2</sup> of sodium chloride.
.3	Shop primer	<p>Zinc containing inhibitor free zinc silicate based or equivalent.</p> <p>Compatibility with main coating system shall be confirmed by the coating manufacturer.</p>
<b>3 Secondary surface preparation</b>		
.1	Steel condition <sup>5</sup>	<p>The steel surface to be coated shall be prepared so that the coating selected can achieve an even distribution at the required NDFT and have an adequate adhesion by removing sharp edges, grinding weld beads and removing weld spatter and any other surface contaminant to grade P2.</p> <p>Edges to be treated to a rounded radius of minimum 2 mm, or subjected to three pass grinding or at least equivalent process before painting.</p>

<sup>2</sup> Refer to standard ISO 8501-1: 1988/Suppl: 1994. Preparation of steel substrate before application of paints and related products – Visual assessment of surface cleanliness.

<sup>3</sup> Refer to standard ISO 8503-1/2: 1988. Preparation of steel substrate before application of paints and related products – Surface roughness characteristics of blast-cleaned steel substrates.

<sup>4</sup> Conductivity measured in accordance with the following standard ISO 8502-9: 1998. Preparation of steel substrate before application of paints and related products – Test for the assessment of surface cleanliness.

<sup>5</sup> Refer to standard ISO 8501-3: 2001. Preparation of steel substrate before application of paints and related products – Visual assessment of surface cleanliness.

	Characteristic	Requirement
.2	Surface treatment <sup>6</sup>	<p>Sa 2½ on damaged shop primer and welds.</p> <p>All surfaces to be coated shall be blasted to Sa 2, removing at least 70% of intact shop primer, which has not passed a pre-qualification certified by test procedures in table 1.3.</p> <p>If the complete coating system comprising epoxy-based main coating and shop primer has passed a pre-qualification certified by test procedures in table 1.3 intact shop primer may be retained provided the same epoxy-based system is used. Retained shop primer shall be cleaned by sweep blasting, high pressure water washing or equivalent method.</p> <p>If a zinc silicate shop primer has passed the pre-qualification test of table 1.3 as part of an epoxy coating system, it may be used in combination with other epoxy coatings certified under table 1.3, provided that the compatibility has been confirmed by the manufacturer by the test with reference to the immersion test of annex 1 or in accordance with the Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers (resolution MSC.215(82)).</p>
.3	Surface treatment after erection	<p>Erection joints St 3 or better or Sa 2½ where practicable.</p> <p><i>For inner bottom:</i></p> <ul style="list-style-type: none"> <li>- Damages up to 20% of the area to be coated to be treated to minimum St 3.</li> <li>- Contiguous damages over 25 m<sup>2</sup> or over 20% of the area to be coated, Sa 2½ shall be applied.</li> </ul> <p><i>For underdeck:</i></p> <ul style="list-style-type: none"> <li>- Damages up to 3% of area to be coated to be treated to minimum St 3.</li> <li>- Contiguous damages over 25 m<sup>2</sup> or over 3% of the area to be coated, Sa 2½ shall be applied.</li> </ul> <p>Coating in overlap to be feathered.</p>
.4	Profile requirements <sup>7</sup>	In case of full or partial blasting 30-75 µm, otherwise as recommended by the coating manufacturer.
.5	Dust <sup>8</sup>	<p>Dust quantity rating "1" for dust size class "3", "4" or "5".</p> <p>Lower dust size classes to be removed if visible on the surface to be coated without magnification.</p>

<sup>6</sup> Refer to standard ISO 8501-1: 1988/Supplement: 1994. Preparation of steel substrate before application of paints and related products – Visual assessment of surface cleanliness.

<sup>7</sup> Refer to standard ISO 8503-1/2: 1988. Preparation of steel substrate before application of paints and related products – Surface roughness characteristics of blast-cleaned steel substrates.

<sup>8</sup> Refer to standard ISO 8502-3:1993. Preparation of steel substrate before application of paints and related products – Test for the assessment of surface cleanliness.

	Characteristic	Requirement
.6	Water soluble salts limit equivalent to NaCl after blasting/grinding <sup>9</sup>	≤ 50 mg/m <sup>2</sup> of sodium chloride.
.7	Contamination	No oil contamination.  Paint manufacturer's recommendations should be followed regarding any other contamination between coats.
<b>4 Miscellaneous</b>		
.1	Ventilation	Adequate ventilation is necessary for the proper drying and curing of coating. Ventilation should be maintained throughout the application process and for a period after application is completed, as recommended by the coating manufacturer.
.2	Environmental conditions	Coating shall be applied under controlled humidity and surface conditions, in accordance with the manufacturer's specifications. In addition, coating shall not be applied when: <ul style="list-style-type: none"> <li>.1 the relative humidity is above 85%; or</li> <li>.2 the surface temperature is less than 3°C above the dew point; or</li> <li>.3 any other requirements of the paint manufacturer are not being met.</li> </ul>
.3	Testing of coating <sup>10</sup>	Destructive testing should be avoided.  Sample dry film thickness shall be measured after each coat for quality control purposes and the total dry film thickness shall be confirmed after completion of the final coat, using appropriate thickness gauges.
.4	Repair	Any defective areas, e.g., pinholes, bubbles, voids, etc., shall be marked up and appropriate repairs effected. All such repairs shall be re-checked and documented.

<sup>9</sup> Conductivity measured in accordance with standard ISO 8502-9: 1998 – Preparation of steel substrate before application of paints and related products – Test for the assessment of surface cleanliness.

<sup>10</sup> Type of gauge and calibration in accordance with standard SSPC-PA2: 2004 – Paint Application Specification No.2.

## **5 COATING SYSTEM APPROVAL**

Results from prequalification tests (table 1, paragraph 1.3) of the coating system shall be documented, and a Statement of Compliance or Type Approval Certificate shall be issued if found satisfactory by a third party, independent of the coating manufacturer.

## **6 COATING INSPECTION REQUIREMENTS**

### **6.1 General**

6.1.1 To ensure compliance with this Standard, the following shall be carried out by qualified coating inspectors certified to NACE Coating Inspector Level 2, FROSIO Inspector Level III or equivalent as verified by the Administration.

6.1.2 Coating inspectors shall inspect surface preparation and coating application during the coating process by carrying out, as a minimum, those inspection items identified in subsection 6.2 to ensure compliance with this Standard. Emphasis shall be placed on initiation of each stage of surface preparation and coatings application as improper work is extremely difficult to correct later in the coating progress. Representative structural members shall be non-destructively examined for coating thickness. The inspector shall verify that appropriate collective measures have been carried out.

6.1.3 Results from the inspection shall be recorded by the inspector and shall be included in the CTF (see annex 2).

### **6.2 Inspection items**

<b>Construction stage</b>		<b>Inspection items</b>
Primary surface preparation	1	The surface temperature of steel, the relative humidity and the dew point shall be measured and recorded before the blasting process starts and at times of sudden changes in weather.
	2	The surface of steel plates shall be tested for soluble salt checked for oil, grease and other contamination.
	3	The cleanliness of the steel surface shall be monitored in the shop primer application process.
	4	The shop primer material shall be confirmed to meet the requirements of 2.3 of table 1. Verified by manufacturer.
Thickness		If compatibility with the main coating system has been declared, then the thickness and curing of the zinc silicate shop primer to be confirmed to conform to the specified values.
Block assembly	1	After completing construction of the block and before secondary surface preparation starts, a visual inspection for steel surface treatment including edge treatment shall be carried out.  Any oil, grease or other visible contamination to be removed.



Construction stage		Inspection items
	2	After blasting/grinding/cleaning and prior to coating, a visual inspection of the prepared surface shall be carried out.  On completion of blasting and cleaning and prior to the application of the first coat of the system, the steel surface shall be tested for levels of remaining soluble salts in at least one location per block.
	3	The surface temperature, the relative humidity and the dew point shall be monitored and recorded during the coating application and curing.
	4	Inspection to be performed of the steps in the coating application process mentioned in table 1.
	5	DFT measurements shall be taken to prove that the coating has been applied to the thickness as specified.
Erection	1	Visual inspection for steel surface condition, surface preparation and verification of conformance to other requirements in table 1, and the agreed specification to be performed.
	2	The surface temperature, the relative humidity and the dew point shall be measured and recorded before coating starts and regularly during the coating process.
	3	Inspection to be performed of the steps in the coating application process mentioned in table 1.

## 7 COATING VERIFICATION REQUIREMENTS

The following shall be carried out by the Administration prior to reviewing the Coating Technical File for the ship subject to this Standard:

- .1 check that the Technical Data Sheet and Statement of Compliance or Type Approval Certificate comply with the Standard;
- .2 check that the coating identification on representative containers is consistent with the coating identified in the Technical Data Sheet and Statement of Compliance or Type Approval Certificate;
- .3 check that the inspector is qualified in accordance with the qualification standards in paragraph 6.1.1;
- .4 check that the inspector's reports of surface preparation and the coating's application indicate compliance with the manufacturer's Technical Data Sheet and Statement of Compliance or Type Approval Certificate; and
- .5 monitor implementation of the coating inspection requirements.

## 8 ALTERNATIVE COATING SYSTEMS

8.1 All systems that are not an epoxy-based system applied according to table 1 of this Standard are defined as an alternative system.

8.2 This Standard is based on recognized and commonly used coating systems. It is not meant to exclude other, alternative, systems with proven equivalent performance, for example non-epoxy-based systems.

8.3 Acceptance of alternative systems shall be subject to documented evidence that they ensure a corrosion prevention performance at least equivalent to that indicated in this Standard, by either:

- .1 testing according to this standard; or
- .2 five years' field exposure with documentary evidence of continuous trading with crude oil cargoes.<sup>11</sup> The coating condition is not less than "GOOD" after five years.

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<sup>11</sup> For field exposure the ship should be trading in varied trade routes and carrying substantial varieties of crude oils to ensure a realistic sample: for example, three ships on three different trade areas with different varieties of crude cargoes.

## ANNEX 1

### TEST PROCEDURES FOR COATING QUALIFICATION FOR CARGO OIL TANKS OF CRUDE OIL TANKERS

#### 1 Scope

This annex provides details of the test procedures for cargo tank coatings for crude oil carriers as referred to in paragraphs 4.6 and 8.3 of this Standard. Both the tank-top and deck-head should be applied with coating systems that have passed the full test protocol as described in this document.

#### 2 Definitions

*Coating specification* means the specification of coating systems which include the type of coating system, steel preparation, surface preparation, surface cleanliness, environmental conditions, application procedure, inspection and acceptance criteria.

#### 3 Background

It is acknowledged that a crude oil cargo tank on board a ship is exposed to two very different environmental conditions.

3.1 When the cargo tank is loaded there are three distinct vertical zones:

- .1 Lowest part, and horizontal parts on stringer decks, etc., exposed to water that can be acidic and sludge that can contain anaerobic bacteria.
- .2 Mid part where the oil cargo is in contact with all immersed steel.
- .3 Vapour space where the air is saturated with various vapours from the loaded cargo tank such as H<sub>2</sub>S, CO<sub>2</sub>, SO<sub>2</sub>, water vapour and other gases and compounds from the inert gas system.

3.2 When the tank is in a ballast condition:

- .1 Lowest part and horizontal parts on stringer decks, etc., exposed to cargo residues and water that can be acidic and sludge that can contain anaerobic bacteria.
- .2 Tank space where the air contains various vapours from the crude oil residues such as H<sub>2</sub>S, CO<sub>2</sub>, SO<sub>2</sub>, water vapour and other gases and compounds from the inert gas system.

#### 4 Testing

The tests herein are designed to simulate, as far as practicable, the two main environmental conditions to which the crude oil cargo tank coating will be exposed. The coating shall be validated by the following tests: the test procedures shall comply with Appendix 1 (Gas-tight chamber simulating the vapour phase of the loaded tank) and Appendix 2 (Immersion test simulating the loaded condition of the crude oil tank<sup>12</sup>).

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<sup>12</sup> Related test method is derived from, but not identical to, standard ISO 2812-1:2007 – Paints and varnishes – Determination of resistance to liquids – Part 1: Immersion in liquids other than water.

## 5 Test gas composition

The test gas is based on the composition of the vapour phase in crude oil tanks, except that the hydrocarbon components are not included as these have no detrimental effect on epoxy coatings such as those used in cargo oil tanks.

### TEST GAS COMPOSITION

N <sub>2</sub>	83 ± 2 per cent by volume of dry gas
CO <sub>2</sub>	13 ± 2 per cent by volume of dry gas
O <sub>2</sub>	4 ± 1 per cent by volume of dry gas
SO <sub>2</sub>	300 ± 20 ppm
H <sub>2</sub> S	200 ± 20 ppm

## 6 Test liquid

Crude oil is a complex chemical material which is not stable over time when stocked. Crude oils can also vary in composition over time. In addition the use of crude oil has proven to create practical and HSE barriers for the involved testing institutes. To overcome this, a model immersion liquid is used to simulate crude oil. The formulation of this crude oil model system is given below:

- .1 start with distillate Marine Fuel, DMA Grade<sup>13</sup> density at 15°C: maximum 890 kg/m<sup>3</sup>, viscosity of maximum 6 mm<sup>2</sup>/s at 40°C;
- .2 add naphthenic acid up to an acid number<sup>14</sup> of 2.5 ± 0.1 mg KOH/g;
- .3 add benzene/ toluene (1:1 ratio) up to a total of 8.0 ± 0.2% w/w of the DMA;
- .4 add artificial seawater<sup>15</sup> up to a total of 5.0 ± 0.2% w/w to the mixture;
- .5 add H<sub>2</sub>S dissolved in a liquid carrier (in order to get 5 ± 1 ppm w/w H<sub>2</sub>S in the total test liquid);
- .6 thoroughly mix the above constituents immediately prior to use; and
- .7 once the mixture is completed, it should be tested to confirm the mixture is compliant with the test mixture concentrations.

*Note: To prevent the risk of H<sub>2</sub>S release into the test facility, it is recommended to use a stock solution for steps 1 to 4, then fill the test containers and complete the test solution with steps 5 and 6.*

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<sup>13</sup> Refer to standard ISO 8217:2005 – Petroleum products – Fuels (class F) – Specifications of marine fuels.

<sup>14</sup> Refer to standard ISO 6618:1997 – Petroleum products and lubricants – Determination of acid or base number – Colour-indicator titration method.

<sup>15</sup> Refer to standard ASTM D1141 – 98(2008) – Standard Practice for the Preparation of Substitute Ocean Water.

## APPENDIX 1

### GAS-TIGHT CABINET TEST

#### 1 Test condition

The vapour test shall be carried out in a gas-tight cabinet. The dimensions and design of the air tight gas cabinet are not critical, provided the requirements of subparagraphs .6 to .10 below are met. The test gas is designed to simulate the actual crude oil cargo tank environment in ballast condition as well as the vapour conditions of the loaded tank.

- .1 The exposure time is 90 days.
- .2 Testing shall be carried out using duplicate panels; a third panel shall be prepared and stored at ambient conditions to act as a reference panel during final evaluation of the test panels.
- .3 The size of each test panel is 150 mm x 100 mm x 3 mm.
- .4 The panels shall be treated according to the Performance standard table 1, 1.2 and the coating system applied according to table 1, 1.4 and 1.5.
- .5 The zinc silicate shop primer, when used, shall be weathered for at least 2 months and cleaned by low pressure fresh water washing. The exact method of shop primer preparation before being over coated shall be reported, and the judgement issued for that specific system. The reverse side and edges of the test piece shall be coated appropriately, in order not to influence the test results.
- .6 Inside the gas-tight cabinet a trough shall be present. This trough shall be filled with  $2 \pm 0.2$  l of water. The water in the trough shall be drained and renewed prior to each time the test gas is refreshed.
- .7 The vapour spaces inside the gas-tight cabinet shall be filled with a mixture of test gas as per item 5 of the Standard. The cabinet atmosphere shall be maintained over the period of the test. When the gas is outside the scope of the test method, it shall be refreshed. The monitoring frequency and method, and the date and time for refreshing the test gas, shall be in the test report.
- .8 The atmosphere in the test cabinet shall at all times be  $95 \pm 5\%$  relative humidity.
- .9 Temperature of the test atmosphere shall be  $60 \pm 3^{\circ}\text{C}$ .
- .10 A stand for the test panels shall be made of a suitable inert material to hold the panels vertically spaced at least 20 mm between panels. The stand shall be positioned in the cabinet to ensure the lower edge of the panels is at least 200 mm above the height of the water and at least 100 mm from the walls of the cabinet. If two shelves are in the cabinet, care shall be taken to ensure solution does not drip on to the lower panels.

## 2 Test results

2.1 Prior to testing, the following measured data of each coating composing the coating system, including the zinc silicate shop primer when used under the coating system, shall be reported:

- .1 infrared (IR) identification of the base and hardener components of the coating;
- .2 specific gravity<sup>16</sup> of the base and hardener components of the paint; and
- .3 mean dry film thickness (DFT) (by using a template).<sup>17</sup>

2.2 After completion of the test duration, the panels shall be removed from the cabinet and rinsed with warm tap water. The panels shall be dried by blotting with absorbent paper and, then, evaluated for rust and blistering within 24 h of the end of the test.

2.3 After testing, the following measured data shall be reported: blisters and rust.<sup>18</sup>

## 3 Acceptance criteria

3.1 The test results based on section 2 shall satisfy the following criteria, the poorest performing of the duplicate test panels shall be used in the report:

Item	Acceptance criteria for epoxy-based systems	Acceptance criteria for alternative systems
Blisters on panel	No blisters	No blisters
Rust on panel	Ri 0 (0%)	Ri 0 (0%)

3.2 When evaluating test panels, blistering or rusting within 5 mm of the panel edge shall be ignored.

## 4 Test report

The test report shall include the following information:

- .1 coating manufacturers' name and manufacturing site;<sup>19</sup>
- .2 dates of test;

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<sup>16</sup> Refer to standard ISO 2811-1/4:1997 – Paints and varnishes. Determination of density.

<sup>17</sup> Six equally distributed measuring points are used on panels size 150 mm x 100 mm.

<sup>18</sup> Refer to the following standards:

- .1 ISO 4628-1:2003 – Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 1: General introduction and designation system;
- .2 ISO 4628-2:2003 – Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 2: Assessment of degree of blistering; and
- .3 ISO 4628:2003 – Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of common types of defect – Part 3: Designation of degree of rusting.

<sup>19</sup> It should be noted that the test is valid irrespective of production site, meaning that no individual testing of product from different production sites is required.

- .3 product name/identification of each coat and, where applicable, zinc silicate shop primer;
- .4 batch numbers of each component of each product;
- .5 details of surface preparation of steel panels, before shop primer application, and treatment of the shop primer before over coating where relevant and at a minimum including the following:
  - .5.1 surface treatment, or treatment of weathered shop primer, and any other important information on treatment influencing the performance; and
  - .5.2 water soluble salt level measured on the steel prior to application of the shop primer;<sup>20</sup>
- .6 details of coating system, including the following:
  - .6.1 zinc silicate shop primer if relevant, its secondary surface pre-treatment and condition under which applied, weathering period;
  - .6.2 number of coats, including the shop primer, and thickness of each;
  - .6.3 mean dry film thickness (DFT) prior to testing;<sup>21</sup>
  - .6.4 thinner if used;<sup>22</sup>
  - .6.5 humidity;<sup>22</sup>
  - .6.6 air temperature;<sup>22</sup> and
  - .6.7 steel temperature;<sup>22</sup>
- .7 details of schedule for refreshing the test gas;
- .8 test results according to section 2; and
- .9 results according to section 3.

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<sup>20</sup> Refer to the following standards:

- .1 ISO 8502-6:2006. Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness – Part 6: Extraction of soluble contaminants for analysis – The Bresle method; and
- .2 ISO 8502-9:1998. Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness – Part 9: Field method for the conductometric determination of water-soluble salts.

<sup>21</sup> Both of actual specimen data and manufacturer's requirement/recommendation.

## APPENDIX 2

### IMMERSION TEST

#### 1 Test condition

The immersion test<sup>22</sup> is developed to simulate the conditions in a crude oil tank in loaded condition.

- .1 The exposure time is 180 days.
- .2 The test liquid should be made as per item 6 in the Standard.
- .3 The test liquid should be added to a container with an inside flat bottom until a column of the test liquid of height of 400 mm is reached, resulting in an aqueous phase of 20 mm. Any other alternative test set-up, using an identical test liquid, which will also result in the immersion of the test panel in 20 mm of the aqueous phase, is also accepted. This can be achieved by using, for instance, inert marbles.
- .4 The temperature of the test liquid should be  $60 \pm 2^{\circ}\text{C}$  and should be uniform and maintained constant with recognized methods such as water or oil bath or air circulation oven capable of keeping the immersion liquid within the required temperature range.
- .5 Test panels shall be positioned vertically and fully immersed during the test.
- .6 Testing shall be carried out using duplicate panels.
- .7 Inert spacers which do not cover the test area shall be used to separate test panels.
- .8 The size of each test panel is 150 mm x 100 mm x 3 mm.
- .9 The panels shall be treated according to the Performance Standard table 1, 1.2 and the coating system applied according to table 1, 1.4 and 1.5.
- .10 The zinc silicate shop primer, when used, shall be weathered for at least 2 months and cleaned by low pressure fresh water washing. The exact method of shop primer preparation before being over coated shall be reported, and the judgement issued for that specific system. The reverse side, and edges, of the test piece shall be coated appropriately, in order not to influence the test results.
- .11 After the full immersion test period is completed the panels shall be removed from the test liquid and wiped with dry clean cloth before evaluation of the panels.
- .12 Evaluation of the test panels shall be done within 24 h after completion of the test.

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<sup>22</sup> Related test method is derived from, but not identical to, standard ISO 2812-1:2007 – Paints and varnishes – Determination of resistance to liquids – Part 1: Immersion in liquids other than water.



## 2 Test results

2.1 Prior to testing, the following measured data of each coating composing the coating system, including the zinc silicate shop primer when used under the coating system, shall be reported:

- .1 infrared (IR) identification of the base and hardener components of the coating;
- .2 specific gravity of the base and hardener components of the paint;<sup>23</sup> and
- .3 mean dry film thickness (DFT) (by using a template).<sup>24</sup>

2.2 After testing, the following measured data shall be reported: blisters and rust.<sup>25</sup>

## 3 Acceptance criteria

3.1 The test results based on section 2 shall satisfy the following criteria, the poorest performing of the duplicate test panels shall be used in the report:

Item	Acceptance criteria for epoxy-based systems	Acceptance criteria for alternative systems
Blisters on panel	No blisters	No blisters
Rust on panel	Ri 0 (0%)	Ri 0 (0%)

3.2 When evaluating test panels, blistering or rusting within 5 mm of the panel edge should be ignored.

## 4 Test report

The test report shall include the following information:

- .1 coating manufacturers' name and manufacturing site;<sup>26</sup>
- .2 dates of test;

<sup>23</sup> Refer to standard ISO 2811-1/4:1997 – Paints and varnishes. Determination of density.

<sup>24</sup> Six equally distributed measuring points are used on panels size 150 mm x 100 mm.

<sup>25</sup> Refer to the following standards:

- .1 ISO 4628-1:2003. Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 1: General introduction and designation system;
- .2 ISO 4628-2:2003. Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 2: Assessment of degree of blistering; and
- .3 ISO 4628:2003. Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of common types of defect – Part 3: Designation of degree of rusting.

<sup>26</sup> It should be noted that the test is valid irrespective of production site, meaning that no individual testing of product from different production sites is required.

- .3 product name/identification of each coat and, where applicable, zinc silicate shop primer;
- .4 batch numbers of each component of each product;
- .5 details of surface preparation of steel panels, before shop primer application, and treatment of the shop primer before over coating where relevant and at a minimum including the following:
  - .5.1 surface treatment, or treatment of weathered shop primer, and any other important information on treatment influencing the performance; and
  - .5.2 water soluble salt level measured on the steel prior to application of the shop primer;<sup>27</sup>
- .6 details of coating system, including the following:
  - .6.1 zinc silicate shop primer if relevant, its secondary surface pre-treatment and condition under which applied, weathering period;
  - .6.2 number of coats, including the shop primer, and thickness of each;
  - .6.3 mean dry film thickness (DFT) prior to testing;<sup>28</sup>
  - .6.4 thinner if used;<sup>29</sup>
  - .6.5 humidity;<sup>29</sup>
  - .6.6 air temperature;<sup>29</sup> and
  - .6.7 steel temperature;<sup>29</sup>
- .7 test results according to section 2; and
- .8 results according to section 3.

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<sup>27</sup> Refer to the following standards:

- .1 ISO 8502-6:2006. Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness – Part 6: Extraction of soluble contaminants for analysis – The Bresle method; and
- .2 ISO 8502-9:1998. Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness – Part 9: Field method for the conductometric determination of water-soluble salts.

<sup>28</sup> Both of actual specimen data and manufacturer's requirement/recommendation.

## APPENDIX 3

### PRECAUTIONS REGARDING THE USE OF DANGEROUS MATERIALS

1 The test methods involve the use of materials that may be hazardous to health as follows:

- .1 Sulphur Dioxide: Corrosive when wet, toxic if inhaled, causes burns, and is an irritant to the eyes and respiratory system.
- .2 Hydrogen Sulphide: Highly flammable (Flash point of  $-82^{\circ}\text{C}$ ), can form an explosive mixture with air, corrosive when wet, causes burns, has to be kept away from sources of ignition, irritant and asphyxiant, LTEL 5 ppm, STEL 10 ppm, higher concentrations can be fatal and have no odour. Repeated exposure to low concentrations can result in the sense of smell for the gas being diminished.
- .3 Benzene: Highly flammable (Flash point of  $-11^{\circ}\text{C}$ ), can form an explosive mixture with air, toxic, carcinogenic, acute health risk.
- .4 Toluene: Highly flammable (Flash point of  $4^{\circ}\text{C}$ ), can form an explosive mixture with air, irritant, acute health risk, reprotoxin.

2 Special test apparatus and precautions may be required depending on the regulations in force in the country where the tests are carried out.

3 Although some countries have no specific requirements preventing either of the tests being carried out, it shall anyhow be required that:

- .1 a risk assessment of the working conditions is carried out;
- .2 during the test period, the system shall be enclosed; and
- .3 the environment shall be controlled, particularly at the start and end of the tests, suitable air exhaust shall be available and personal protective equipment shall be worn.

ANNEX 2

EXAMPLE OF DAILY LOG AND NON-CONFORMITY REPORT

DAILY LOG

Sheet No:

<b>Ship:</b>	<b>Tank/Hold No:</b>	<b>Database:</b>							
<b>Part of structure:</b>									
<b>SURFACE PREPARATION</b>									
<b>Method:</b>	<b>Area (m<sup>2</sup>):</b>								
<b>Abrasive:</b>	<b>Grain size:</b>								
<b>Surface temperature:</b>	<b>Air temperature:</b>								
<b>Relative humidity (max):</b>	<b>Dew point:</b>								
<b>Standard achieved:</b>									
<b>Rounding of edges:</b>									
<b>Comments:</b>									
<b>Job No.:</b>	<b>Date:</b>	<b>Signature:</b>							
<b>COATING APPLICATION:</b>									
<b>Method:</b>									
<b>Coat No.</b>	<b>System</b>	<b>Batch No.</b>	<b>Date</b>	<b>Air temp.</b>	<b>Surf temp.</b>	<b>RH%</b>	<b>Dew point</b>	<b>DFT* Meas.</b>	<b>Specified</b>
<small>* Measured minimum and maximum DFT. DFT readings to be attached to daily log.</small>									
<b>Comments:</b>									
<b>Job No:</b>	<b>Date:</b>			<b>Signature:</b>					

**NON-CONFORMITY REPORT**

**Sheet No:**

<b>Ship:</b>	<b>Tank/Hold No:</b>	<b>Database:</b>
<b>Part of structure:</b>		
<b>DESCRIPTION OF THE INSPECTION FINDINGS TO BE CORRECTED</b>		
<b>Description of findings:</b>		
<b>Reference document (daily log):</b>		
<b>Action taken:</b>		
<b>Job No.:</b>	<b>Date:</b>	<b>Signature:</b>

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**ANNEX 1**

**RESOLUTION MSC.287(87)  
(adopted on 20 May 2010)**

**ADOPTION OF THE INTERNATIONAL GOAL-BASED SHIP CONSTRUCTION  
STANDARDS FOR BULK CARRIERS AND OIL TANKERS**

THE MARITIME SAFETY COMMITTEE,

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

BEING DESIROUS that the Organization should play a larger role in determining the structural standards to which new ships are built,

RECALLING ALSO that among the strategic directions of the Organization relating to developing and maintaining a comprehensive framework for safe, secure, efficient and environmentally sound shipping is the establishment of goal-based standards for the design and construction of ships,

CONSIDERING that ships should be designed and constructed for a specified design life to be safe and environmentally friendly, so that, if properly operated and maintained under specified operating and environmental conditions, they can remain safe throughout their service life,

NOTING regulations II-1/2.28 and II-1/3-10 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended (hereinafter referred to as "the Convention"), adopted by resolution MSC.290(87), concerning goal-based ship construction standards for bulk carriers and oil tankers,

NOTING ALSO that the aforementioned regulation II-1/3-10 requires that bulk carriers and oil tankers as defined therein satisfy the applicable structural requirements of a recognized organization, or national standards of an Administration, conforming to the functional requirements of the goal-based ship construction standards for bulk carriers and oil tankers,

HAVING CONSIDERED, at its eighty-seventh session, the proposed International Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers,

1. ADOPTS the International Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers, the text of which is set out in the Annex to the present resolution;
2. INVITES Contracting Governments to the Convention to note that the International Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers will take effect on 1 January 2012 upon entry into force of regulation II-1/3-10 of the Convention;
3. REQUESTS the Secretary-General to transmit certified copies of this resolution and the text of the International Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers, contained in the Annex, to all Contracting Governments to the Convention;
4. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and the Annex to all Members of the Organization which are not Contracting Governments to the Convention.

## ANNEX

### INTERNATIONAL GOAL-BASED SHIP CONSTRUCTION STANDARDS FOR BULK CARRIERS AND OIL TANKERS

#### 1 PREAMBLE

1.1 The notion of "goal-based ship construction standards" was introduced in the Organization at the eighty-ninth session of the Council in November 2002 through a proposal by the Bahamas and Greece\*, suggesting that the Organization should develop ship construction standards that would permit innovation in design but ensure that ships are constructed in such a manner that, if properly maintained, they remain safe for their entire economic life. The standards would also have to ensure that all parts of a ship can be easily accessed to permit proper inspection and ease of maintenance. The Council referred the proposal to the seventy-seventh meeting of the Maritime Safety Committee (MSC) in May/June 2003 for consideration.

1.2 The MSC, at its seventy-seventh session, considered the matter as requested and recommended that the ninetieth session of the Council should consider it further in the context of the development of the Organization's Strategic Plan. The Committee also agreed to include a new item on "Goal-based new ship construction standards" in its work programme and agenda for its next meeting.

1.3 The ninetieth session of the Council, in considering the strategy and policy of the Organization for the 2006 to 2011 period, approved strategic directions regarding the development of goal-based standards for the design and construction of new ships. Subsequently, at its twenty-second extraordinary session, the Council included in the strategic directions of the Organization a provision that "IMO will establish goal-based standards for the design and construction of new ships".

1.4 The Assembly, at its twenty-third session in November/December 2003, when adopting resolution A.944(23) on the Organization's Strategic plan for the six-year period 2004 to 2010, resolved, *inter alia*, that "the IMO would establish goal-based standards for the design and construction of new ships". This decision was also reflected in resolution A.943(23) on the Long-term work plan of the Organization, up to 2010, where the subject "Goal-based new ship construction standards" was introduced in the list of general subjects.

1.5 The MSC commenced detailed technical work on the development of goal-based ship construction standards at its seventy-eighth session in May 2004, when a comprehensive general debate of the issues involved took place and the Committee agreed to utilize a five-tier system initially proposed by the Bahamas, Greece and IACS, consisting of the following:

- .1 **Tier I – Goals**  
High-level objectives to be met.
- .2 **Tier II – Functional requirements**  
Criteria to be satisfied in order to conform to the goals.

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\* Document C 89/12/1 (Bahamas, Greece) – IMO Strategic Plan.

- .3 ***Tier III – Verification of conformity***  
Procedures for verifying that the rules and regulations for ship design and construction conform to the goals and functional requirements.
- .4 ***Tier IV – Rules and regulations for ship design and construction***  
Detailed requirements developed by IMO, national Administrations and/or recognized organizations and applied by national Administrations and/or recognized organizations acting on their behalf to the design and construction of a ship in order to conform to the goals and functional requirements.
- .5 ***Tier V – Industry practices and standards***  
Industry standards, codes of practice and safety and quality systems for shipbuilding, ship operation, maintenance, training, manning, etc., which may be incorporated into, or referenced in, the rules and regulations for the design and construction of a ship.

1.6 Following deliberation on the subject at its eighty-first session, the Committee agreed to limit the scope of its consideration initially to bulk carriers and oil tankers and consider expansion to other ship types and areas of safety at a later time.

## 2 SCOPE

The International Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers (hereinafter referred to as "the Standards") describe the goals and establish the functional requirements that the rules for the design and construction of bulk carriers and oil tankers of an organization recognized by the Administration, or the national rules of an Administration, shall conform to, as defined in SOLAS regulations II-1/2.28 and II-1/3-10. Additionally, the Standards establish that the above mentioned rules shall be verified as conforming to the goals and functional requirements.

## 3 STRUCTURE

These Standards consist of the following three tiers:

- Tier I – Goals
- Tier II – Functional requirements
- Tier III – Verification of conformity.

## 4 TIER I – GOALS

The Tier I goals are as defined in SOLAS regulation II-1/3-10 and are reproduced here for ease of reference, as follows:

Ships shall be designed and constructed for a specified design life to be safe and environmentally friendly, when properly operated and maintained under the specified operating and environmental conditions, in intact and specified damage conditions, throughout their life.

- .1 *Safe and environmentally friendly* means the ship shall have adequate strength, integrity and stability to minimize the risk of loss of the ship or pollution to the marine environment due to structural failure, including collapse, resulting in flooding or loss of watertight integrity.



- .2 *Environmentally friendly* also includes the ship being constructed of materials for environmentally acceptable recycling.
- .3 *Safety* also includes the ship's structure, fittings and arrangements providing for safe access, escape, inspection and proper maintenance and facilitating safe operation.
- .4 *Specified operating and environmental conditions* are defined by the intended operating area for the ship throughout its life and cover the conditions, including intermediate conditions, arising from cargo and ballast operations in port, waterways and at sea.
- .5 *Specified design life* is the nominal period that the ship is assumed to be exposed to operating and/or environmental conditions and/or the corrosive environment and is used for selecting appropriate ship design parameters. However, the ship's actual service life may be longer or shorter depending on the actual operating conditions and maintenance of the ship throughout its life cycle.

## **5 TIER II – FUNCTIONAL REQUIREMENTS**

(Applicable to bulk carriers and oil tankers in unrestricted navigation\*)

### **DESIGN**

#### **II.1 Design life**

The specified design life shall not be less than 25 years.

#### **II.2 Environmental conditions**

Ships shall be designed in accordance with North Atlantic environmental conditions and relevant long-term sea state scatter diagrams.

#### **II.3 Structural strength**

##### **II.3.1 General design**

The ship's structural members shall be of a design that is compatible with the purpose of the space and ensures a degree of structural continuity. The structural members of ships shall be designed to facilitate load/discharge for all contemplated cargoes to avoid damage by loading/discharging equipment, which may compromise the safety of the structure.

##### **II.3.2 Deformation and failure modes**

The structural strength shall be assessed against excessive deflection and failure modes, including but not limited to buckling, yielding and fatigue.

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\* Unrestricted navigation means that the ship is not subject to any geographical restrictions (i.e. any oceans, any seasons) except as limited by the ship's capability for operation in ice.

### **II.3.3 Ultimate strength**

Ships shall be designed to have adequate ultimate strength. Ultimate strength calculations shall include ultimate hull girder capacity and related ultimate strength of plates and stiffeners, and be verified for a longitudinal bending moment based on the environmental conditions in functional requirement II.2.

### **II.3.4 Safety margins**

Ships shall be designed with suitable safety margins:

- .1 to withstand, at net scantlings\*, in the intact condition, the environmental conditions anticipated for the ship's design life and the loading conditions appropriate for them, which shall include full homogeneous and alternate loads, partial loads, multi-port and ballast voyage, and ballast management condition loads and occasional overruns/overloads during loading/unloading operations, as applicable to the class designation; and
- .2 appropriate for all design parameters whose calculation involves a degree of uncertainty, including loads, structural modelling, fatigue, corrosion, material imperfections, construction workmanship errors, buckling, residual and ultimate strength.

## **II.4 Fatigue life**

The design fatigue life shall not be less than the ship's design life and shall be based on the environmental conditions in functional requirement II.2.

## **II.5 Residual strength**

Ships shall be designed to have sufficient strength to withstand the wave and internal loads in specified damaged conditions such as collision, grounding or flooding. Residual strength calculations shall take into account the ultimate reserve capacity of the hull girder, including permanent deformation and post-buckling behaviour. Actual foreseeable scenarios shall be investigated in this regard as far as is reasonably practicable.

## **II.6 Protection against corrosion**

Measures shall be applied to ensure that net scantlings required to meet structural strength provisions are maintained throughout the specified design life. Measures include, but are not limited to, coatings, corrosion additions, cathodic protection, impressed current systems, etc.

### **II.6.1 Coating life**

Coatings shall be applied and maintained in accordance with manufacturers' specifications concerning surface preparation, coating selection, application and maintenance. Where coating is required to be applied, the design coating life shall be specified. The actual coating life may be longer or shorter than the design coating life, depending on the actual conditions

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\* The net scantlings should provide the structural strength required to sustain the design loads, assuming the structure is in intact condition and without any corrosion margin. However, when assessing fatigue and global strength of hull girder and primary supporting structures, a portion of the total corrosion margin may be added to the net scantlings to reflect the material thickness that can reasonably be expected to exist over the design life.

and maintenance of the ship. Coatings shall be selected as a function of the intended use of the compartment, materials and application of other corrosion prevention systems, e.g., cathodic protection or other alternatives.

#### **II.6.2 Corrosion addition**

The corrosion addition shall be added to the net scantling and shall be adequate for the specified design life. The corrosion addition shall be determined on the basis of exposure to corrosive agents such as water, cargo or corrosive atmosphere, or mechanical wear, and whether the structure is protected by corrosion prevention systems, e.g., coating, cathodic protection or by alternative means. The design corrosion rates (mm/year) shall be evaluated in accordance with statistical information established from service experience and/or accelerated model tests. The actual corrosion rate may be greater or smaller than the design corrosion rate, depending on the actual conditions and maintenance of the ship.

#### **II.7 Structural redundancy**

Ships shall be of redundant design and construction so that localized damage (such as local permanent deformation, cracking or weld failure) of any stiffening structural member will not lead to immediate consequential collapse of the complete stiffened panel.

#### **II.8 Watertight and weathertight integrity**

Ships shall be designed to have adequate watertight and weathertight integrity for the intended service of the ship and adequate strength and redundancy of the associated securing devices of hull openings.

#### **II.9 Human element considerations**

Ship's structures and fittings shall be designed and arranged using ergonomic principles to ensure safety during operations, inspection and maintenance. These considerations shall include, but not be limited to, stairs, vertical ladders, ramps, walkways and standing platforms used for means of access, the work environment, inspection and maintenance and the facilitation of operation.

#### **II.10 Design transparency**

Ships shall be designed under a reliable, controlled and transparent process made accessible to the extent necessary to confirm the safety of the new as-built ship, with due consideration to intellectual property rights. Readily available documentation shall include the main goal-based parameters and all relevant design parameters that may limit the operation of the ship.

### **CONSTRUCTION**

#### **II.11 Construction quality procedures**

Ships shall be built in accordance with controlled and transparent quality production standards with due regard to intellectual property rights. The ship construction quality procedures shall include, but not be limited to, specifications for material, manufacturing, alignment, assembling, joining and welding procedures, surface preparation and coating.

## **II.12 Survey during construction**

A survey plan shall be developed for the construction phase of the ship, taking into account the ship type and design. The survey plan shall contain a set of requirements, including specifying the extent and scope of the construction survey(s) and identifying areas that need special attention during the survey(s), to ensure compliance of construction with mandatory ship construction standards.

### ***IN-SERVICE CONSIDERATIONS***

## **II.13 Survey and maintenance**

Ships shall be designed and constructed to facilitate ease of survey and maintenance, in particular avoiding the creation of spaces too confined to allow for adequate survey and maintenance activities. Areas shall be identified that need special attention during surveys throughout the ship's life. In particular, this shall include all necessary in-service survey and maintenance that was assumed when selecting ship design parameters.

## **II.14 Structural accessibility**

The ship shall be designed, constructed and equipped to provide adequate means of access to all internal structures to facilitate overall and close-up inspections and thickness measurements.

### ***RECYCLING CONSIDERATIONS***

## **II.15 Recycling**

Ships shall be designed and constructed of materials for environmentally acceptable recycling without compromising the safety and operational efficiency of the ship.

## **6 TIER III – VERIFICATION OF CONFORMITY**

6.1 The rules for the design and construction of bulk carriers and oil tankers of an organization which is recognized by an Administration in accordance with the provisions of SOLAS regulation XI-1/1, or national rules of an Administration used as an equivalent to the rules of a recognized organization according to SOLAS regulation II-1/3-1, shall be verified as conforming to the Tier I goals and Tier II functional requirements, based on the guidelines developed by the Organization\*. The final decision on verification of conformity shall be taken by the Maritime Safety Committee of the Organization which shall inform all Contracting Governments of the decision.

6.2 The term "verification" (and any variation of the word "verify") means that the rules for the design and construction of bulk carriers and oil tankers as described above have been compared to the Standards and have been found to be in conformity with or are consistent with the goals and functional requirements as set out in the Standards.

6.3 Once the rules for the design and construction of bulk carriers and oil tankers of an Administration or recognized organization have been verified as being in conformity with the Standards, this conformity shall be considered to remain in effect for rule changes, provided

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\* Refer to the Guidelines for verification of conformity with goal-based ship construction standards for bulk carriers and oil tankers, adopted by the Organization by resolution MSC.296(87).

that no verification of rule changes has resulted in a non-conformity. Unless the Maritime Safety Committee decides otherwise, any rule changes introduced as a result of verification of conformity shall apply to ships for which the building contract is placed on or after the date on which the rule change enters into force.

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**ANNEX 8**

**RESOLUTION MSC.294(87)  
(adopted on 21 May 2010)**

**ADOPTION OF AMENDMENTS TO THE INTERNATIONAL MARITIME DANGEROUS  
GOODS (IMDG) CODE**

THE MARITIME SAFETY COMMITTEE,

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

NOTING resolution MSC.122(75) by which it adopted the International Maritime Dangerous Goods Code (hereinafter referred to as "the IMDG Code"), which has become mandatory under chapter VII of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended (hereinafter referred to as "the Convention"),

NOTING ALSO article VIII(b) and regulation VII/1.1 of the Convention concerning the amendment procedure for amending the IMDG Code,

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

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the IMDG Code, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(2)(bb) of the Convention, that the said amendments shall be deemed to have been accepted on 1 July 2011, unless prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;
3. INVITES Contracting Governments to the Convention to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 January 2012 upon their acceptance in accordance with paragraph 2 above;
4. AGREES that Contracting Governments to the Convention may apply the aforementioned amendments in whole or in part on a voluntary basis as from 1 January 2011;
5. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;
6. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

## ANNEX

### AMENDMENTS TO THE INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG) CODE

#### Contents

3.1.3 Amend the title as follows:

"Mixtures or solutions".

3.4.7 "Exemptions" is deleted and "3.4.8" Marine Pollutants" is renumbered as "3.4.7".

5.4.1 Amend the title as follows:

"Dangerous goods transport information".

Insert the following:

#### **"Chapter 5.5 – Special provisions**

5.5.1 (Reserved).

5.5.2 Special provisions applicable to fumigated cargo transport units (UN 3359)".

Replace in 7.2.8 "Segregation provisions for goods of class 4.1 and class 5.2" with "(Reserved)".

Replace in 7.4.3 "Fumigated units" with "(Reserved)".

Insert "7.5.4 Tracking and monitoring equipment".

#### **Preamble**

In paragraph 12 quarter of the preamble, in the first sentence, after the words "IMDG Code which" the words "will enter" are replaced by the word "entered" and in the second sentence, after the word "Governments", the word "are" is replaced by the word "were".

A new paragraph 12quinquies is inserted as follows:

"12quinquies At its eighty-seventh session in May 2010, the MSC adopted Amendment 35 to the mandatory IMDG Code, which will enter into force on 1 January 2012 without any transitional period. However, in accordance with resolution MSC.294(87), Governments are encouraged to apply this Amendment in whole or part on a voluntary basis from 1 January 2011."

In paragraph 16 of the preamble, the text between brackets "(see MSC/Circ.1025 and MSC/Circ.1025/Add.1)" is replaced by "(see MSC/Circ.1025 as amended by MSC.1/Circ.1025/Add.1, MSC.1/Circ.1262 and MSC.1/Circ.1360)".

## **PART 1 – GENERAL PROVISIONS, DEFINITIONS AND TRAINING**

### **Chapter 1.1 – General provisions**

1.1.3.1 In the last sentence, in the word "provision" add the letter "s", and in the word "lists" delete the second letter "s". Before "900" insert "349, 350, 351, 352, 353 and".

### **Chapter 1.2 – Definitions, units of measurements and abbreviations**

#### **1.2.1 Definitions**

##### ***Approval***

*Multilateral approval* Delete the last sentence ("The term ... "through or into" specifically excludes ... that country").

*Pressure receptacle* Before "and bundles" insert ", metal hydride storage systems".

*Repaired IBC* In the second sentence, "manufacturer's specification" is replaced with "design type from the same manufacturer".

*Tank* At the end of the sentence, "substances of class 2" is replaced with "gases as defined in 2.2.1.1".

*Cargo transport unit* is replaced by the following:

"*Cargo transport unit* means a road transport tank or freight vehicle, a railway transport tank or freight wagon, a multimodal freight container or portable tank, or a MEGC;".

*Closed cargo transport unit* is replaced by the following:

"*Closed cargo transport unit*, with the exception of class 1, means a cargo transport unit which totally encloses the contents by permanent structures with complete and rigid surfaces. Cargo transport units with fabric sides or tops are not considered closed cargo transport units; for definition of class 1 *cargo transport unit* see 7.1.7.1.1."

*GHS* In the first sentence "second" is replaced with "third" and the reference "Rev.2" is replaced with "Rev.3".

*Liquids* After "(ADR)" insert ", as amended" and the footnote is deleted.

*Tank* Insert a hyphen between "tank" and "wagon" and between "tank" and "vehicle".

The following new definitions are inserted in alphabetical order:

"*Fuel cell* means an electrochemical device that converts the chemical energy of a fuel to electrical energy, heat and reaction products.



*Fuel cell engine* means a device used to power equipment and which consists of a fuel cell and its fuel supply, whether integrated with or separate from the fuel cell, and includes all appurtenances necessary to fulfil its function.

*Manual of test and criteria* means the fifth revised edition of the United Nations publication entitled "*Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria*" (ST/SG/AC.10/11/Rev.5).

*Metal hydride storage system* means a single complete hydrogen storage system, including a receptacle, metal hydride, pressure relief device, shut-off valve, service equipment and internal components used for the transport of hydrogen only.

*Open cryogenic receptacle* means a transportable thermally insulated receptacle for refrigerated liquefied gases maintained at atmospheric pressure by continuous venting of the refrigerated liquefied gas.

*Remanufactured large packaging* means a metal or rigid plastics large packaging that:

- (a) Is produced as a UN type from a non-UN type; or
- (b) Is converted from one UN design type to another UN design type. Remanufactured large packagings are subject to the same provisions of this Code that apply to new large packagings of the same type (see also design type definition in 6.6.5.1.2).

*Reused large packaging* means a large packaging to be refilled which has been examined and found free of defects affecting the ability to withstand the performance tests: the term includes those which are refilled with the same or similar compatible contents and are transported within distribution chains controlled by the consignor of the product.

*Through or into* means through or into the countries in which a consignment is transported but specifically excludes countries "over" which a consignment is carried by air, provided that there are no scheduled stops in those countries."

### **1.2.3 List of Abbreviations**

BC Code "BC Code" is replaced with "IMSBC Code", and its definition is replaced with "International Maritime Solid Bulk Cargoes Code".

ISO The address of ISO is replaced with "1, ch. de la Voie-Creuse, CH-1211 Geneva 20, Switzerland".

## **Chapter 1.3 – Training**

### **1.3.1 Training of shore-side personnel**

1.3.1.1 In the first sentence, replace "shall receive training" with "shall be trained" and a new second sentence is inserted as follows:

"Employees shall be trained in accordance with the provisions of 1.3.1 before assuming responsibilities and shall only perform functions, for which

required training has not yet been provided, under the direct supervision of a trained person."

1.3.1.2 At the end of the introductory text, replace "shall receive the following training" with "shall be trained in the following".

1.3.1.2.1 Replace "shall receive training designed to provide familiarity" with "shall be trained in order to be familiar".

1.3.1.2.2 Replace "shall receive detailed training concerning" with "shall be trained in".

1.3.1.3 The existing paragraph is replaced by the following:

"1.3.1.3 Records of training received according to this chapter shall be kept by the employer and made available to the employee or competent authority, upon request. Records shall be kept by the employer for a period of time established by the competent authority."

1.3.1.4 In the first sentence, replace "should receive training on" with "should be trained in".

## **Chapter 1.4 – Security provisions**

### **1.4.2 General provisions for shore-side personnel**

#### **1.4.2.3 Security Training**

1.4.2.3.4 The existing paragraph is replaced by the following:

"1.4.2.3.4 Records of all security training received should be kept by the employer and made available to the employee or competent authority, upon request. Records should be kept by the employer for a period of time established by the competent authority."

### **1.4.3 Provisions for high consequence dangerous goods**

1.4.3.5 The existing paragraph is replaced by the following:

"1.4.3.5 For radioactive material, the provisions of this chapter are deemed to be complied with when the provisions of the Convention on Physical Protection of Nuclear Material<sup>1</sup> and the IAEA circular on The Physical Protection of Nuclear Material and Nuclear Facilities<sup>2</sup> are applied."

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<sup>1</sup> IAEACIRC/274/Rev.1, IAEA, Vienna (1980).

<sup>2</sup> IAEACIRC/225/Rev.4 (Corrected), IAEA, Vienna (1999). See also "Guidance and Considerations for the Implementation of INFCIRC/225/Rev.4, the Physical Protection of Nuclear Material and Nuclear Facilities, IAEA-TECDOC-967/Rev.1.

## **Chapter 1.5 – General provisions concerning class 7**

### **1.5.1 Scope and application**

- 1.5.1.1 In the second sentence, replace "2005" with "2009" (twice). And the last sentence is replaced by the following:

"Explanatory material can be found in "Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (2005 Edition)", Safety Standard Series No. TS-G-1.1 (Rev.1), IAEA, Vienna (2008)"

and the footnote is deleted.

- 1.5.1.2 The first sentence is replaced by the following:

"The objective of this Code is to establish provisions that shall be satisfied to ensure safety and to protect persons, property and the environment from the effects of radiation in the transport of radioactive material."

- 1.5.1.3 In the third sentence, replace "that is characterized" with "that are characterized".

- 1.5.1.5.1 The first paragraph is replaced by the following:

"1.5.1.5.1 Excepted packages which may contain radioactive material in limited quantities, instruments, manufactured articles and empty packagings as specified in 2.7.2.4.1 shall be subject only to the following provisions of Parts 5 to 7:"

and subparagraph .1 is replaced by the following:

- .1 The applicable provisions specified in 5.1.2, 5.1.3.2, 5.1.4, 5.1.5.4, 5.2.1.5.2, 5.2.1.7, 7.1.14.1, 7.1.14.3 and 7.3.4.2;"

- 1.5.1.5.2 The existing paragraph is replaced by the following:

"1.5.1.5.2 Excepted packages shall be subject to the relevant provisions of all other parts of this Code."

### **1.5.2 Radiation protection programme**

- 1.5.2.3 At the end of the second sentence, replace "and 1.5.2.4" with ", 1.5.2.4 and 7.2.9".

## **PART 2 – CLASSIFICATION**

### **Chapter 2.0 – Introduction**

#### **2.0.2 UN Numbers and Proper Shipping Names**

- 2.0.2.2 The existing first paragraph is replaced by the following:

"2.0.2.2 Dangerous goods commonly transported are listed in the Dangerous Goods List in chapter 3.2. Where an article or substance is specifically listed by name, it shall be identified in transport by the

proper shipping name in the Dangerous Goods List. Such substances may contain technical impurities (for example those deriving from the production process) or additives for stability or other purposes that do not affect their classification. However, a substance listed by name containing technical impurities or additives for stability or other purposes affecting its classification shall be considered a mixture or solution (see 2.0.2.5). For dangerous goods not specifically listed by name "generic" or "not otherwise specified" entries are provided (see 2.0.2.7) to identify the article or substance in transport."

2.0.2.5 The existing paragraph is replaced by the following:

"2.0.2.5 A mixture or solution composed of a single predominant substance identified by name in the Dangerous Goods List and one or more substances not subject to the provisions of this Code and/or traces of one or more substances identified by name in the Dangerous Goods List, shall be assigned the UN number and proper shipping name of the predominant substance named in the Dangerous Goods List unless:

- .1 The mixture or solution is identified by name in the Dangerous Goods List;
- .2 The name and description of the substance named in the Dangerous Goods List specifically indicate that they apply only to the pure substance;
- .3 The hazard class or division, subsidiary risk(s), packing group, or physical state of the mixture or solution is different from that of the substance named in the Dangerous Goods List; or
- .4 The hazard characteristics and properties of the mixture or solution necessitate emergency response measures that are different from those required for the substance identified by name in the Dangerous Goods List.

In those other cases, except the one described in (.1), the mixture or solution shall be treated as a dangerous substance not specifically listed by name in the Dangerous Goods List."

2.0.2.10 Add a new paragraph 2.0.2.10 with the following:

"2.0.2.10 A mixture or solution meeting the classification criteria of this Code that is not identified by name in the Dangerous Goods List and that is composed of two or more dangerous goods shall be assigned to an entry that has the proper shipping name, description, hazard class or division, subsidiary risk(s) and packing group that most precisely describe the mixture or solution."

## **2.0.3 Classification of substances, mixtures and solutions with multiple hazards (precedence of hazards characteristics)**

2.0.3.5 At the end of the paragraph, insert the following new sentence:

"For radioactive material in excepted packages, special provision 290 of chapter 3.3 applies."

## **Chapter 2.1 – Explosives**

### **2.1.1.3 Definitions**

2.1.1.3 A new subparagraph .5 is added as follows:

".5 *Phlegmatized* means that a substance (or "phlegmatizer") has been added to an explosive to enhance its safety in handling and transport. The phlegmatizer renders the explosive insensitive, or less sensitive, to the following actions: heat, shock, impact, percussion or friction. Typical phlegmatizing agents include, but are not limited to: wax, paper, water, polymers (such as chlorofluoropolymers), alcohol and oils (such as petroleum jelly and paraffin)."

### **2.1.2 Compatibility groups and classification codes**

2.1.2.2 Add the following new notes under the table:

**"NOTE 1:** Articles of compatibility groups D and E may be fitted or packed together with their own means of initiation provided that such means have at least two effective protective features designed to prevent an explosion in the event of accidental functioning of the means of initiation. Such articles and packages shall be assigned to compatibility groups D or E.

**NOTE 2:** Articles of compatibility groups D and E may be packed together with their own means of initiation, which do not have two effective protective features when, in the opinion of the competent authority of the country of origin, the accidental functioning of the means of initiation does not cause the explosion of an article under normal conditions of transport. Such packages shall be assigned to compatibility groups D or E."

### **2.1.3 Classification Procedures**

#### **2.1.3.5.5 Default fireworks classification table\*\***

2.1.3.5.5 In **Note 1** replace "all pyrotechnic composition" with "all pyrotechnic substances" and the existing **Note 2** is replaced by the following:

**"NOTE 2:** "Flash composition" in this table refers to pyrotechnic substances in powder form or as pyrotechnic units as presented in the fireworks, that are used to produce an aural effect, or used as a bursting charge or lifting charge, unless the time taken for the pressure rise is

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\* [Footnote text is unchanged.]

demonstrated to be more than 8 ms for 0.5 g of pyrotechnic substance in the HSL Flash Composition Test in Appendix 7 of the United Nations Manual of Tests and Criteria."

- 2.1.3.5.5 Within the **Default fireworks classification table**, replace "pyrotechnic composition" with "pyrotechnic substance" whenever it appears.

## **Chapter 2.2 – Class 2 Gases**

### **2.2.0 Introductory notes**

- 2.2.0 **Note 2** is deleted.

- 2.2.0 Delete the words "Note 1:" and in the title of 2.2.0 delete "s" in the word "notes".

### **2.2.2 Class subdivisions**

- 2.2.2.2 In subparagraph .2, delete the second sentence ("The oxidizing ability ... 10156-2:2005")

and the following new note is added:

**"NOTE:** In 2.2.2.2.2, "gases which cause or contribute to the combustion of other material more than air does" means pure gases or gas mixtures with an oxidizing power greater than 23.5% as determined by a method specified in ISO 10156:1996 or 10156-2:2005."

- 2.2.2.6 A new paragraph 2.2.2.6 is added as follows:

"2.2.2.6 Gases of class 2.2 are not subject to the provisions of this Code when contained in the following:

- .1 Foodstuffs (except UN 1950), including carbonated beverages;
- .2 Balls intended for use in sports;
- .3 Tyres (except for air transport); or
- .4 Light bulbs provided they are packaged so that the projectile effects of any rupture of the bulb will be contained within the package."

### **2.2.3 Mixture of gases**

- 2.2.3.4 The reference "(see ISO 10156:1996 and ISO 10156-2:2055)" is replaced with "(see note in 2.2.2.2)".

## **Chapter 2.3 – Class 3 Flammable liquids**

### **2.3.3 Determination of flash point**

2.3.3.6 The existing section is replaced by the following:

#### **"2.3.3.6 Determination of flash point**

The following methods for determining the flash point of flammable liquids may be used:

##### International standards:

ISO 1516  
ISO 1523  
ISO 2719  
ISO 13736  
ISO 3679  
ISO 3680

##### National standards:

*American Society for Testing Materials International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania, USA 19428-2959:*

ASTM D3828-07a, Standard Test Methods for Flash Point by Small Scale Closed Cup Tester

ASTM D56-05, Standard Test Method for Flash Point by Tag Closed Cup Tester

ASTM D3278-96(2004)e, Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus

ASTM D93-08, Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester.

*Association française de normalisation, AFNOR, 11, rue de Pressensé, 93571 La Plaine Saint-Denis Cedex:*

French Standard NF M 07 – 019

French Standards NF M 07 – 011/NF T 30 – 050/NF T 66 – 009

French Standard NF M 07 – 036

*Deutsches Institut für Normung, Burggrafenstr. 6, D-10787 Berlin:*

Standard DIN 51755 (flash points below 65°C)

*State Committee of the Council of Ministers for Standardization, 113813, GSP, Moscow, M-49 Leninsky Prospekt, 9:*

GOST 12.1.044-84".

2.3.4 Add a new section 2.3.4 with the following:

**"2.3.4 Determination of initial boiling point**

The following methods for determining the initial boiling point of flammable liquids may be used:

International standards:

ISO 3924  
ISO 4626  
ISO 3405

National standards:

*American Society for Testing Materials International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania, USA 19428-2959:*

ASTM D86-07a, Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure

ASTM D1078-05, Standard Test Method for Distillation Range of Volatile Organic Liquids

Further acceptable methods:

Method A.2 as described in Part A of the Annex to Commission Regulation (EC) No.440/2008<sup>1</sup>."

**Chapter 2.4 – Class 4 Flammable solids; substances liable to spontaneous combustion; substances which, in contact with water, emit flammable gases**

**2.4.3 Class 4.2 – Substances liable to spontaneous combustion**

**2.4.3.1 Definitions and properties**

2.4.3.1.2 The existing paragraph is replaced with the following:

"2.4.3.1.2 Self-heating of a substance is a process where the gradual reaction of that substance with oxygen (in air) generates heat. If the rate of heat production exceeds the rate of heat loss, then the temperature of the substance will rise which, after an induction time, may lead to self-ignition and combustion."

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<sup>1</sup> Commission Regulation (EC) No 440/2008 of 30 May 2008 laying down test methods pursuant to Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (Official Journal of the European Union, No. L 142 of 31.05.2008, p.1-739 and No. L 143 of 03.06.2008, p.55).



## Chapter 2.5 – Class 5 Oxidizing substances and organic peroxides

### 2.5.3 Class 5.2 – Organic peroxides

2.5.3.2.4 In the table, amend the entries listed below as follows:

Organic peroxide	Column	Amendment
UN No.3105 tert-AMYLPEROXY-3,5,5-TRIMETHYLHEXANOATE	Subsidiary risks and remarks	Delete "3"
UN No 3106 DI-(2-tert-BUTYLPEROXYISOPROPYL)BENZENE(S)	Organic peroxide	Amend to read "DI-(tert-BUTYLPEROXYISOPROPYL)BENZENE(S)"
UN No.3105 2,5-DIMETHYL-2,5-DI-(tert-BUTYLPEROXY)HEXANE (Concentration > 52 – 100)	(1 <sup>st</sup> row) Delete	

and amend the index accordingly.

Insert the following new entries:

Numbers (generic entry)	Organic peroxide	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
3103	2,5-DIMETHYL-2,5-DI-(tert-BUTYLPEROXY)HEXANE	> 90 – 100					OP5			
3105	2,5-DIMETHYL-2,5-DI-(tert-BUTYLPEROXY)HEXANE	> 52 – 90	≥ 10				OP7			

and amend the index accordingly.

## Chapter 2.6 – Toxic and infectious substances

### 2.6.0 Introductory notes

**NOTE 2:** In the paragraph, before "an infectious" insert the words "a toxic or".

### 2.6.2 Class 6.1 – Toxic substances

2.6.2.2.4.2 At the end of the NOTE, the reference "2.8.2.2" should be replaced with "2.8.2.3". And move the note to 2.6.2.2.4.1.

### 2.6.3 Class 6.2 – Infectious substances

2.6.3.1.5 The existing paragraph is deleted and "(reserved)" is added.

2.6.3.6.2 Amend to read: "Animal material affected by pathogens of category A or which would be assigned to category A in cultures only, shall be assigned to UN 2814 or UN 2900 as appropriate. Animal material affected by pathogens of category B other than those which would be assigned to category A if they were in cultures shall be assigned to UN 3373".

## Chapter 2.7 – Radioactive material

### 2.7.1.3 Definitions or specific terms

*Fissile material* The paragraph before subparagraphs .1 and .2 is replaced with the following:

"*Fissile nuclides* means uranium-233, uranium-235, plutonium-239 and plutonium-241. Fissile material means a material containing any of the fissile nuclides. Excluded from the definition of fissile material are:"

### 2.7.2 Classification

#### 2.7.2.2 Determination of activity level

2.7.2.2.1 In the table, under "Krypton (36)", add the following new entry:

" Kr-79	$4 \times 10^0$	$2 \times 10^0$	$1 \times 10^3$	$1 \times 10^5$ "
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#### 2.7.2.3 Determination of other material characteristics

##### 2.7.2.3.1 *Low specific activity (LSA) material*

2.7.2.3.1.2.1 In subparagraph (ii) replace "providing they" with "that".

2.7.2.3.1.2.1 In subparagraphs (iii) and (iv) replace "excluding material classified as fissile according to 2.7.2.3.5" with "excluding fissile material not excepted under 2.7.2.3.5".

2.7.2.3.1.2.3 At the beginning and after "excluding powders," insert "meeting the requirements of 2.7.2.3.1.3,".

2.7.2.3.3.2.1 Replace ", or" with "and".

2.7.2.3.4.1 In the second sentence after "package", insert ", taking into account the provisions of 6.4.8.14,".

##### 2.7.2.3.5 *Fissile material*

The introductory sentence is replaced with the following:

"Packages containing fissile material shall be classified under the relevant entry of Table 2.7.2.1.1, the description of which includes the words "FISSILE" or "fissile-excepted". Classification as "fissile-excepted" is allowed only if one of the conditions (a) to (d) of this paragraph is met. Only one type of exception is allowed per consignment (see also 6.4.7.2).".

2.7.2.3.5.1 Replace by the following:

- ".1 A mass limit per consignment, provided that the smallest external dimension of each package is not less than 10 cm, such that:

$$\frac{\text{mass of uranium} - 235 \text{ (g)}}{X} + \frac{\text{mass of other fissile material (g)}}{Y} < 1$$

where X and Y are the mass limits defined in Table 2.7.2.3.5, provided that either:

- (i) each individual package contains not more than 15 g of fissile nuclides; for unpackaged material, this quantity limitation shall apply to the consignment being carried in or on the conveyance; or
- (ii) the fissile material is a homogeneous hydrogenous solution or mixture where the ratio of fissile nuclides to hydrogen is less than 5% by mass; or
- (iii) there are not more than 5 g of fissile nuclides in any 10 litre volume of material.

Beryllium shall not be present in quantities exceeding 1% of the applicable consignment mass limits provided in Table 2.7.2.3.5 except where the concentration of beryllium in the material does not exceed 1 gram beryllium in any 1000 grams.

Deuterium shall also not be present in quantities exceeding 1% of the applicable consignment mass limits provided in Table 2.7.2.3.5 except where deuterium occurs up to natural concentration in hydrogen."

2.7.2.3.5.2 Replace "fissile material is" with "fissile nuclides are".

2.7.2.3.5.4 The paragraph is replaced by the following:

- ".4 Plutonium containing not more than 20% of fissile nuclides by mass up to a maximum of 1 kg of plutonium per consignment. Shipments under this exception shall be under exclusive use."

**2.7.2.4.1 Classification as excepted package**

2.7.2.4.1.1.2 At the end of the sentence add "as specified in Table 2.7.2.4.1.2".

2.7.2.4.1.1.4 At the end of the sentence add "as specified in Table 2.7.2.4.1.2".

2.7.2.4.1.3 In the first sentence of the first paragraph replace "provided that" with "only if".

2.7.2.4.1.4 In the first sentence of the first paragraph, replace "Radioactive material with an activity not exceeding the limit" with "Radioactive material in forms other than as specified in 2.7.2.4.1.3 and with an activity not exceeding the limits".

2.7.2.4.1.5 In the first sentence, delete "with an activity not exceeding the limit specified in column 4 of Table 2.7.2.4.1.2" and replace "provided that" with "only if".

2.7.2.4.1.6 At the end, replace "provided that" with "only if".

**2.7.2.4.2 Classification as Low specific activity (LSA) material**

2.7.2.4.2 Replace "if the conditions of 2.7.2.3.1 and 4.1.9.2 are met" with "if the definition of LSA in 2.7.1.3 and the conditions of 2.7.2.3.1, 4.1.9.2 and 7.1.14.2 are met".

**2.7.2.4.3 Classification as Surface contaminated object (SCO)**

2.7.2.4.3 Replace "if the conditions of 2.7.2.3.2.1 and 4.1.9.2 are met" with "if the definition of SCO in 2.7.1.3 and the conditions of 2.7.2.3.2, 4.1.9.2 and 7.1.14.2 are met".

## **Chapter 2.8 – Corrosive substances**

### **2.8.2 Assignments to packing groups**

2.8.2.4 At the end of the paragraph, replace "OECD Guideline 404<sup>\*</sup>." with "OECD Test Guideline 404<sup>1</sup> or 435<sup>2</sup>. A substance which is determined not to be corrosive in accordance with OECD Test Guideline 430<sup>3</sup> or 431<sup>4</sup> may be considered not to be corrosive to skin for the purposes of this Code without further testing." And the footnote "<sup>\*</sup>" is deleted.

## **Chapter 2.9 – Miscellaneous dangerous goods substances and articles (Class 9) and environmentally hazardous substances**

### **2.9.1 Definitions**

2.9.1.2 The existing paragraph is deleted.

### **2.9.2 Assignment to class 9**

2.9.2.1 Subparagraphs .3 and .4 are deleted.

2.9.2.2 Insert a new paragraph 2.9.2.2 with the following:

"2.9.2.2 The substances and articles of Class 9 are subdivided as follows:

**Substances which, on inhalation as fine dust, may endanger health**

2212	BLUE ASBESTOS (crocidolite) or
2212	BROWN ASBESTOS (amosite, myosorite)
2590	WHITE ASBESTOS (chrysotile, actinolite, anthophyllite, tremolite)

<sup>1</sup> OECD Guideline for the testing of chemicals No. 404 "Acute Dermal Irritation/Corrosion" 2002.

<sup>2</sup> OECD Guideline for the testing of chemicals No. 435 "In Vitro Membrane Barrier Test Method for Skin Corrosion" 2006.

<sup>3</sup> OECD Guideline for the testing of chemicals No. 430 "In Vitro Skin Corrosion: Transcutaneous Electrical Resistance Test (TER)" 2004.

<sup>4</sup> OECD Guideline for the testing of chemicals No. 431 "In Vitro Skin Corrosion: Human Skin Model Test" 2004.

### **Substances evolving flammable vapour**

- 2211 POLYMERIC BEADS, EXPANDABLE, evolving flammable vapour
- 3314 PLASTICS MOULDING COMPOUND in dough, sheet or extruded rope form evolving flammable vapour

### **Lithium batteries**

- 3090 LITHIUM METAL BATTERIES (including lithium alloy batteries)
- 3091 LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT (including lithium alloy batteries) or
- 3091 LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT (including lithium alloy batteries)
- 3480 LITHIUM ION BATTERIES (including lithium ion polymer batteries)
- 3481 LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT (including lithium ion polymer batteries) or
- 3481 LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion polymer batteries)

### **Life-saving appliances**

- 2990 LIFE-SAVING APPLIANCES, SELF-INFLATING
- 3072 LIFE-SAVING APPLIANCES NOT SELF-INFLATING containing dangerous goods as equipment
- 3268 AIR BAG INFLATORS or
- 3268 AIR BAG MODULES or
- 3268 SEAT-BELT PRETENSIONERS

### **Substances and articles which, in the event of fire, may form dioxins**

This group of substances includes:

- 2315 POLYCHLORINATED BIPHENYLS, LIQUID
- 3432 POLYCHLORINATED BIPHENYLS, SOLID
- 3151 POLYHALOGENATED BIPHENYLS, LIQUID or
- 3151 POLYHALOGENATED TERPHENYLS, LIQUID
- 3152 POLYHALOGENATED BIPHENYLS, SOLID or
- 3152 POLYHALOGENATED TERPHENYLS, SOLID

Examples of articles are transformers, condensers and apparatus containing those substances.

**Substances transported or offered for transport at elevated temperatures**

- 3257 ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100°C and below its flashpoint (including molten metal, molten salts, etc.)  
3258 ELEVATED TEMPERATURE SOLID, N.O.S., at or above 240°C

**Environmentally hazardous substances**

- 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.  
3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

These entries are used for substances and mixtures which are dangerous to the aquatic environment that do not meet the classification criteria of any other class or another substance within Class 9. These entries may also be used for wastes not otherwise subject to the provisions of this Code but which are covered under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and for substances designated to be environmentally hazardous substances by the competent authority of the country of origin, transit or destination which do not meet the criteria for an environmentally hazardous substance according to the provisions of this Code or for any other hazard Class. The criteria for substances which are hazardous to the aquatic environment are given in section 2.9.3.

**Genetically modified micro-organisms (GMMOs) and genetically modified organisms (GMOs)**

- 3245 GENETICALLY MODIFIED MICRO-ORGANISMS or  
3245 GENETICALLY MODIFIED ORGANISMS

GMMOs and GMOs which do not meet the definition of toxic substances (see 2.6.2) or infectious substances (see 2.6.3) shall be assigned to UN 3245.

GMMOs or GMOs are not subject to the provisions of this Code when authorized for use by the competent authorities of the countries of origin, transit and destination.

Genetically modified live animals shall be transported under terms and conditions of the competent authorities of the countries of origin and destination.

**Other substances or articles presenting a danger during transport, but not meeting the definitions of another class:**

1841 ACETALDEHYDE AMMONIA  
1845 CARBON DIOXIDE, SOLID (DRY ICE)  
1931 ZINC DITHIONITE (ZINC HYDROSULPHITE)  
1941 DIBROMODIFLUOROMETHANE  
1990 BENZALDEHYDE  
2071 AMMONIUM NITRATE BASED FERTILISER  
2216 FISH MEAL (FISH SCRAP), STABILIZED  
2807 MAGNETIZED MATERIAL\*  
2969 CASTOR BEANS or  
2969 CASTOR MEAL or  
2969 CASTOR POMACE or  
2969 CASTOR FLAKE  
3166 ENGINE, INTERNAL COMBUSTION or  
3166 VEHICLE, FLAMMABLE GAS POWERED or  
3166 VEHICLE, FLAMMABLE LIQUID POWERED or  
3166 ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or  
3166 ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or  
3166 VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or  
3166 VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED  
3171 BATTERY-POWERED VEHICLE or  
3171 BATTERY-POWERED EQUIPMENT  
3316 CHEMICAL KIT or  
3316 FIRST AID KIT  
3334 AVIATION REGULATED LIQUID, N.O.S.\*  
3335 AVIATION REGULATED SOLID, N.O.S.\*  
3359 FUMIGATED CARGO TRANSPORT UNIT  
3363 DANGEROUS GOODS IN MACHINERY or  
3363 DANGEROUS GOODS IN APPARATUS  
3496 BATTERIES, NICKEL-METAL HYDRIDE".

**2.9.3 Environmentally hazardous substances (aquatic environment)**

**2.9.3.1 General definitions**

2.9.3.1.1 The definition of "Substance" is replaced by the following:

"Substance means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition".

**2.9.3.2 Definitions and data requirements**

2.9.3.2.2 In the second sentence, before the word "freshwater", insert the words "it has been agreed that".

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\* Not subject to the provisions of this Code but may be subject to provisions governing the transport of dangerous goods by other modes (see also special provision 960).

2.9.3.2.3 Replace second and third sentence with the following:

"These species are considered as surrogate for all aquatic organisms and data on other species such as Lemna, may also be considered if the test methodology is suitable".

2.9.3.2.5 In the third sentence, delete the word "aquatic".

2.9.3.2.5 The fourth sentence is replaced by the following:

"These are fresh water tests and thus the use of the results from OECD Test Guideline 306, which is more suitable for marine environments, has also been included".

#### **2.9.3.4 Mixtures classification categories and criteria**

2.9.3.4.3.2 In the first paragraph, the last sentence is replaced by the following:

"When chronic (long term) toxicity data (NOEC) are also available, they shall be used as well".

2.9.3.4.4.1 In the first sentence, replace the words "this data" with "these data".

2.9.3.4.5.1 In the first sentence, the words "classification of its ingredients" are replaced with "concentrations of its classified ingredients".

2.9.3.4.5.2 The first sentence is replaced with the following:

"Mixtures may be made of a combination of both ingredients that are classified (as Acute 1 and/or Chronic 1, 2) and those for which adequate test data are available."

and in the second sentence replace "toxicity data is available" with "toxicity data are available".

2.9.3.4.6.1.1 In the last sentence, the words "and it is not necessary therefore to undergo the further classification procedure" are replaced with "; therefore, it is not necessary to pursue the classification procedure further".

2.9.3.4.6.4.1 The first sentence is replaced with the following:

"Category acute 1 ingredients with toxicities well below 1 mg/l may influence the toxicity of the mixture and are given increased weight in applying the summation method."

and the second sentence is replaced by the following:

"When a mixture contains ingredients classified as acute 1 or chronic 1, the tiered approach described in 2.9.3.4.6.2 and 2.9.3.4.6.3 shall be applied using a weighted sum by multiplying the concentrations of acute 1 ingredients by a factor, instead of merely adding up the percentages".



## **PART 3 – DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND EXEMPTIONS**

### **Chapter 3.1 – General**

#### **3.1.2 Proper Shipping Names**

3.1.2 Delete **Note 2** and renumber **Note 3** as **Note 2**.

##### **3.1.2.8 Generic or "not otherwise specified" (N.O.S.) entries**

3.1.2.8.1 In the first sentence after "special provision 274" insert "or 318".

3.1.2.8.1.1 In the first sentence after "recognized chemical", insert "or biological name,".

#### **3.1.3 Mixtures and solutions containing one dangerous substance**

3.1.3 The existing section "3.1.3" and the title are replaced with the following:

##### **"3.1.3 Mixtures or solutions**

**NOTE:** Where a substance is specifically listed by name in the Dangerous Goods List, it shall be identified in transport by the proper shipping name in the Dangerous Goods List. Such substances may contain technical impurities (for example those deriving from the production process) or additives for stability or other purposes that do not affect its classification. However, a substance listed by name containing technical impurities or additives for stability or other purposes affecting its classification shall be considered a mixture or solution (see 2.0.2.2 and 2.0.2.5).

3.1.3.1 A mixture or solution is not subject to the provisions of this Code if the characteristics, properties, form or physical state of the mixture or solution are such that it does not meet the criteria, including human experience criteria, for inclusion in any class.

3.1.3.2 A mixture or solution composed of a single predominant substance identified by name in the Dangerous Goods List and one or more substances not subject to the provisions of this Code and/or traces of one or more substances identified by name in the Dangerous Goods List, shall be assigned the UN number and proper shipping name of the predominant substance named in the Dangerous Goods List unless:

- .1 The mixture or solution is identified by name in the Dangerous Goods List;
- .2 The name and description of the substance named in the Dangerous Goods List specifically indicate that they apply only to the pure substance;
- .3 The hazard class or division, subsidiary risk(s), packing group, or physical state of the mixture or solution is different from that of the substance named in the Dangerous Goods List; or

- .4 The hazard characteristics and properties of the mixture or solution necessitate emergency response measures that are different from those required for the substance identified by name in the Dangerous Goods List.

3.1.3.3 Qualifying words such as "MIXTURE" or "SOLUTION", as appropriate, shall be added as part of the proper shipping name, for example, "ACETONE SOLUTION". In addition, the concentration of the mixture or solution may also be indicated after the basic description of the mixture or solution, for example, "ACETONE 75% SOLUTION".

3.1.3.4 A mixture or solution meeting the classification criteria of this Code that is not identified by name in the Dangerous Goods List and that is composed of two or more dangerous goods shall be assigned to an entry that has the proper shipping name, description, hazard class or division, subsidiary risk(s) and packing group that most precisely describe the mixture or solution."

### **3.1.4 Segregation groups**

3.1.4.4 The segregation groups are amended as follows:

#### **8 Hypochlorites**

Add the following entries:

UN 3485 Calcium hypochlorite, dry, corrosive or calcium hypochlorite mixture, dry, corrosive with more than 39% available chlorine (8.8% available oxygen)

UN 3486 Calcium hypochlorite mixture, dry, corrosive with more than 10% but not more than 39% available chlorine

UN 3487 Calcium hypochlorite, hydrated, corrosive or calcium hypochlorite, hydrated mixture, corrosive, with not less than 5.5% but not more than 16% water

#### **18 Alkalis**

Add the following entry:

UN 3484 Hydrazine aqueous solution, flammable, with more than 37% hydrazine, by mass

## **Chapter 3.2 – Dangerous Goods List**

For UN Nos. 0323, 0366, 0441, 0445, 0455, 0456, 0460 and 0500, add "347" in column (6).

For UN Nos. 1002 and 1956, delete "292" in column (6).

For UN Nos. 1092, 1098, 1135, 1143, 1163, 1182, 1185, 1238, 1239, 1244, 1251, 1510, 1541, 1580, 1595, 1605, 1647, 1670, 1695, 1752, 1809, 1810, 1834, 1838, 1892, 1994, 2232, 2334, 2337, 2382, 2407, 2474, 2477, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2521, 2605, 2606, 2644, 2646, 2668, 3023, 3079 and 3246 add "354" in column (6).

For UN Nos. 1092, 1098, 1135, 1143, 1163, 1182, 1185, 1238, 1239, 1244, 1251, 1541, 1580, 1595, 1605, 1647, 1670, 1695, 1752, 1809, 1810, 1838, 1892, 1994, 2232, 2334, 2337, 2382, 2407, 2474, 2477, 2480, 2482, 2484, 2485, 2486, 2487, 2488, 2521, 2606, 2644, 2646, 2668, 3023, 3246 and 3381 to 3390 amend the code in column (7b) to read "E0".

For UN Nos. 1135, 1143, 1695, 1752, 1809, 1810, 2232, 2337, 2382, 2474, 2477, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2521, 2605, 2606, 2644, 2646, 3023, 3079 and 3246 replace "P001" with "P602" in column (8).

For UN Nos. 1135, 1182, 1541, 1605, 1670, 1810, 1838, 1892, 2232, 2382, 2474, 2477, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2521, 2605, 2606, 2644, 2668, 3079 and 3246 amend the code in column (13) to read "T20".

For UN Nos. 1135, 1182, 1251, 1541, 1580, 1605, 1670, 1810, 1838, 1892, 2232, 2382, 2474, 2477, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2521, 2605, 2606, 2644, 2668, 3079 and 3246 add "TP37" in column (14).

For UN Nos. 1194, 1222, 1261, 1865, 3094 (PG I) and 3301 (PG I), replace "P099" with "P001" in column (8).

For UN Nos. 1251 and 1580 replace "T14" with "T22" in column (13).

For UN Nos. 1378, 1450, 1461, 1462, 1482 (PG II and III), 1549, 1556 (PG I, II and III), 1557 (PG I, II and III), 1564 (PG II and III), 1566 (PG II and III), 1583 (PG I, II and III), 1655 (PG I, II and III), 1707, 1935 (PG I, II and III), 2024 (PG I, II and III), 2025 (PG I, II and III), 2026 (PG I, II and III), 2291, 2570 (PG I, II and III), 2627, 2630, 2742, 2856, 2881 (PG I, II and III), 3141, 3144 (PG I, II and III), 3210 (PG II and III), 3212, 3213 (PG II and III), 3214, 3219 (PG II and III), 3256, 3257, 3258, 3283 (PG I, II and III), 3284 (PG I, II and III), 3285 (PG I, II and III), 3361, 3362 and 3440 (PG I, II and III) add "274" in column (6).

For UN Nos. 1391, 1649 and 2030 (PG I), delete "329" in column (6).

For UN Nos. 1450 and 3213 (PG II and III), add "350" and delete "900" in column (6).

For UN Nos. 1461 and 3210 (PG II and III), add "351" and delete "900" in column (6).

For UN Nos. 1482 (PG II and III) and 3214, add "353" and delete "900" in column (6).

For UN Nos. 1748 (PG II), 2208 and 2880 (PG II and III), delete "313" in column (6).

For UN Nos. 1810, 1834 and 1838, replace "8" with "6.1" in column (3) and add "8" in column (4).

For UN Nos. 1810, 1838, 2474, 2486 and 2668, replace "II" with "I" in column (5).

For UN Nos. 1810, 1834, 2474 and 2668 add "TP13" in column (14).

For UN Nos. 1950 and 2037, add "344" in column (6).

For UN 1040      Add "342" in column (6).

For UN 1072      Add "355" in column (6).

For UN 1131 in column (16) delete "see also SP 953".

For UN Nos. 1259, 2845, 3194, 3392, 3394 in column (16) replace "Prohibited on any ship carrying goods of class 1 with exceptions as in 7.2.7.1.3.2" with "Separated longitudinally by an intervening complete compartment or hold from Class 1".

For UN 1266 (PG II and III) Add "163" in column (6).

For UN 1267 (PG I, II and III) Add "357" in column (6).

For UN 1267 (PG I) Delete "Boiling range: 14°C upwards" in column (17).

For UN 1268 (PG I) Delete "Boiling range: 14°C upwards" in column (17).

For UN 1462 Add "352" and delete "900" in column (6).

For UN 1510 Replace "5.1" with "6.1" in column (3) and replace "6.1" with "5.1" in column (4).

For UN 1580 Replace "P602" with "P601" in column (8).

For UN 1838 Replace "P001" with "P602" in column (8) and delete "IBC02" in column (10).

For UN 1845 Delete "III" in column (5).

For UN 1977 Add "345 346" in column (6).

For UN 1999 (PG II and III) In column (2), amend the name and description to read "TARS, LIQUID, including road oils, and cutback bitumens". Amend the alphabetical index accordingly.

For UN Nos. 2078, 2206, 2236, 2250, 2281, 2285, 2290, 2328, 2478, 2480, 2482, 2484, 2485, 2487, 2488, 3080 and 3428, insert in column (17) "Irritating to skin, eyes and mucous membranes".

For UN 2315 Delete "908" in column (6).

For UN Nos. 2474, 2486 and 2668 amend the value in column (7a) to read "0".

For UN Nos. 2481, 2483, 2486, 2605 and 3079, replace "3" with "6.1" in column (3) and replace "6.1" with "3" in column (4).

For UN Nos. 2910, 2916, 2917, 2919 and 3323, add "325" in column (6).

For UN 2481 Replace "P601" with "P602" in column (8).

For UN 2668 Replace "P001 IBC99" with "P602" in column (8) and delete "IBC99" in column (10).

For UN Nos. 3077 and 3082, delete "179" and "909" in column (6).

For UN Nos. 3095 (PG I), 3096 (PG I) and 3124 (PG I), replace "P099" with "P002" in column (8).

For UN 3151 Delete "908" in column (6).

For UN 3212 Add "349" in column (6).

For UN Nos. 3328, 3329, 3330 and 3331, add "326" in column (6).

For UN Nos. 3391 to 3394, 3395 to 3399 (PG I, II and III) and 3400 (PG II and III), add "TP36" in column (14).

For UN 3468 Add "356" in column (6) and replace "P099" with "P205" in column (8).

For UN 3474 In column (2), amend the name and description to read "1-HYDROXYBENZOTRIAZOLE MONOHYDRATE" and in column (6), delete "28". Amend the alphabetical index accordingly.

For UN Nos. 3480 and 3481, add "348" in column (6).

For UN 3126 (PGII), 3127 (PGII), 3128 (PGII), 3131 (PGII) and 3132 (PGII) insert "T3" in column (13) and "TP33" in column (14).

For UN 3126 (PGIII), 3127 (PGIII), 3128 (PGIII), 3131 (PGIII) and 3132 (PGIII) insert "T1" in column (13) and "TP33" in column (14).

For UN 0020, 0021, 0243, 0244, 0245, 0246, 0248, 0249, 0250, 0301, 0303, 0322, 0354, 0355, 0356, 0357, 0358, 0359, 0380 insert in column (17) ",," after "under deck" in the last sentence.

For UN 0501 replace "S-X" with "S-Y" in column (15).

For UN 0216, Amend column (2) to read "TRINITRO-m-CRESOL". Amend the alphabetical index accordingly.

For UN 1110, Amend column (2) to read "n-AMYL METHYL KETONE". Amend the alphabetical index accordingly.

For UN 1125, Amend column (2) to read "n-BUTYLAMINE". Amend the alphabetical index accordingly.

For UN 1128, Amend column (2) to read "n-BUTYL FORMATE". Amend the alphabetical index accordingly.

For UN 1131, Delete "953" in column (6) and replace in column (16) "Prohibited on any ship carrying goods of class 1 with exceptions as in 7.2.7.1.3.2" with "Separated longitudinally by an intervening complete compartment or hold from Class 1".

For UN 1143, Replace "Category B" with "Category D" in column (16).

For UN 1274, Amend column (2) to read "n-PROPANOL (PROPYL ALCOHOL, NORMAL)". Amend the alphabetical index accordingly.

For UN 1276, Amend column (2) to read "n-PROPYL ACETATE". Amend the alphabetical index accordingly.

For UN 1348, Amend column (2) to read "SODIUM DINITRO-o-CRESOLATE, WETTED with not less than 15% water, by mass". Amend the alphabetical index accordingly.

For UN 1391, Replace "e.g., metallic sodium, suspended in a flammable liquid such as toluene, xylene, naphta, kerosene, etc" with "suspended in a liquid" in column (17).

For UN 1471 (PG II) amend column (2) to read "LITHIUM HYPOCHLORITE, DRY or LITHIUM HYPOCHLORITE MIXTURE" and amend the alphabetical index accordingly.

For UN 1486, 1498 and 1499, add "964" in column (6).

For UN 1510, Replace in column (17) "Toxic if swallowed, by skin contact or by vapour inhalation" with "Highly toxic if swallowed, by skin contact or by inhalation".

For UN 1512, Delete "B2" in column (11).

For UN 1579, Amend column (2) to read "4-CHLORO-o-TOLUIDINE HYDROCHLORIDE, SOLID". Amend the alphabetical index accordingly.

For UN 1591, Amend column (2) to read "o-DICHLOROBENZENE". Amend the alphabetical index accordingly.

For UN 1598, Amend column (2) to read "DINITRO-o-CRESOL". Amend the alphabetical index accordingly.

For UN 1647, Replace "Category C" with "Category D" in column (16).

For UN 1649, Delete "" in column (15) and delete "May have a flashpoint within the range of flammable liquids." and ""If flammable : F-E, S-D" in column (17).

For UN 1661, Amend column (2) to read "NITROANILINES (o-, m-, p-)". Amend the alphabetical index accordingly.

For UN 1663, Amend column (2) to read "NITROPHENOLS (o-, m-, p-)". Amend the alphabetical index accordingly.

For UN 1673, Amend column (2) to read "PHENYLENEDIAMINES (o-, m-, p-)". Amend the alphabetical index accordingly.

For UN 1810, Replace "Category C" with "Category D" in column (16) and add in column (17) "Highly toxic if swallowed, by skin contact or by inhalation.".

For UN 1834, Replace "Category C" with "Category D" in column (16) and add in column (17) "Highly toxic if swallowed, by skin contact or by inhalation.".

For UN 1838, Replace "Category C" with "Category D" in column (16) and replace in column (17) "Vapour irritates mucous membranes" with "Highly toxic if swallowed, by skin contact or by inhalation. Causes burns to skin, eyes and mucous membranes.".

For UN 1865, Amend column (2) to read "n-PROPYL NITRATE". Amend the alphabetical index accordingly.

For UN 1913, Replace "Category B" with "Category D" in column (16).

For UN 1951, Replace "Category B" with "Category D" in column (16).

For UN 1963, Replace "Category B" with "Category D" in column (16).

For UN 1970, Replace "Category B" with "Category D" in column (16).

For UN 1977, Delete in column (17) in the second sentence "of the gas".

For UN 2030, Delete "\*" in column (15) and delete "\*If flammable : F-E, S-C (S-C is a special case)" in column (17).

For UN 2187, Replace "Category B" with "Category D" in column (16).

For UN 2201, Replace "Category B" with "Category D" in column (16).

For UN 2227, Amend column (2) to read "n-BUTYL METHACRYLATE, STABILIZED". Amend the alphabetical index accordingly.

For UN 2247, Amend column (2) to read "n-DECANE". Amend the alphabetical index accordingly.

For UN 2278, Amend column (2) to read "n-HEPTENE". Amend the alphabetical index accordingly.

For UN 2337, Replace "Category B" with "Category D" in column (16).

For UN 2364, Amend column (2) to read "n-PROPYLBENZENE". Amend the alphabetical index accordingly.

For UN 2384, Amend column (2) to read "DI-n-PROPYL ETHER". Amend the alphabetical index accordingly.

For UN 2398, Amend column (2) to read "METHYL tert-BUTYL ETHER". Amend the alphabetical index accordingly.

For UN 2455, Delete "F-C, S-V" in column (15).

For UN 2474, Replace "Category B" with "Category D" in column (16) and replace in column (17) "Toxic if swallowed, by skin contact or by inhalation" with "Highly toxic if swallowed, by skin contact or by inhalation".

For UN 2477, Add "Clear of living quarters." in column (16).

For UN 2481, Replace in column (17) "Toxic by inhalation" with "Highly toxic if swallowed, by skin contact or by inhalation".

For UN 2482, Amend column (2) to read "n-PROPYL ISOCYANATE". Amend the alphabetical index accordingly.

For UN 2483, Replace in column (17) "Toxic if swallowed, by skin contact or by inhalation" with "Highly toxic if swallowed, by skin contact or by inhalation".

For UN 2485, Amend column (2) to read "n-BUTYL ISOCYANATE". Amend the alphabetical index accordingly.

For UN 2486, Replace in column (17) "Toxic by inhalation" with "Highly toxic if swallowed, by skin contact or by inhalation".

For UN 2591, Replace "Category B" with "Category D" in column (16).

For UN 2605, Replace in column (17) "Toxic if swallowed, by skin contact or by inhalation" with "Highly toxic if swallowed, by skin contact or by inhalation".

For UN 2606, Replace "Category E" with "Category D" in column (16).

For UN 2644, Replace "Category C" with "Category D" in column (16).

For UN 2668, Replace "Category A" with "Category D" in column (16) and replace in column (17) "Toxic if swallowed, by skin contact or by inhalation" with "Highly toxic if swallowed, by skin contact or by inhalation".

For UN 2671, Amend column (2) to read "AMINOPYRIDINES (o-, m-, p-)". Amend the alphabetical index accordingly.

For UN 2740, Amend column (2) to read "n-PROPYL CHLOROFORMATE". Amend the alphabetical index accordingly.

For UN 2743, Amend column (2) to read "n-BUTYL CHLOROFORMATE". Amend the alphabetical index accordingly.

For UN 2949, Insert "," after "HYDROSULPHIDE" in column (2).

For UN 3056, Amend column (2) to read "n-HEPTALDEHYDE". Amend the alphabetical index accordingly.

For UN 3065 (PG II and III), Insert "," after "BEVERAGES" in column (2).

For UN 3079, Replace in column (17) "Toxic if swallowed, by skin contact or by inhalation" with "Highly toxic if swallowed, by skin contact or by inhalation".

For UN Nos 3101, 3102, 3103, 3104, 3105, 3106, 3107, 3108, 3109, 3110, 3111, 3112, 3113, 3114, 3115, 3116, 3117, 3118, 3119 and 3120, Add at the end of current text in column (17) "May evolve irritant or toxic fumes."

For UN 3124, Replace in column (17) "Toxic if swallowed, by skin contact or by inhalation" with "Highly toxic if swallowed, by skin contact or by inhalation".

For UN 3166:

Amend column (2) to read "ENGINE, INTERNAL COMBUSTION or VEHICLE, FLAMMABLE GAS POWERED or VEHICLE, FLAMMABLE LIQUID POWERED or ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED".

Amend column (6) to read "312 356 961 962".

Amend column (15) to read "\*\*".



Amend column (16) to read "Category A".

Amend column (17) to read "Type of articles transported under this entry include internal combustion engines, compression/ignition engines, fuel cell powered engines, motor vehicles, hybrid vehicles, motorcycles and boats. \*F-D, S-U for gases or F-E, S-E for liquids.".

Amend the alphabetical index accordingly.

For UN 3171:

Amend column (6) to read "240 961 962".

Amend column (15) to read "F-I, S-I".

Amend column (16) to read "Category A".

Amend column (17) to read "Type of articles transported under this entry include vehicles or equipment powered by wet batteries, sodium batteries or lithium batteries with the batteries installed, such as electrically-powered cars, lawnmowers, wheelchairs and other mobility aids.".

For UN 3359 In column (2), amend the proper shipping name to read "FUMIGATED CARGO TRANSPORT UNIT". Delete "910" in column (6). In column (17), amend "FUMIGATED UNIT" to read "FUMIGATED CARGO TRANSPORT UNIT", delete "Fumigants shall not be applied to the contents of a cargo transport unit once it has been loaded aboard the ship. A closed cargo transport unit that has been fumigated is not subject to the provisions of this Code if it has been completely ventilated either by opening the doors of the unit or by mechanical ventilation after fumigation and if the date of ventilation is marked on the fumigation warning sign (see also special provision 910)" and add "See also 5.5.2.". Amend the proper shipping name in the index accordingly.

For UN Nos. 3381, 3382, 3383, 3385, 3387 and 3389 Replace in column (17) "Highly toxic by inhalation. Toxic if swallowed or by skin contact." with "Highly toxic if swallowed, by skin contact or by inhalation." and "significant" with "highly".

For UN Nos. 3384, 3386, 3388 and 3390 Replace in column (17) "Toxic by inhalation, if swallowed or by skin contact." with "Highly toxic if swallowed, by skin contact or by inhalation." and "significant" with "highly".

Add the following new entries:

(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)	(13)	(14)	(15)	(16)	(17)
0509	POWDER, SMOKELESS	1.4C	-	-	-	0	E0	P114(b)	PP48	-	-	-	-	F-B, S-Y	Category 09.	Substances based on nitrocellulose used as a propellant.
1471	LITHIUM HYPOCHLORITE, DRY or LITHIUM HYPOCHLORITE MIXTURE	5.1	-	III	223	5 kg	E1	P002 LP02	-	IBC08	B3	T1	TP33	F-H, S-Q	Category A. Ventilation may be required. The possible need to open hatches in case of fire to provide maximum ventilation and to apply water in an emergency, and the consequent risk to the stability of the ship through flooding of the cargo spaces, shall be considered before loading. "Separated from" ammonium compounds, acids, cyanides, hydrogen peroxide and liquid organic substances. "Away from" sources of heat.	See entry above.
3482	ALKALI METAL DISPERSION, FLAMMABLE or ALKALINE EARTH METAL DISPERSION, FLAMMABLE	4.3	3	I	182 183	0	E0	P402	PP31	-	-	-	-	F-G, S-N	Category D. "Separated from" acids.	Finely divided alkali or alkaline earth metal suspended in a flammable liquid. Reacts violently with moisture, water or acids, evolving hydrogen, which may be ignited by the heat of the reaction.
3483	MOTOR FUEL ANTI-KNOCK MIXTURE, FLAMMABLE	6.1	3 P	I	-	0	E5	P602	-	-	-	T14	TP2 TP13	F-E, S-D	Category D. Clear of living quarters. Shaded from radiant heat.	Volatile flammable liquids evolving toxic vapour. Mixture of tetraethyllead or tetramethyllead with ethylene dibromide and ethylene dichloride. Insoluble in water. Highly toxic if swallowed, by skin contact or by inhalation.
3484	HYDRAZINE AQUEOUS SOLUTION, FLAMMABLE with more than 37% hydrazine, by mass	8	3 6.1	I	-	0	E0	P001	-	-	-	T10	TP2 TP13	F-E, S-C	Category D. Clear of living quarters. Segregation as for class 3, but "away from" class 4.1. "Separated from" acids.	Colourless flammable liquid. Powerful reducing agent, burns readily. Toxic if swallowed, by skin contact or by inhalation. Causes burns to skin, eyes and mucous membranes. Reacts violently with acids.

(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)	(13)	(14)	(15)	(16)	(17)
3485	CALCIUM HYPOCHLORITE, DRY, CORROSIVE or CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 39% available chlorine (8.8% available oxygen)	5.1	8	II	314	1 kg	E2	P002	PP85	-	-	-	-	F-H, S-Q	Category D. Cargo transport units shall be shaded from direct sunlight and stowed away from sources of heat. Packages in cargo transport units shall be stowed so as to allow for adequate air circulation throughout the cargo. "Separated from" ammonium compounds, acids, cyanides, hydrogen peroxides and liquid organic substances.	White or yellowish corrosive solid (powder, granules or tablets) with chlorine-like odour. Soluble in water. May cause fire in contact with organic material or ammonium compounds. Substances are liable to exothermic decomposition at elevated temperatures. This condition may lead to fire or explosion. Decomposition can be initiated by heat or by impurities (e.g., powdered metals (iron, manganese, cobalt, magnesium) and their compounds). Liable to heat slowly. Reacts with acids, evolving chlorine, an irritating, corrosive and toxic gas. In the presence of moisture, corrosive to most metals. Causes burns to skin, eyes and mucous membranes.
3486	CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 10% but not more than 39% available chlorine	5.1	8	III	314	5 kg	E1	P002	PP85	-	-	-	-	F-H, S-Q	Category D. Cargo transport units shall be shaded from direct sunlight and stowed away from sources of heat. Packages in cargo transport units shall be stowed so as to allow for adequate air circulation throughout the cargo. "Separated from" ammonium compounds, acids, cyanides, hydrogen peroxides and liquid organic substances.	White or yellowish corrosive solid (powder, granules or tablets) with chlorine-like odour. Soluble in water. May cause fire in contact with organic material or ammonium compounds. Substances are liable to exothermic decomposition at elevated temperatures. This condition may lead to fire or explosion. Decomposition can be initiated by heat or by impurities (e.g., powdered metals (iron, manganese, cobalt, magnesium) and their compounds). Liable to heat slowly. Reacts with acids, evolving chlorine, an irritating, corrosive and toxic gas. In the presence of moisture, corrosive to most metals. Causes burns to skin, eyes and mucous membranes.
3487	CALCIUM HYPOCHLORITE, HYDRATED, CORROSIVE or CALCIUM HYPOCHLORITE, HYDRATED MIXTURE,	5.1	8	II	314 322	1 kg	E2	P002	PP85	-	-	-	-	F-H, S-Q	Category D. Cargo transport units shall be shaded from direct sunlight and stowed away from	White or yellowish corrosive solid (powder, granules or tablets) with chlorine-like odour. Soluble in water. May cause fire in contact with

(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)	(13)	(14)	(15)	(16)	(17)
	CORROSIVE with not less than 5.5% but not more than 16% water														sources of heat. Packages in cargo transport units shall be stowed so as to allow for adequate air circulation throughout the cargo. "Separated from" ammonium compounds, acids, cyanides, hydrogen peroxides and liquid organic substances.	organic material or ammonium compounds. Substances are liable to exothermic decomposition at elevated temperatures. This condition may lead to fire or explosion. Decomposition can be initiated by heat or by impurities (e.g., powdered metals (iron, manganese, cobalt, magnesium) and their compounds). Liable to heat slowly. Reacts with acids, evolving chlorine, an irritating, corrosive and toxic gas. In the presence of moisture, corrosive to most metals. Causes burns to skin, eyes and mucous membranes.
3487	CALCIUM HYPOCHLORITE, HYDRATED, CORROSIVE or CALCIUM HYPOCHLORITE, HYDRATED MIXTURE, CORROSIVE with not less than 5.5% but not more than 16% water	5.1	8	III	223 314	5 kg	E1	P002	PP85	-	-	-	-	F-H, S-Q	Category D. Cargo transport units shall be shaded from direct sunlight and stowed away from sources of heat. Packages in cargo transport units shall be stowed so as to allow for adequate air circulation throughout the cargo. "Separated from" ammonium compounds, acids, cyanides, hydrogen peroxides and liquid organic substances.	See entry above.
3488	TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an inhalation toxicity lower than or equal to 200 ml/m <sup>3</sup> and saturated vapour concentration greater than or equal to 500 LC <sub>50</sub>	6.1	3 8	I	274	0	E0	P601	-	-	-	T22	TP2 TP13	F-E, S-D	Category D. Clear of living quarters. Segregation as for class 3 but "away from" class 4.1.	A variety of toxic liquids which present a highly toxic inhalation hazard as well as being flammable and corrosive. Highly toxic if swallowed, by skin contact or by inhalation. Causes burns to skin, eyes and mucous membranes.
3489	TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an inhalation toxicity lower than or equal to 1000 ml/m <sup>3</sup> and saturated vapour concentration greater than or equal to 10 LC <sub>50</sub>	6.1	3 8	I	274	0	E0	P602	-	-	-	T20	TP2 TP13	F-E, S-D	Category D. Clear of living quarters. Segregation as for class 3 but "away from" class 4.1.	A variety of toxic liquids which present a highly toxic inhalation hazard as well as being flammable and corrosive. Highly toxic if swallowed, by skin contact or by inhalation. Causes burns to skin, eyes and mucous membranes.
3490	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an	6.1	4.3 3	I	274	0	E0	P601	-	-	-	T22	TP2 TP13	F-G, S-N	Category D. Clear of living quarters. Segregation as for class 3 but "away from"	A variety of toxic liquids which present a highly toxic inhalation hazard as well as being water-

(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)	(13)	(14)	(15)	(16)	(17)
	inhalation toxicity lower than or equal to 200 ml/m <sup>3</sup> and saturated vapour concentration greater than or equal to 500 LC <sub>50</sub>														classes 3 and 8.	reactive and flammable. Highly toxic if swallowed, by skin contact or by inhalation.
3491	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an inhalation toxicity lower than or equal to 1000 ml/m <sup>3</sup> and saturated vapour concentration greater than or equal to 10 LC <sub>50</sub>	6.1	4.3 3	I	274	0	E0	P602	-	-	-	T20	TP2 TP13	F-G, S-N	Category D. Clear of living quarters. Segregation as for class 3 but "away from" classes 3 and 8.	A variety of toxic liquids which present a highly toxic inhalation hazard as well as being water-reactive and flammable. Highly toxic if swallowed, by skin contact or by inhalation.
3492	TOXIC BY INHALATION LIQUID, CORROSIVE, FLAMMABLE, N.O.S. with an inhalation toxicity lower than or equal to 200 ml/m <sup>3</sup> and saturated vapour concentration greater than or equal to 500 LC <sub>50</sub>	6.1	8 3	I	274	0	E0	P601	-	-	-	T22	TP2 TP13	F-E, S-D	Category D. Clear of living quarters. Segregation as for class 3 but "away from" class 4.1.	A variety of toxic liquids which present a highly toxic inhalation hazard as well as being flammable and corrosive. Highly toxic if swallowed, by skin contact or by inhalation. Causes burns to skin, eyes and mucous membranes.
3493	TOXIC BY INHALATION LIQUID, CORROSIVE, FLAMMABLE, N.O.S. with an inhalation toxicity lower than or equal to 1000 ml/m <sup>3</sup> and saturated vapour concentration greater than or equal to 10 LC <sub>50</sub>	6.1	8 3	I	274	0	E0	P602	-	-	-	T20	TP2 TP13	F-E, S-D	Category D. Clear of living quarters. Segregation as for class 3 but "away from" class 4.1.	A variety of toxic liquids which present a highly toxic inhalation hazard as well as being flammable and corrosive. Highly toxic if swallowed, by skin contact or by inhalation. Causes burns to skin, eyes and mucous membranes.
3494	PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC	3	6.1	I	343	0	E0	P001	-	-	-	T14	TP2 TP13	F-E, S-E	Category D. Clear of living quarters.	Immiscible with water. Evolves hydrogen sulphide, which is a flammable, toxic gas with a foul odour, heavier than air (1.2). Toxic if swallowed, by skin contact or by inhalation.
3494	PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC	3	6.1	II	343	1 l	E2	P001	-	IBC02	-	T7	TP2	F-E, S-E	Category D. Clear of living quarters.	See entry above.
3494	PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC	3	6.1	III	343	5 l	E1	P001	-	IBC03	-	T4	TP1	F-E, S-E	Category C. Clear of living quarters.	See entry above.
3495	IODINE	8	6.1	III	279	5 kg	E1	P002	-	IBC08	B3	T1	TP33	F-A, S-B	Category B. Clear of living quarters. "Separated from" ammonia.	Bluish-black solid with a metallic lustre and a pungent odour. Melting point: 114°C. Below its melting point, may evolve vapours which are irritating to skin, eyes and mucous membranes. Slightly soluble in water but soluble in most organic solvents. Corrosive to most metals.

(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)	(13)	(14)	(15)	(16)	(17)
3496	BATTERIES, NICKEL-METAL HYDRIDE	9	-	-	117 963	0	E0	See SP963	-	-	-	-	-	F-A, S-I	Category A. "Away from" sources of heat.	Nickel-metal hydride button cells or nickel-metal hydride cells or batteries packed with or contained in equipment are not subject to the provisions of this Code.

and amend the alphabetical index and Appendix A accordingly.

## **Chapter 3.3 – Special provisions applicable to certain substances, materials or articles**

### **3.3.1 Special Provisions**

**SP172** Amend to read as follows:

"Radioactive material with a subsidiary risk shall:

- (a) be labelled with subsidiary risks labels corresponding to each subsidiary risk exhibited by the material; corresponding placard shall be affixed to transport units in accordance with the relevant provisions of 5.3.1;
- (b) be allocated to packing groups I, II or III, as and if appropriate, by application of the grouping criteria provided in Part 2 corresponding to the nature of the predominant subsidiary risk.

The description required in 5.4.1.5.7.1.2 shall include a description of these subsidiary risks (e.g., "Subsidiary risk: 3, 6.1"), the name of the constituents which most predominantly contribute to this (these) subsidiary risk(s), and where applicable, the packing group. For packing, see also 4.1.9.1.5."

**SP179** Delete.

**SP188** At the end of the second sentence in subparagraph .2, after "case", add the following text:

", except those manufactured before 1 January 2009"

and at the beginning of subparagraph .6, after "Except for packages containing", insert "button cell batteries installed in equipment (including circuit boards), or".

**SP198** Insert after "paints" the words ", perfumery products" and after "1263" insert ", 1266".

**SP219** Replace the existing text with the following:

**"219** Genetically modified microorganisms (GMMOs) and genetically modified organisms (GMOs) packed and marked in accordance with packing instruction P904 are not subject to any other provisions of this Code.

If GMMOs or GMOs meet the definition in Chapter 2.6 of a toxic substance or an infectious substance and the criteria for inclusion in Class 6.1 or 6.2 the provisions of this Code for transporting toxic substances or infectious substances apply."

**SP240** Insert SP240 with the following:

**"240** This entry only applies to vehicles and equipment powered by wet batteries, sodium batteries or lithium batteries and transported with these batteries installed. Examples of such vehicles and equipment are electrically-powered cars, lawnmowers, wheelchairs and other mobility aids. Hybrid electric vehicles powered by both an internal combustion

engine and wet batteries, sodium batteries or lithium batteries, transported with the batteries installed shall be consigned under the entries UN 3166 VEHICLE, FLAMMABLE GAS POWERED or UN 3166 VEHICLE, FLAMMABLE LIQUID POWERED, as appropriate. Vehicles which contain a fuel cell shall be consigned under the entries UN 3166 VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or UN 3166 VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED, as appropriate."

**SP290** Replace the existing text with the following:

**"290** When this radioactive material meets the definitions and criteria of other classes or divisions as defined in Part 2, it shall be classified in accordance with the following:

- .1 Where the substance meets the criteria for dangerous goods in excepted quantities as set out in chapter 3.5, the packagings shall be in accordance with 3.5.2 and meet the testing requirements of 3.5.3. All other requirements applicable to radioactive material, excepted packages as set out in 1.5.1.5 shall apply without reference to the other class or division;
- .2 Where the quantity exceeds the limits specified in 3.5.1.2 the substance shall be classified in accordance with the predominant subsidiary risk. The dangerous goods transport document shall describe the substance with the UN number and proper shipping name applicable to the other class supplemented with the name applicable to the radioactive excepted package according to column 2 in the Dangerous Goods List of chapter 3.2, and shall be transported in accordance with the provisions applicable to that UN number. An example of the information shown on the dangerous goods transport document is:

UN 1993, Flammable liquid, N.O.S. (ethanol and toluene mixture), Radioactive material, excepted package – limited quantity of material, class 3, PG II.

In addition, the provisions of 2.7.2.4.1 shall apply;

- .3 The provisions of chapter 3.4 for the transport of dangerous goods packed in limited quantities shall not apply to substances classified in accordance with subparagraph .2;
- .4 When the substance meets a special provision that exempts this substance from all dangerous goods provisions of the other classes it shall be classified in accordance with the applicable UN number of class 7 and all requirements specified in 1.5.1.5 shall apply."

**SP292** Delete.

**SP302** Amend to read as follows:

**"302** Fumigated cargo transport units containing no other dangerous goods are only subject to the provisions of 5.5.2."



**SP304** Amend to read as follows:

"This entry may only be used for the transport of non-activated batteries which contain dry potassium hydroxide and which are intended to be activated prior to use by the addition of an appropriate amount of water to the individual cells."

**SP 310** In the first sentence the word "lithium" is deleted.

**SP312** Insert SP312 with the following:

**"312** Vehicles or machinery powered by a fuel cell engine shall be consigned under the entries UN 3166 VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or UN 3166 VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED, or UN 3166 ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or UN 3166 ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED as appropriate. These entries include hybrid electric vehicles powered by both a fuel cell and an internal combustion engine with wet batteries, sodium batteries or lithium batteries, transported with the battery(ies) installed."

Other vehicles which contain an internal combustion engine shall be consigned under the entries UN 3166 VEHICLE, FLAMMABLE GAS POWERED or UN 3166 VEHICLE, FLAMMABLE LIQUID POWERED, as appropriate. These entries include hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries or lithium batteries, transported with the batteries installed.

**SP313** Delete.

**SP329** Delete.

**SP900** In the text, delete the following substances:

AMMONIUM BROMATE  
AMMONIUM BROMATE SOLUTION  
AMMONIUM CHLORATE  
AMMONIUM CHLORATE SOLUTION  
AMMONIUM CHLORITE  
AMMONIUM PERMANGANATE  
AMMONIUM PERMANGANATE SOLUTION

and replace:

"CHLORIC ACID AQUEOUS SOLUTION with a concentration exceeding 10%" with  
"CHLORIC ACID, AQUEOUS SOLUTION with more than 10% chloric acid"

"HYDROCYANIC ACID with more than 20% acid, by mass" with "HYDROCYANIC ACID, AQUEOUS SOLUTION (HYDROGEN CYANIDE, AQUEOUS SOLUTION) with more than 20% hydrogen cyanide"

"HYDROGEN CYANIDE SOLUTION with more than 45% HYDROGEN CYANIDE" with "HYDROGEN CYANIDE SOLUTION IN ALCOHOL with more than 45% hydrogen cyanide".

**SP908** Delete.

**SP909** Delete.

**SP910** Delete.

**SP 953** Delete.

Insert the following new special provisions:

- "342** Glass inner receptacles (such as ampoules or capsules) intended only for use in sterilization devices, when containing less than 30 ml of ethylene oxide per inner packaging with not more than 300 ml per outer packaging, may be transported in accordance with the provisions in chapter 3.5, irrespective of the indication of "E0" in column 7b of the Dangerous Goods List provided that:
- .1 After filling, each glass inner receptacle has been determined to be leak-tight by placing the glass inner receptacle in a hot water bath at a temperature, and for a period of time, sufficient to ensure that an internal pressure equal to the vapour pressure of ethylene oxide at 55°C is achieved. Any glass inner receptacle showing evidence of leakage, distortion or other defect under this test shall not be transported under the terms of this special provision;
  - .2 In addition to the packaging required by 3.5.2, each glass inner receptacle is placed in a sealed plastics bag compatible with ethylene oxide and capable of containing the contents in the event of breakage or leakage of the glass inner receptacle; and
  - .3 Each glass inner receptacle is protected by a means of preventing puncture of the plastics bag (e.g., sleeves or cushioning) in the event of damage to the packaging (e.g., by crushing).
- 343** This entry applies to crude oil containing hydrogen sulphide in sufficient concentration that vapours evolved from the crude oil can present an inhalation hazard. The packing group assigned shall be determined by the flammability hazard and inhalation hazard, in accordance with the degree of danger presented.
- 344** The provisions of 6.2.4 shall be met.
- 345** This gas contained in open cryogenic receptacles with a maximum capacity of 1 litre constructed with glass double walls having the space between the inner and outer wall evacuated (vacuum insulated) is not subject to the provisions of this Code provided each receptacle is transported in an outer packaging with suitable cushioning or absorbent materials to protect it from impact damage.
- 346** Open cryogenic receptacles conforming to the requirements of packing instruction P203 and containing no dangerous goods except for UN 1977, nitrogen, refrigerated liquid, which is fully absorbed in a porous material are not subject to any other provisions of this Code.

- 347** This entry shall only be used if the results of Test series 6 (d) of Part I of the United Nations Manual of Tests and Criteria have demonstrated that any hazardous effects arising from functioning are confined within the package.
- 348** Batteries manufactured after 31 December 2011 shall be marked with the Watt-hour rating on the outside case.
- 349** Mixtures of a hypochlorite with an ammonium salt are not to be accepted for transport. UN No. 1791 hypochlorite solution is a substance of class 8.
- 350** Ammonium bromate and its aqueous solutions and mixtures of a bromate with an ammonium salt are not to be accepted for transport.
- 351** Ammonium chlorate and its aqueous solutions and mixtures of a chlorate with an ammonium salt are not to be accepted for transport.
- 352** Ammonium chlorite and its aqueous solutions and mixtures of a chlorite with an ammonium salt are not to be accepted for transport.
- 353** Ammonium permanganate and its aqueous solutions and mixtures of a permanganate with an ammonium salt are not to be accepted for transport.
- 354** This substance is toxic by inhalation.
- 355** Oxygen cylinders for emergency use transported under this entry may include installed actuating cartridges (cartridges, power device of Class 1.4, Compatibility Group C or S), without changing the classification of Class 2.2 provided the total quantity of deflagrating (propellant) explosives does not exceed 3.2 g per oxygen cylinder. The cylinders with the installed actuating cartridges as prepared for transport shall have an effective means of preventing inadvertent activation.
- 356** Metal hydride storage system(s) installed in conveyances or in completed conveyance components or intended to be installed in conveyances shall be approved by the competent authority before acceptance for transport. The transport document shall include an indication that the package was approved by the competent authority or a copy of the competent authority approval shall accompany each consignment.
- 357** Petroleum crude oil containing hydrogen sulphide in sufficient concentration that vapours evolved from the crude oil can present an inhalation hazard shall be consigned under the entry UN 3494 PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC.
- 961** Vehicles and equipment are not subject to the provisions of this Code if they are stowed on a roll-on/roll-off ship or in another cargo space designated by the Administration (flag State) as specifically designed and approved for the carriage of vehicles and equipment and there are no signs of leakage from the battery, engine, fuel cell, compressed gas cylinder or accumulator, or fuel tank when applicable.

In addition, vehicles and equipment are not subject to the provisions of this Code if any of the following conditions are met:

- .1 The fuel tank(s) of the vehicle or equipment powered by a flammable liquid fuel is empty and installed batteries are protected from short circuit;
- .2 The fuel tank(s) of the vehicle or equipment powered by a flammable gas is emptied of liquefied or compressed gas, the positive pressure in the tank does not exceed 2 bar, the fuel shut-off or isolation valve is closed and secured, and installed batteries are protected from short circuit; or
- .3 The vehicle or equipment is solely powered by a wet or dry electric storage battery or a sodium battery, and the battery is protected from short circuit.

**962** Vehicles or equipment powered by internal combustion engines, fuel cells or batteries not meeting the conditions of special provision 961 shall be assigned to class 9 and shall meet the following requirements:

- .1 vehicles and equipment shall not show signs of leakage from batteries, engines, fuel cells, compressed gas cylinders or accumulators, or fuel tank(s) when applicable;
- .2 for flammable liquid powered vehicles and equipment, the fuel tank(s) containing the flammable liquid shall not be more than one-fourth full and in any case the flammable liquid shall not exceed 250 l;
- .3 for flammable gas powered vehicles and equipment, the fuel shut-off valve of the fuel tank(s) shall be securely closed;
- .4 installed batteries shall be protected from damage, short circuit, and accidental activation during transport. Lithium ion or lithium metal batteries shall meet the requirements of the United Nations Manual of Tests and Criteria, Part III, subsection 38.3, unless otherwise approved by the competent authority; and
- .5 dangerous goods required for the operation of the vehicle or equipment such as fire extinguishers, compressed gas accumulators, airbag inflators, etc., shall be securely mounted in the vehicle or equipment.

The marking, labelling and placarding provisions of this Code shall not apply."

**963** Nickel-metal hydride button cells or nickel-metal hydride cells or batteries packed with or contained in equipment are not subject to the provisions of this Code.

All other nickel-metal hydride cells or batteries shall be securely packed and protected from short circuit. They are not subject to other provisions of this Code provided that they are loaded in a cargo transport unit in a

total quantity of less than 100 Kg gross mass. When loaded in a cargo transport unit in a total quantity of 100 Kg gross mass or more, they are not subject to other provisions of this Code except those of 5.4.1, 5.4.3 and column (16) of the dangerous good list in Chapter 3.2.

- 964** This substance is not subject to the provisions of this Code when transported in non friable prills or granules form and if it passes the test for oxidizing solid substances as reflected in the United Nations *Manual of Test and Criteria* (see 34.4.1) and is accompanied by a certificate from a laboratory accredited by a competent authority, stating that the product has been correctly sampled by trained staff from the laboratory and that the sample was correctly tested and has passed the test.

## **Chapter 3.4 – Limited quantities**

### **3.4.2 Packing**

3.4.2.1 Add a new second sentence to read as follows: "Intermediate packagings may be used."

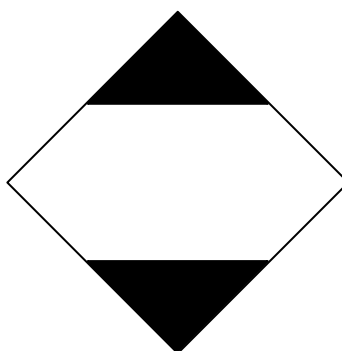
3.4.2.2 The end of the first sentence, after "with these special provisions", is replaced with the following:

"Inner packagings that are liable to break or be easily punctured, such as those made of glass, porcelain, stoneware or certain plastics, shall be placed in suitable intermediate packagings meeting the provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8, and be so designed that they meet the construction requirements of 6.1.4."

### **3.4.5 Marking and labelling**

3.4.5.1 and 3.4.5.2 are replaced with the following:

- "3.4.5.1 Packages containing dangerous goods in limited quantities need not be labelled nor marked with the marine pollutant mark, proper shipping name or UN number of the contents, but shall bear the marking shown below. The marking shall comply with 5.2.1.9.

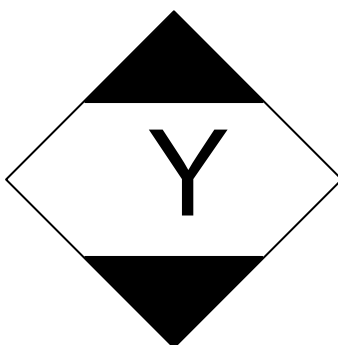


Marking for packages containing limited quantities

Top and bottom portions and line shall be black, centre area white or suitable contrasting background. Minimum dimensions: 100 mm x 100 mm. Minimum width of line forming diamond: 2 mm. If the size of the

package so requires, the dimension may be reduced, to be not less than 50 mm x 50 mm provided the marking remains clearly visible.

- 3.4.5.2 Packages containing dangerous goods consigned for air transport in conformity with the provisions of Part 3, Chapter 4 of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air shall bear the marking shown below. The marking shall be readily visible, legible and able to withstand open weather exposure without a substantial reduction in effectiveness.



Marking for packages containing limited quantities conforming to Part 3, Chapter 4 of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air

Top and bottom portions and line shall be black, centre area white or suitable contrasting background. Minimum dimensions: 100 mm x 100 mm. Minimum width of line forming diamond: 2 mm. The symbol "Y" shall be placed in the centre of the mark and shall be clearly visible. If the size of the package so requires, the dimension may be reduced, to be not less than 50 mm x 50 mm provided the marking remains clearly visible.

- 3.4.5.3 Packages containing dangerous goods bearing the marking shown in 3.4.5.2 shall be deemed to meet the provisions of sections 3.4.1, 3.4.2 and 3.4.4 of this chapter and need not bear the marking shown in 3.4.5.1.
- 3.4.5.4 When packages containing dangerous goods in limited quantities are placed in an overpack or in a unit load, the overpack or the unit load shall be marked with the marking required by this chapter unless the markings representative of all dangerous goods in the overpack or the unit load are visible. In addition, an overpack shall be marked with the word "OVERPACK" unless markings representative of all dangerous goods, as required by this chapter, in the overpack are visible.
- 3.4.5.5 Cargo transport units containing dangerous goods in only limited quantities shall not be placarded nor marked according to 5.3.2.0 and 5.3.2.1. They shall, however, be suitably marked on the exterior with the mark in 3.4.5.1 which shall have minimum dimensions of 250 mm x 250 mm in locations indicated in 5.3.1.1.4.1."

### **3.4.7 Exceptions**

3.4.7 Delete paragraph.

### **3.4.8 Marine pollutants**

3.4.8 Renumbered as 3.4.7

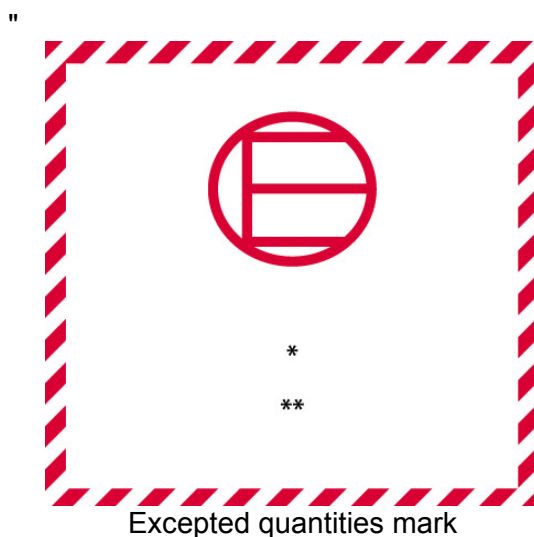
## **Chapter 3.5 – Dangerous goods packed in excepted quantities**

### **3.5.3 Tests of packages**

3.5.3.1.2 In the last paragraph delete the word "drop".

### **3.5.4 Marking of packages**

3.5.4.1 Amend the mark as follows:



Hatching and symbol of the same colour, black or red,  
on white or suitable contrasting background

\* *The Class or, when assigned, the Division number(s) shall be shown in this location.*

\*\* *The name of the consignor or of the consignee shall be shown in this location if not shown elsewhere on the package."*

## **PART 4 – PACKING AND TANK PROVISIONS**

### **Chapter 4.1 – Use of packagings, including intermediate bulk containers (IBCs) and large packagings**

#### **4.1.1 General provisions for the packing of dangerous goods in packagings including IBCs and large packagings**

4.1.1.1 At the end, replace "or reused" with ", reused or remanufactured".

4.1.1.2 Add a new subparagraph .3 to read as follows:

"3 shall not allow permeation of the dangerous goods that could constitute a danger under normal conditions of transport."

4.1.1.3 Replace the second sentence with the following:

"However, IBCs manufactured before 1 January 2011 and conforming to a design type which has not passed the vibration test of 6.5.6.13 or which was not required to meet the criteria of 6.5.6.9.5.4 at the time it was subjected to the drop test, may still be used."

#### **4.1.4 List of packing instructions**

4.1.4.1 Amend the following provisions:

**P001** Delete the asterisk in the PG I column against the authorized maximum capacity (250 l) specified for 6HA1 and 6HB1 composite packagings.

**P002** In special packing provision PP85, replace "For UN Nos. 1748, 2208 and 2880" with "For UN Nos. 1748, 2208, 2880, 3485, 3486 and 3487,".

**P114 (b)** Amend special packing provision PP48 to read as follows:

"**PP48** For UN Nos. 0508 and 0509, metal packagings shall not be used."

**P200 (4)** In special packing provision "k:", amend the first sentence to read as follows:

"Valve outlets shall be fitted with pressure retaining gas-tight plugs or caps having threads that match those of the valve outlets.". Amend the seventh paragraph ("Each valve shall have a taper threaded connection ...") to read as follows:

Each valve shall be capable of withstanding the test pressure of the pressure receptacle and be connected directly to the pressure receptacle by either a taper thread or other means which meets the requirements of ISO 10692-2:2001."

In special packing provision "q:", in the first sentence, replace "The valves" with "Valve outlets". In the second sentence, at the end, replace "manifold outlet valve" with "outlet of the manifold valve" and add "pressure retaining" before "gas-tight plug". Add a new third sentence to read as follows:

"Gas-tight plugs or caps shall have threads that match those of the valve outlets."

and add the following new special packing provision "ra" below "r":

"ra: This gas may also be packed in capsules under the following conditions:

(i) The mass of gas shall not exceed 150 g per capsule;



- (ii) The capsules shall be free from faults liable to impair the strength;
- (iii) The leakproofness of the closure shall be ensured by an additional device (cap, crown, seal, binding, etc.) capable of preventing any leakage of the closure during transport;
- (iv) The capsules shall be placed in an outer packaging of sufficient strength. A package shall not weigh more than 75 kg."

**P200** In Table 2, against UN 1037, add "ra" in column "Special packing provisions".

**P203** Replace the existing "P203" with the following:

P203	PACKING INSTRUCTION	P203
This instruction applies to class 2 refrigerated liquefied gases.		
<b>Requirements for closed cryogenic receptacles:</b>		
<p>(1) The general requirements of 4.1.6.1 shall be met.</p> <p>(2) The requirements of chapter 6.2 shall be met.</p> <p>(3) The closed cryogenic receptacles shall be so insulated that they do not become coated with frost.</p> <p>(4) Test pressure Refrigerated liquids shall be filled in closed cryogenic receptacles with the following minimum test pressures:</p> <ul style="list-style-type: none"> <li>(a) For closed cryogenic receptacles with vacuum insulation, the test pressure shall not be less than 1.3 times the sum of the maximum internal pressure of the filled receptacle, including during filling and discharge, plus 100 kPa (1 bar);</li> <li>(b) For other closed cryogenic receptacles, the test pressure shall be not less than 1.3 times the maximum internal pressure of the filled receptacle, taking into account the pressure developed during filling and discharge.</li> </ul> <p>(5) Degree of filling For non-flammable, non-toxic refrigerated liquefied gases the volume of liquid phase at the filling temperature and at a pressure of 100 kPa (1 bar) shall not exceed 98% of the water capacity of the pressure receptacle. For flammable refrigerated liquefied gases the degree of filling shall remain below the level at which, if the contents were raised to the temperature at which the vapour pressure equalled the opening pressure of the relief valve, the volume of the liquid phase would reach 98% of the water capacity at that temperature.</p> <p>(6) Pressure-relief devices Closed cryogenic receptacles shall be fitted with at least one pressure-relief device.</p> <p>(7) Compatibility Materials used to ensure the leakproofness of the joints or for the maintenance of the closures shall be compatible with the contents. In the case of receptacles intended for the transport of oxidizing gases, (i.e. with a subsidiary risk of 5.1) these materials shall not react with these gases in a dangerous manner.</p>		

P203	PACKING INSTRUCTION	P203
<p><b>Requirements for open cryogenic receptacles:</b></p> <p>Only the following non oxidizing refrigerated liquefied gases of class 2.2 may be transported in open cryogenic receptacles: UN 1913, 1951, 1963, 1970, 1977, 2591, 3136 and 3158.</p> <p>Open cryogenic receptacles shall be constructed to meet the following requirements:</p> <ol style="list-style-type: none"> <li>(1) The receptacles shall be designed, manufactured, tested and equipped in such a way as to withstand all conditions, including fatigue, to which they will be subjected during their normal use and during normal conditions of transport.</li> <li>(2) The capacity shall be not more than 450 litres.</li> <li>(3) The receptacle shall have a double wall construction with the space between the inner and outer wall being evacuated (vacuum insulation). The insulation shall prevent the formation of hoar frost on the exterior of the receptacle.</li> <li>(4) The materials of construction shall have suitable mechanical properties at the service temperature.</li> <li>(5) Materials which are in direct contact with the dangerous goods shall not be affected or weakened by the dangerous goods intended to be transported and shall not cause a dangerous effect, e.g., catalysing a reaction or reacting with the dangerous goods.</li> <li>(6) Receptacles of glass double wall construction shall have an outer packaging with suitable cushioning or absorbent materials which withstand the pressures and impacts liable to occur under normal conditions of transport.</li> <li>(7) The receptacle shall be designed to remain in an upright position during transport, e.g., have a base whose smaller horizontal dimension is greater than the height of the centre of gravity when filled to capacity or be mounted on gimbals.</li> <li>(8) The openings of the receptacles shall be fitted with devices allowing gases to escape, preventing any splashing out of liquid, and so configured that they remain in place during transport.</li> <li>(9) Open cryogenic receptacles shall bear the following marks permanently affixed, e.g., by stamping, engraving or etching: <ul style="list-style-type: none"> <li>- The manufacturer's name and address;</li> <li>- The model number or name;</li> <li>- The serial or batch number;</li> <li>- The UN number and proper shipping name of gases for which the receptacle is intended;</li> <li>- The capacity of the receptacle in litres.</li> </ul> </li> </ol>		

**P402** In PP 31, insert "3148," after "1422," and replace "and 3399 (PG I)" with ", 3399 (PG I) and 3482".

**P601** In special packing provision (1) in the first indent, replace "quantity of 1 litre" with "net quantity of 1 litre".

**P602** In special packing provision (1) in the first indent, replace "quantity of 1 litre" with "net quantity of 1 litre".

**P620** Add the following new additional requirement:

"4. Other dangerous goods shall not be packed in the same packaging as class 6.2 infectious substances unless they are necessary for maintaining the viability, stabilizing or preventing degradation or neutralizing the hazards of the infectious substances. A quantity of 30 ml or less of dangerous goods included in Classes 3, 8 or 9 may be packed in each primary receptacle containing infectious substances. These small quantities of dangerous goods of Classes 3, 8 or 9 are not subject to any additional provisions of this Code when packed in accordance with this packing instruction."

and renumber remaining provision "4." as "5." accordingly.

**P621** In the second sentence, insert ", except 4.1.1.15," after "4.1.1".

**P804** (1) Replace the existing paragraph in the table with the following:

"(1) Combination packagings with a maximum gross mass of 25 kg, consisting of one or more glass inner packaging(s) with a maximum capacity of 1.3 litres each and filled to no more than 90% of their capacity; the closure(s) of which shall be physically held in place by any means capable of preventing back-off or loosening by impact or vibration during transport, individually placed in:

- metal or rigid plastics receptacles together with cushioning and absorbent material sufficient to absorb the entire contents of the glass inner packaging(s), further packed in;
- 1A2, 1B2, 1N2, 1H2, 1D, 1G, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, or 4H2 outer packagings."


**P901** Replace "Maximum quantity of dangerous goods per outer packaging: 10 kg." with "The quantity of dangerous goods per outer packaging shall not exceed 10 kg, excluding the mass of any carbon dioxide, solid, (dry ice) used as a refrigerant."

and at the end of the additional provision, add the following new text:

"Dry ice

When carbon dioxide, solid, (dry ice) is used as a refrigerant, the packaging shall be designed and constructed to permit the release of the gaseous carbon dioxide to prevent the build up of pressure that could rupture the packaging."

**P904** Replace the existing "P904" with the following:

P904	PACKING INSTRUCTION	P904
	This instruction applies to UN 3245.	
	The following packagings are authorized:	
(1)	Packagings meeting the provisions of 4.1.1.1, 4.1.1.2, 4.1.1.4, 4.1.1.8 and 4.1.3 and so designed that they meet the construction requirements of 6.1.4. Outer packagings constructed of suitable material of adequate strength and designed in relation to the packaging capacity and its intended use shall be used. Where this packing instruction is used for the transport of inner packagings of combination packagings the packaging shall be designed and constructed to prevent inadvertent discharge during normal conditions of transport.	
(2)	Packagings, which need not conform to the packaging test requirements of Part 6, but conforming to the following:	
(a)	An inner packaging comprising:	
(i)	primary receptacle(s) and a secondary packaging, the primary receptacle(s) or the secondary packaging shall be leakproof for liquids or siftproof for solids;	
(ii)	for liquids, absorbent material placed between the primary receptacle(s) and the secondary packaging. The absorbent material shall be in a quantity sufficient to absorb the entire contents of the primary receptacle(s) so that any release of the liquid substance will not compromise the integrity of the cushioning material or of the outer packaging;	
(iii)	if multiple fragile primary receptacles are placed in a single secondary packaging they shall be individually wrapped or separated to prevent contact between them;	
(b)	An outer packaging shall be strong enough for its capacity, mass and intended use, and with a smallest external dimension of at least 100 mm.	
	For transport, the mark illustrated below shall be displayed on the external surface of the outer packaging on a background of a contrasting colour and shall be clearly visible and legible. The mark shall be in the form of a square set at an angle of 45° (diamond-shaped) with each side having a length of at least 50 mm; the width of the line shall be at least 2 mm and the letters and numbers shall be at least 6 mm high.	
		
	<b>Additional provision:</b>	
	<u>Ice, dry ice and liquid nitrogen</u>	
	When dry ice or liquid nitrogen is used, all applicable provisions of this Code shall be met. When used, ice or dry ice shall be placed outside the secondary packagings or in the outer packaging or an overpack. Interior supports shall be provided to secure the secondary packagings in the original position after the ice or dry ice has dissipated. If ice is used, the outside packaging or overpack shall be leakproof. If carbon dioxide, solid (dry ice) is used, the packaging shall be designed and constructed to permit the release of carbon dioxide gas to prevent a build-up of pressure that could rupture the packagings and the package (the outer packaging or the overpack) shall be marked "Carbon dioxide, solid" or "Dry ice".	
	The primary receptacle and the secondary packaging shall maintain their integrity at the temperature of the refrigerant used as well as the temperatures and the pressures which could result if refrigeration were lost.	

Add the following new packing instruction:

P205	PACKING INSTRUCTION	P205
This instruction applies to UN 3468.		
(1)	For metal hydride storage systems, the general packing requirements of 4.1.6.1 shall be met.	
(2)	Only pressure receptacles not exceeding 150 litres in water capacity and having a maximum developed pressure not exceeding 25 MPa are covered by this packing instruction.	
(3)	Metal hydride storage systems meeting the applicable requirements for the construction and testing of pressure receptacles containing gas of chapter 6.2 are authorized for the transport of hydrogen only.	
(4)	When steel pressure receptacles or composite pressure receptacles with steel liners are used, only those bearing the "H" mark, in accordance with 6.2.2.9.2(j) shall be used.	
(5)	Metal hydride storage systems shall meet the service conditions, design criteria, rated capacity, type tests, batch tests, routine tests, test pressure, rated charging pressure and provisions for pressure relief devices for transportable metal hydride storage systems specified in ISO 16111:2008 and their conformity and approval shall be assessed in accordance with 6.2.2.5.	
(6)	Metal hydride storage systems shall be filled with hydrogen at a pressure not exceeding the rated charging pressure shown in the permanent markings on the system as specified by ISO 16111:2008.	
(7)	The periodic test requirements for a metal hydride storage system shall be in accordance with ISO 16111:2008 and carried out in accordance with 6.2.2.6, and the interval between periodic inspections shall not exceed five years.	

#### 4.1.4.2 Packing instructions concerning the use of IBCs

4.1.4.2 Amend the following packing instructions:

**IBC04** Replace ", 21N, 31A, 31B and 31N" with "and 21N".

**IBC05** In (1), replace ", 21N, 31A, 31B and 31N" with "and 21N".  
In (2), replace ", 21H2, 31H1 and 31H2" with "and 21H2".  
In (3), replace ", 21HZ1 and 31HZ1" with "and 21HZ1".

**IBC06, IBC07 and IBC08**  
In (1), replace ", 21N, 31A, 31B and 31N" with "and 21N".  
In (2), replace ", 21H2, 31H1 and 31H2" with "and 21H2".  
In (3), replace ", 21HZ2, 31HZ1 and 31HZ2" with "and 21HZ2".

**IBC06** Replace the additional provision with the following:

**"Additional provision:**  
Where the solid may become liquid during transport see 4.1.3.4."

**IBC07** Amend the additional provision to read as follows:

**"Additional provision:**  
1. Where the solid may become liquid during transport see 4.1.3.4.  
2. Liners of wooden IBCs shall be siftproof."

**IBC08** Add the following new additional provision:

**"Additional provision:**  
Where the solid may become liquid during transport see 4.1.3.4."

**IBC520** For UN No. 3109, in the entry for Peroxyacetic acid, stabilized, not more than 17% (last entry), add "31H2" in column "Type of IBC". And in the eleventh row, "Isopropyl cumyl" should read "Isopropylcumyl" without a space,

and amend the index accordingly.

**IBC620** In the second sentence, insert ", except 4.1.1.15" after "4.1.1".

#### **4.1.5 Special packing provisions for goods of class 1**

4.1.5.5 Replace the existing paragraph with the following:

"4.1.5.5 Unless otherwise specified in this Code, packagings, including IBCs and large packagings, shall conform to the requirements of chapters 6.1, 6.5 or 6.6, as appropriate, and shall meet their test provisions for packing group II."

#### **4.1.6 Special packing provisions for goods of class 2**

##### **4.1.6.1 General provisions**

4.1.6.1.8 In the last paragraph, replace "the requirements of annex B of ISO 10297:1999" with "the requirements of annex A of ISO 10297:2006". At the end, add the following new paragraph:

"For metal hydride storage systems, the valve protection requirements specified in ISO 16111:2008 shall be met."

4.1.6.1.10 In the first sentence, insert "or P205, as applicable" after "P200".

#### **4.1.7 Special packing provisions for organic peroxides (class 5.2) and self-reactive substances of class 4.1**

##### **4.1.7.1 Use of packagings**

4.1.7.1 Amend the heading to read "**Use of packagings (except IBCs)**".

4.1.7.1.1 Replace existing paragraph with the following:

"4.1.7.1.1 Packagings for organic peroxides and self-reactive substances shall conform to the provisions of chapter 6.1 and shall meet its test provisions for packing group II."

##### **4.1.7.2 Use of intermediate bulk containers**

4.1.7.2.1 At the end, add the following new sentence: "IBCs shall conform to the requirements of chapter 6.5 and shall meet its test provisions for packing group II."

#### **4.1.9 Special packing provisions for class 7**

##### **4.1.9.1 General**

4.1.9.1.3 In the first sentence, after "package", insert ", other than an excepted package,".

4.1.9.1.5 Replace existing paragraph with the following:

"4.1.9.1.5 For radioactive material having other dangerous properties the package design shall take into account those properties. Radioactive material with a subsidiary risk, packaged in packages that do not require competent authority approval, shall be transported in packagings, IBCs, tanks or bulk containers fully complying with the provisions of the relevant chapters of Part 6 as appropriate, as well as applicable provisions of chapters 4.1, 4.2 or 4.3 for that subsidiary risk."

##### **4.1.9.2 Provisions and controls for transport of LSA material and SCO**

4.1.9.2.3.2 Replace "2.7.2.3.2" with "2.7.1.2".

##### **4.1.9.3 Packages containing fissile material**

4.1.9.3.1 Insert "(or mass of each fissile nuclide for mixtures when appropriate)" after "a mass of fissile material".

#### **Chapter 4.2 – Use of portable tanks and multiple-element gas containers (MEGCs)**

##### **4.2.0 Transitional provisions**

4.2.0.3 A new paragraph "4.2.0.3" is added with the following:

"4.2.0.3 Portable tanks and MEGCs manufactured before 1 January 2012, that conform to the marking provisions of 6.7.2.20.1, 6.7.3.16.1, 6.7.4.15.1 or 6.7.5.13.1 of the IMDG Code in force on 1 January 2010 (amendment 34-08), as relevant, may continue to be used if they comply with all other relevant provisions of the current edition of the Code including, when applicable, the requirement of 6.7.2.20.1 (g) for marking the symbol "S" on the plate when the shell or the compartment is divided by surge plates into sections of not more than 7,500 litres capacity. When the shell, or the compartment, was already divided by surge plates into sections of not more than 7,500 litres capacity before 1 January 2012, the capacity of the shell, or respectively of the compartment, need not be supplemented with the symbol "S" until the next periodic inspection or test according to 6.7.2.19.5 is performed.

Portable tanks manufactured before 1 January 2014 need not be marked with the portable tank instruction as required in 6.7.2.20.2, 6.7.3.16.2 and 6.7.4.15.2 until the next periodic inspection and test."

## **4.2.5 Portable tank instructions and special provisions**

### **4.2.5.2 Portable tank instructions**

4.2.5.2.6 In the table for portable tank instructions T1-T22, add a new footnote "b" in the heading of the last column after "Bottom-opening provisions". The footnote shall read as follows:

"<sup>b</sup> When this column indicates "not allowed", bottom openings are not permitted when the substance to be transported is a liquid (see 6.7.2.6.1). When the substance to be transported is a solid at all temperatures encountered under normal conditions of transport, bottom openings conforming to the provisions of 6.7.2.6.2 are authorized."

### **4.2.5.3 Portable tank special provisions**

4.2.5.3 Add the following new special provisions accordingly:

"TP36 Fusible elements in the vapour space may be used on portable tanks.

TP37 Portable tank provision T14 may continue to be applied until 31 December 2016 except:

- .1 for UN 1810, 2474 and 2668, T7 may be applied;
- .2 for UN 2486, T8 may be applied; and
- .3 for UN 1838, T10 may be applied."

## **PART 5 – CONSIGNMENTS PROCEDURES**

### **Chapter 5.1 – General provisions**

5.1.1.3 Insert a new subsection 5.1.1.3 with the following:

"5.1.1.3.1 A carrier shall not accept dangerous goods for transport unless:

- (a) A copy of the dangerous goods transport document and other documents or information as required by the provisions of this Code are provided; or
- (b) The information applicable to the dangerous goods is provided in electronic form.

5.1.1.3.2 The information applicable to the dangerous goods shall accompany the dangerous goods to final destination. This information may be on the dangerous goods transport document or may be on another document. This information shall be given to the consignee when the dangerous goods are delivered.

5.1.1.3.3 When the information applicable to the dangerous goods is given to the carrier in electronic form, the information shall be available to the carrier at all times during transport to final destination. The information shall be able to be produced without delay as a paper document."



Renumber (current) 5.1.1.3 as 5.1.1.4

## **5.1.5 General provisions for class 7**

### **5.1.5.1.4 Notifications**

5.1.5.1.4.1 Insert "the competent authority of the country of origin of the shipment and to" after "have been submitted to".

5.1.5.1.4.2 At the end, insert "the competent authority of the country of origin of the shipment and" after "shall notify".

5.1.5.1.4.4 In subparagraph .5, insert "(or of each fissile nuclide for mixtures when appropriate)" after "the mass of fissile material".

### **5.1.5.3 Determination of transport index (TI) and criticality safety index (CSI)**

5.1.5.3.4.4 Replace "when otherwise specified in the competent authority approval certificate of the country of origin of design (see 2.7.2.4.6)" with "under the provisions of 5.1.5.3.5".

5.1.5.3.4.5 Replace "when otherwise specified in the competent authority approval certificate of the country of origin of design (see 2.7.2.4.6)" with "under the provisions of 5.1.5.3.5".

5.1.5.3.5 Add a new paragraph 5.1.5.3.5 to read as follows:

"5.1.5.3.5 In all cases of international transport of packages requiring competent authority design or shipment approval, for which different approval types apply in the different countries concerned by the shipment, the categorization shall be in accordance with the certificate of the country of origin of design".

5.1.5.4 Add a new subsection 5.1.5.4 to read as follows:

#### **"5.1.5.4 Specific provisions for excepted packages**

5.1.5.4.1 Excepted packages shall be legibly and durably marked on the outside of the packaging with:

- .1 The UN number preceded by the letters "UN";
- .2 An identification of either the consignor or consignee, or both; and
- .3 The permissible gross mass if this exceeds 50 kg.

5.1.5.4.2 The documentation provisions of chapter 5.4 do not apply to excepted packages of radioactive material, except that the UN number preceded by the letters "UN", and the name and address of the consignor and the consignee shall be shown on a transport document such as a bill of lading, air waybill or other similar document."

## **Chapter 5.2 – Marking and labelling of packages including IBCs**

### **5.2.1 Marking of packages including IBCs**

#### **5.2.1.5 Special marking provisions for class 7**

5.2.1.5.2 Replace existing paragraph with the following:

"The marking of excepted packages shall be as required by 5.1.5.4.1."

5.2.1.5.8 Replace existing paragraph with the following:

"5.2.1.5.8 In all cases of international transport of packages requiring competent authority design or shipment approval, for which different approval types apply in the different countries concerned by the shipment, marking shall be in accordance with the certificate of the country of origin of the design."

#### **5.2.1.6 Special marking provisions for marine pollutants**

5.2.1.6.1 Replace existing paragraph with the following:

"5.2.1.6.1 Packages containing marine pollutants meeting the criteria of 2.9.3 shall be durably marked with the environmentally hazardous substance mark with the exception of single packagings and combination packagings where such single packagings or inner packagings of such combination packagings have:

- a net quantity of 5 l or less for liquids; or
- a net mass of 5 kg or less for solids."

**5.2.1.6.3** The marine pollutant mark is amended as follows:



#### **5.2.1.7**

5.2.1.7 Replace "ISO 780:1985" with "ISO 780:1997".

5.2.1.7.1 (d) Delete "or" at the end.

5.2.1.7.1 (e) Add "or" at the end.

5.2.1.7.1 Add a new subparagraph (f) with the following:

"(f) dangerous goods in hermetically sealed inner packagings each containing not more than 500 ml."

#### **5.2.1.9 Limited quantity mark**

5.2.1.9 A new section "5.2.1.9 – Limited quantity mark" is added as follows:

##### **"5.2.1.9 Limited quantity mark**

5.2.1.9.1 Packages containing dangerous goods in limited quantities shall be marked according to 3.4.5. The provisions of 5.2.1.2.1 and 5.2.1.2.2 shall be met."

#### **5.2.2.1.12 *Special provisions for the labelling of radioactive material***

5.2.2.1.12.2.2 In the second sentence, insert "(or mass of each fissile nuclide for mixtures when appropriate)" after "the mass of fissile material".

5.2.2.1.12.5 Amend to read as follows:

"5.2.2.1.12.5 In all cases of international transport of packages requiring competent authority design or shipment approval, for which different approval types apply in the different countries concerned by the shipment, labelling shall be in accordance with the certificate of the country of origin of design."

### **Chapter 5.3 – Placarding and marking of cargo transport units**

#### **5.3.1.2 Specifications for placards**

5.3.1.2.1.1 At the end of the second sentence after the words "bottom corner" delete the "." and insert a semi-colon ";".

#### **5.3.1.3 Fumigated units**

5.3.1.3 Delete.

### **5.3.2 Marking of cargo transport units**

#### **5.3.2.0 Display of Proper Shipping Name**

5.3.2.0 Replace the existing text with the following:

"5.3.2.0.1 The Proper Shipping Name of the contents shall be durably marked on at least both sides of:

- .1 tank transport units containing dangerous goods;
- .2 bulk containers containing dangerous goods; or

- .3 any other cargo transport unit containing packaged dangerous goods of a single commodity for which no placard, UN Number or marine pollutant mark is required. Alternatively, the UN Number may be displayed.

5.3.2.0.2 The proper shipping name for the goods shall be displayed in characters not less than 65 mm high. The proper shipping name shall be of the contrasting colour with the background."

#### **5.3.2.1 Display of UN Numbers**

5.3.2.1.1.4 Amend to read as follows:

- "4 packaged radioactive material with a single UN number in or on a vehicle, or in a freight container, when required to be transported under exclusive use."

#### **5.3.2.4 Limited quantities**

5.3.2.4 The existing text is replaced with the following:

- "5.3.2.4 Cargo transport units containing dangerous goods in only limited quantities shall not be placarded nor marked according to 5.3.2.0 and 5.3.2.1. They shall, however, be suitably marked on the exterior with the mark in 3.4.5.1 which shall have minimum dimensions of 250 mm x 250 mm in locations indicated in 5.3.1.1.4.1."

#### **5.3.2.5 Fumigated units**

5.3.2.5 Delete.

### **Chapter 5.4 – Documentation**

Replace existing Note 1 with the following:

- "NOTE 1** The provisions of this Code do not preclude the use of electronic data processing (EDP) and electronic data interchange (EDI) transmission techniques as an alternative to paper documentation. All references to "dangerous goods transport document" in this chapter also include provision of the required information by use of EDP and EDI transmission techniques."

and a new "NOTE 5" is inserted with the following:

- "NOTE 5** In addition to the provisions of this chapter other additional information may be included. However, this information shall not:
  - .1 divert attention from the safety information required by this chapter or by the competent authority;
  - .2 contradict the safety information required by this chapter or by the competent authority; or

.3 duplicate information already provided.".

#### **5.4.1 Dangerous goods transport documentation**

Amend the title to read **"5.4.1 Dangerous goods transport information"**.

##### **5.4.1.1 General**

5.4.1.1 Replace with the following:

##### **"5.4.1.1 General**

5.4.1.1.1 Except as otherwise provided, the consignor who offers dangerous goods for transport shall give to the carrier the information applicable to those dangerous goods, including any additional information and documentation as specified in this Code. This information may be provided on a dangerous goods transport document or, with the agreement of the carrier, by EDP or EDI techniques.

5.4.1.1.2 When the dangerous goods transport information is given to the carrier by EDP or EDI techniques, the consignor shall be able to produce the information without delay as a paper document, with the information in the sequence required by this chapter."

##### **5.4.1.2.5 Example of a dangerous goods transport document**

5.4.1.2.5 In the footnote, replace "Recommendation No.11 (Documentary aspects of international Transport of Dangerous Goods) (ECE/TRADE/204, edition 96.1 – currently under revision)", with the following:

"Revised Recommendations No.11 (Documentary aspects of international Transport of Dangerous Goods) (ECE/TRADE/C/CEFACT/2008/8)".

##### **5.4.1.4 Information required on the dangerous goods transport document**

##### **5.4.1.4.3 Information which supplements the Proper Shipping Name in the dangerous goods description**

5.4.1.4.3.2 At the end of the sentence, replace "Proper Shipping Name" with "dangerous goods description specified in 5.4.1.4.1.1 to .5".

##### **5.4.1.5 Information required in addition to the dangerous goods description**

5.4.1.5.1 After the existing paragraph, add the following new note:

**"NOTE:** The number, type and capacity of each inner packaging within the outer packaging of a combination packaging is not required to be indicated."

#### **5.4.1.5.7      *Radioactive material***

5.4.1.5.7.1.3 In the second sentence, after "the mass of fissile material" insert "(or mass of each fissile nuclide for mixtures when appropriate)".

5.4.1.5.7.1.10 After the existing sentence, add "For radioactive material for which the  $A_2$  value is unlimited, the multiple of  $A_2$  shall be zero."

5.4.1.5.7.3 Replace the existing paragraph with the following:

"5.4.1.5.7.3 In all cases of international transport of packages requiring competent authorities design or shipment approval, for which different approval types apply in the different countries concerned by the shipment, the UN number and proper shipping name required in 5.4.1.4.1 shall be in accordance with the certificate of the country of origin of design."

#### **5.4.1.5.11    Special provisions for segregation**

5.4.1.5.11.1 In the last sentence, after "Phosphoric acid", insert ", acetic acid".

#### **5.4.1.6    Certification**

5.4.1.6.2 Replace the existing paragraph with the following:

"5.4.1.6.2 If the dangerous goods documentation is presented to the carrier by means of EDP or EDI transmission techniques, the signature(s) may be electronic signature(s) or may be replaced by the name(s) (in capitals) of the person authorized to sign."

5.4.1.6.3 A new paragraph 5.4.1.6.3 is added with the following:

"5.4.1.6.3 When the dangerous goods transport information is given to a carrier by EDP or EDI techniques and subsequently the dangerous goods are transferred to a carrier that requires a paper dangerous goods transport document, the carrier shall ensure that the paper document indicates "Original received electronically" and the name of the signatory shall be shown in capital letters."

#### **5.4.2    Container/vehicle packing certificate**

5.4.2.3 Replace the existing paragraph with the following:

"5.4.2.3 If the dangerous goods documentation is presented to the carrier by means of EDP or EDI transmission techniques, the signature(s) may be electronic signature(s) or may be replaced by the name(s) (in capitals) of the person authorized to sign."

5.4.2.4 A new paragraph 5.4.2.4 is added with the following:

"5.4.2.4 When the dangerous goods transport information is given to a carrier by EDP or EDI techniques and subsequently the dangerous goods are transferred to a carrier that requires a paper dangerous goods transport document, the carrier shall ensure

that the paper document indicates "Original received electronically" and the name of the signatory shall be shown in capital letters."

#### **5.4.4 Other required information and documentation**

##### **5.4.4.2 Fumigated units**

5.4.4.2 Delete.

#### **5.4.6 Retention of dangerous goods transport information**

5.4.6 A new section 5.4.6 is added with the following:

##### **"5.4.6 Retention of dangerous goods transport information**

5.4.6.1 The consignor and the carrier shall retain a copy of the dangerous goods transport document and additional information and documentation as specified in this Code, for a minimum period of three months.

5.4.6.2 When the documents are kept electronically or in a computer system, the consignor and the carrier shall be able to reproduce them in a printed form."

#### **Chapter 5.5 – Special provisions**

5.5 A new "Chapter 5.5 – Special provisions" is added with the following:

##### **"Chapter 5.5 – Special provisions**

**5.5.1** (Reserved).

**5.5.2 Special provisions applicable to fumigated cargo transport units (UN 3359)**

##### **5.5.2.1 General**

5.5.2.1.1 Fumigated cargo transport units (UN 3359) containing no other dangerous goods are not subject to any provisions of this Code other than those of this section.

5.5.2.1.2 When the fumigated cargo transport unit is loaded with dangerous goods in addition to the fumigant, any provision of this Code relevant to these goods (including placarding, marking and documentation) applies in addition to the provisions of this section.

5.5.2.1.3 Only cargo transport units that can be closed in such a way that the escape of gas is reduced to a minimum shall be used for the transport of cargo under fumigation.

5.5.2.1.4 The provisions of 3.2 and 5.4.3 apply to all fumigated cargo transport units (UN 3359).

### 5.5.2.2 Training

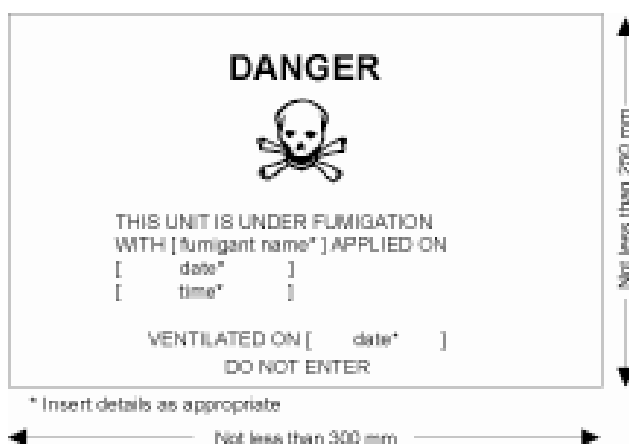
Persons engaged in the handling of fumigated cargo transport units shall be trained commensurate with their responsibilities.

### 5.5.2.3 Marking and placarding

5.5.2.3.1 A fumigated cargo transport unit shall be marked with a warning mark, as specified in 5.5.2.3.2, affixed at each access point in a location where it will be easily seen by persons opening or entering the cargo transport unit. This mark shall remain on the cargo transport unit until the following provisions are met:

- (a) The fumigated cargo transport unit has been ventilated to remove harmful concentrations of fumigant gas; and
- (b) The fumigated goods or materials have been unloaded.

5.5.2.3.2 The fumigation warning mark shall be rectangular and shall not be less than 300 mm wide and 250 mm high. The markings shall be in black print on a white background with lettering not less than 25 mm high. An illustration of this mark is given below.



5.5.2.3.3 If the fumigated cargo transport unit has been completely ventilated either by opening the doors of the unit or by mechanical ventilation after fumigation, the date of ventilation shall be marked on the fumigation warning mark.

5.5.2.3.4 When the fumigated cargo transport unit has been ventilated and unloaded, the fumigation warning mark shall be removed.

5.5.2.3.5 Class 9 placards (Model No.9, see 5.2.2.2.2) shall not be affixed to a fumigated cargo transport unit except as required for other Class 9 substances or articles packed therein.



#### **5.5.2.4 Documentation**

5.5.2.4.1 Documents associated with the transport of cargo transport units that have been fumigated and have not been completely ventilated before transport shall include the following information:

- .1 UN 3359, fumigated cargo transport unit, 9, or UN 3359, fumigated cargo transport unit, class 9;
- .2 The date and time of fumigation; and
- .3 The type and amount of the fumigant used.

5.5.2.4.2 The transport document may be in any form, provided it contains the information required in 5.5.2.4.1. This information shall be easy to identify, legible and durable.

5.5.2.4.3 Instructions for disposal of any residual fumigant including fumigation devices (if used) shall be provided.

A document is not required when the fumigated cargo transport unit has been completely ventilated and the date of ventilation has been marked on the warning mark (see 5.5.2.3.3 and 5.5.2.3.4).".

#### **5.5.2.5 Additional provisions**

5.5.2.5.1 Cargo transport units shall be fumigated and handled taking into account the provisions of the MSC.1/Circ.1361 on Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units.

5.5.2.5.2 When fumigated cargo transport units are stowed under deck, equipment for detecting fumigant gas(es) shall be carried on the ship with instructions for their use.

5.5.2.5.3 Fumigants shall not be applied to the contents of a cargo transport unit once it has been loaded aboard the ship.

5.5.2.5.4 A fumigated cargo transport unit shall not be allowed on board until a sufficient period has elapsed to attain a reasonable uniform gas concentration throughout the cargo in it. Because of variations due to types and amounts of fumigants and commodities and temperature levels, the period between fumigant application and loading of the fumigated cargo transport unit on board the ship shall be determined by the competent authority. Twenty-four hours is normally sufficient for this purpose. Unless the doors of a fumigated cargo transport unit have been opened to allow the fumigant gas(es) and residues to be completely ventilated or the unit has been mechanically ventilated, the shipment shall conform to the provisions of this Code concerning UN 3359. Ventilated cargo transport units shall be marked with the date of ventilation on the fumigated warning mark. When the fumigated goods or materials have been unloaded, the fumigation warning mark shall be removed.

5.5.2.5.5 The master shall be informed prior to the loading of a fumigated cargo transport unit.".

**PART 6 – CONSTRUCTION AND TESTING OF PACKAGINGS, INTERMEDIATE BULK CONTAINERS (IBCs), LARGE PACKAGINGS, PORTABLE TANKS, MULTIPLE-ELEMENT GAS CONTAINERS (MEGCs) AND ROAD TANK VEHICLES**

**Chapter 6.1 – Provisions for the construction and testing of packagings (other than for class 6.2 substances)**

**6.1.3 Marking**

6.1.3.1 (a) Replace the second sentence with the following: "This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant provisions in chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7."

6.1.4.0 Add a new subsection 6.1.4.0 with the following:

**"6.1.4.0 General provisions**

Any permeation of the substance contained in the packaging shall not constitute a danger under normal conditions of transport."

**6.1.5 Test provisions for packagings**

**6.1.5.3 Drop test**

**6.1.5.3.6 *Criteria for passing the test***

6.1.5.3.6.3 Replace with the following:

"6.1.5.3.6.3 The packaging or outer packaging of a composite or combination packaging shall not exhibit any damage liable to affect safety during transport. Inner receptacles, inner packagings, or articles shall remain completely within the outer packaging and there shall be no leakage of the filling substance from the inner receptacle(s) or inner packaging(s)."

**Chapter 6.2 – Provisions for the construction and testing of pressure receptacles, aerosol dispensers, small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas**

After the heading of the chapter, add the following new note:

**"Note:** *Aerosol dispensers, small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas are not subject to the provisions of 6.2.1 to 6.2.3.*"

## **6.2.1 General provisions**

6.2.1 The note after the heading is deleted.

6.2.1.1.5 At the end of the existing paragraph, add a new sentence with the following:

"The test pressure of a metal hydride storage system shall be in accordance with packing instruction P205."

6.2.1.1.9 Delete the "s" on the word "receptacles".

## **6.2.1.2 Materials**

6.2.1.2.1 After the word "intended", insert the words "to be transported".

## **6.2.1.3 Service equipment**

6.2.1.3.4 After "P200 (1)" insert ", P205".

## **6.2.1.5 Initial inspection and test**

6.2.1.5.1 After "cryogenic receptacles" insert "and metal hydride storage systems".

6.2.1.5.3 Add a new paragraph 6.2.1.5.3 to read as follows:

"6.2.1.5.3 For metal hydride storage systems, it shall be verified that the inspections and tests specified in 6.2.1.5.1 .1, .2, .3, .4, .5 if applicable, .6, .7, .8 and .9 have been performed on an adequate sample of the receptacles used in the metal hydride storage system. In addition, on an adequate sample of metal hydride storage systems, the inspections and tests specified in 6.2.1.5.1 .3 and .6 shall be performed, as well as 6.2.1.5.1 .5, if applicable, and inspection of the external conditions of the metal hydride storage system.

Additionally, all metal hydride storage systems shall undergo the initial inspections and tests specified in 6.2.1.5.1 .8 and .9, as well as a leakproofness test and a test of the satisfactory operation of the service equipment."

## **6.2.1.6 Periodic inspection and test**

6.2.1.6.1.4 After the existing paragraph insert the following three **NOTES** with the following:

**"Note 1:** With the agreement of the competent authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.

**Note 2:** With the agreement of the competent authority, the hydraulic pressure test of cylinders or tubes may be replaced by an equivalent method based on acoustic emission testing or a combination of acoustic emission testing and ultrasonic examination. ISO 16148:2006 may be used as a guide for acoustic emission testing procedures.

**Note 3:** The hydraulic pressure test may be replaced by ultrasonic examination carried out in accordance with ISO 10461:2005+A1:2006 for seamless aluminium alloy gas cylinders and in accordance with ISO 6406:2005 for seamless steel gas cylinders."

6.2.1.6.1 At the end, after the subparagraphs, replace the existing "**Note 1** and **Note 2**" with the following:

**Note:** *For the periodic inspection and test frequencies, see packing instruction P200 of 4.1.4.1."*

## 6.2.2 Provisions for UN pressure receptacles

### 6.2.2.1 Design, construction and initial inspection and test

6.2.2.1.1 In the table, add the following three new entries after ISO 7866:1999 standard:

"

ISO 4706:2008	Gas cylinders – Refillable welded steel cylinders – Test pressure 60 bar and below
ISO 18172-1:2007	Gas cylinders – Refillable welded stainless steel cylinders – Part 1: Test pressure 6 MPa and below
ISO 20703:2006	Gas cylinders – Refillable welded aluminium-alloy cylinders – Design, construction and testing

"

6.2.2.1.5 Add a new paragraph 6.2.2.1.5 with the following:

"6.2.2.1.5 The following standards apply for the design, construction, and initial inspection and test of UN metal hydride storage systems, except that inspection requirements related to the conformity assessment system and approval shall be in accordance with 6.2.2.5:

ISO 16111:2008	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride
----------------	---

"

### 6.2.2.2 Materials

6.2.2.2 At the beginning, in the text between brackets and after "P200", insert "or P205".

### 6.2.2.3 Service equipment

6.2.2.3 Replace "ISO 10297:1999" with "ISO 10297:2006"

and at the end of 6.2.2.3, add the following new paragraph:

"For UN metal hydride storage systems, the requirements specified in the following standard apply to closures and their protection:

ISO 16111:2008	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride
----------------	---

"

#### **6.2.2.4 Periodic inspection and test**

6.2.2.4 At the beginning after "UN cylinders" insert "and UN metal hydride storage systems" and in the table, add the following new entry at the end:

"

ISO 16111:2008	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride
----------------	---

"

#### **6.2.2.7 Marking of refillable UN pressure receptacles**

6.2.2.7 After the heading, add the following new note:

**"Note:** *Marking provisions for UN metal hydride storage systems are given in 6.2.2.9.*"

6.2.2.7.1 Assign paragraph number 6.2.2.7.1 to the first unnumbered paragraph under 6.2.2.7. Renumber subsequent paragraphs and cross-references accordingly.

6.2.2.7.2 (a) (existing 6.2.2.7.1 (a)) Replace the second sentence with the following:

"This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant provisions in chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7;"

6.2.2.7.9 Add a new paragraph 6.2.2.7.9 to read as follows:

"6.2.2.7.9 For bundles of cylinders, pressure receptacle marking provisions shall only apply to the individual cylinders of a bundle and not to any assembly structure."

#### **6.2.2.8 Marking of non-refillable UN pressure receptacles**

6.2.2.8 Assign paragraph number 6.2.2.8.1 to the first unnumbered paragraph under 6.2.2.8, and renumber the following paragraphs accordingly.


6.2.2.9 Add a new subsection 6.2.2.9 with the following:

##### **"6.2.2.9 Marking of UN metal hydride storage systems**

6.2.2.9.1 UN metal hydride storage systems shall be marked clearly and legibly with the marks listed below. These marks shall be permanently affixed (e.g., stamped, engraved, or etched) on the metal hydride storage system. The marks shall be on the shoulder, top end or neck of the metal hydride storage system or on a permanently affixed component of the metal hydride storage system. Except for the United Nations packaging symbol, the minimum size of the marks shall be 5 mm for metal hydride storage systems with a smallest overall dimension greater than or equal to 140 mm and 2.5 mm for metal hydride storage systems with a smallest overall dimension less than 140 mm.

The minimum size of the United Nations packaging symbol shall be 10 mm for metal hydride storage systems with a smallest overall dimension greater than or equal to 140 mm and 5 mm for metal hydride storage systems with a smallest overall dimension less than 140 mm.

6.2.2.9.2 The following marks shall be applied:

- (a) The United Nations packaging symbol  ;

This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant requirements in chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7;

- (b) "ISO 16111" (the technical standard used for design, manufacture and testing);
- (c) The character(s) identifying the country of approval as indicated by the distinguishing signs of motor vehicles in international traffic;
- (d) The identity mark or stamp of the inspection body that is registered with the competent authority of the country authorizing the marking;
- (e) The date of the initial inspection, the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/");
- (f) The test pressure of the receptacle in bar, preceded by the letters "PH" and followed by the letters "BAR";
- (g) The rated charging pressure of the metal hydride storage system in bar, preceded by the letters "RCP" and followed by the letters "BAR";
- (h) The manufacturer's mark registered by the competent authority. When the country of manufacture is not the same as the country of approval, then the manufacturer's mark shall be preceded by the character(s) identifying the country of manufacture as indicated by the distinguishing signs of motor vehicles in international traffic. The country mark and the manufacturer's mark shall be separated by a space or slash;
- (i) The serial number assigned by the manufacturer;
- (j) In the case of steel receptacles and composite receptacles with steel liner, the letter "H" showing compatibility of the steel (see ISO 11114-1:1997); and,

- (k) In the case of metal hydride storage systems having limited life, the date of expiry, denoted by the letters "FINAL" followed by the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/").

The certification marks specified in (a) to (e) above shall appear consecutively in the sequence given. The test pressure (f) shall be immediately preceded by the rated charging pressure (g). The manufacturing marks specified in (h) to (k) above shall appear consecutively in the sequence given.

6.2.2.9.3 Other marks are allowed in areas other than the side wall, provided they are made in low stress areas and are not of a size and depth that will create harmful stress concentrations. Such marks shall not conflict with required marks.

6.2.2.9.4 In addition to the preceding marks, each metal hydride storage system that meets the periodic and test requirements of 6.2.2.4 shall be marked indicating:

- (a) The character(s) identifying the country authorizing the body performing the periodic inspection and test, as indicated by the distinguishing sign of motor vehicles in international traffic. This marking is not required if this body is approved by the competent authority of the country approving manufacture;
- (b) The registered mark of the body authorized by the competent authority for performing periodic inspection and test;
- (c) The date of the periodic inspection and test, the year (two digits) followed by the month (two digits) separated by a slash (i.e. "/" ). Four digits may be used to indicate the year.

The above marks shall appear consecutively in the sequence given."

#### **6.2.4 Provisions for aerosol dispensers, small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas**

6.2.4.3 Replace with the following:

"6.2.4.3 With the approval of the competent authority, aerosols and receptacles, small, are not subject to 6.2.4.1 and 6.2.4.2, if they are required to be sterile but may be adversely affected by water bath testing, provided:

- (a) They contain a non-flammable gas and either
  - (i) contain other substances that are constituent parts of pharmaceutical products for medical, veterinary or similar purposes;

- (ii) contain other substances used in the production process for pharmaceutical products; or
- (iii) are used in medical, veterinary or similar applications;
- (b) An equivalent level of safety is achieved by the manufacturer's use of alternative methods for leak detection and pressure resistance, such as helium detection and water bathing a statistical sample of at least 1 in 2000 from each production batch; and
- (c) For pharmaceutical products according to (a)(i) and (iii) above, they are manufactured under the authority of a national health administration. If required by the competent authority, the principles of Good Manufacturing Practice (GMP) established by the World Health Organization (WHO)<sup>2</sup> shall be followed."

## **Chapter 6.3 – Provisions for the construction and testing of packagings for class 6.2 infectious substances of category A**

### **6.3.4 Marking**

6.3.4.2 (a) Replace the second sentence with the following:

"This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant provisions in chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7;"

### **6.3.5 Test provisions for packagings**

#### **6.3.5.4 Puncture test**

##### **6.3.5.4.1 *Packagings with a gross mass of 7 kg or less***

6.3.5.4.1 In the second sentence, after "not exceeding 6 mm" insert "(see below)".

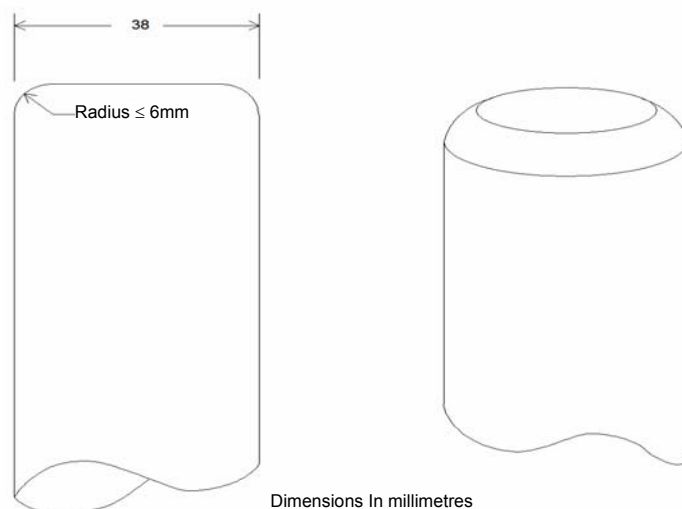
##### **6.3.5.4.2 *Packagings with a gross mass exceeding 7 kg***

6.3.5.4.2 In the third sentence, after "not exceeding 6 mm" insert "(see below)". And at the end, insert the following new figure:

---

<sup>2</sup> WHO Publication: "Quality assurance of pharmaceuticals. A compendium of guidelines and related materials. Volume 2: Good manufacturing practices and inspection".





## **Chapter 6.4 – Provisions for the construction, testing and approval of packages and material of class 7**

### **6.4.2 General provisions**

6.4.2.9 Delete "otherwise".

### **6.4.5 Provisions for industrial packages**

#### **6.4.5.4 Alternative provisions for Type IP-2 and Type IP-3 packages**

6.4.5.4.2.3 Replace "an increase of more than 20%" with "more than a 20% increase".

6.4.5.4.3.3 Replace "an increase of more than 20%" with "more than a 20% increase".

6.4.5.4.4 Replace "of a permanent enclosed character" with "with the characteristics of a permanent enclosure". And in subparagraph .3 after "Part 1: General Cargo Containers" insert "and subsequent amendments 1:1993, 2:1998, 3:2005, 4:2006 and 5:2006,".

6.4.5.4.4.3.2 Replace "any increase of more than 20%" with "more than a 20% increase".

6.4.5.4.5.2.2 Replace "any increase of more than 20%" with "more than a 20% increase".

### **6.4.6 Provisions for packages containing uranium hexafluoride**

6.4.6.1 Replace "ISO 7195:1993 "Packaging of uranium hexafluoride (UF<sub>6</sub>) for transport"" with "ISO 7195:2005 "Nuclear Energy – Packaging of uranium hexafluoride (UF<sub>6</sub>) for transport"".

6.4.6.2.1 Replace "ISO 7195:1993" with "ISO 7195:2005".

6.4.6.4 (a) Replace "ISO 7195:1993" with "ISO 7195:2005".

## **6.4.7 Provisions for Type A packages**

### **Type A packages to contain liquids**

6.4.7.16.2 (ii) Replace "designed to ensure retention of the liquid contents" by "designed to enclose the liquid contents completely and ensure their retention".

## **6.4.10 Provisions for Type C packages**

**6.4.10.2** Replace references "6.4.8.7.2" and "6.4.8.11" with "6.4.8.8.2" and "6.4.8.12".

## **6.4.11 Provisions for packages containing fissile material**

6.4.11.5 Replace with the following:

"6.4.11.5 The package, after being subjected to the tests specified in 6.4.15, shall:

- (a) Preserve the minimum overall outside dimensions of the package to at least 10 cm; and
- (b) Prevent the entry of a 10 cm cube."

6.4.11.7 (a) Replace "each of which" by "not less than two of which".

## **6.4.13 Testing the integrity of the containment system and shielding and evaluating criticality safety**

6.4.13 (c) Replace "6.4.11.12" with "6.4.11.13".

## **6.4.15 Test for demonstrating ability to withstand normal conditions of transport**

6.4.15.5 Replace existing subparagraph (a) with the following:

"(a) A total weight equal to 5 times the maximum weight of the package; and".

## **6.4.23 Applications for approval and approvals for radioactive material transport**

6.4.23.12 (j) In the second sentence, replace "(for fissile material)" with "(for fissile material or for each fissile nuclide when appropriate)".

6.4.23.13 (j) In the second sentence, replace "(for fissile material)" with "(for fissile material or for each fissile nuclide when appropriate)".

6.4.23.14 (l) In the second sentence, replace "(for fissile material)" with "(for fissile material or for each fissile nuclide when appropriate)".

## **Chapter 6.5 – Provisions for the construction and testing of large packagings**

### **6.5.1 General requirements**

#### **6.5.1.4 Designatory code system for IBCs**

6.5.1.4.1.2 At the beginning before the list add "Materials".

## 6.5.2 Marking

6.5.2.1.1.1 Replace the second sentence with the following:

"This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant provisions in chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7."

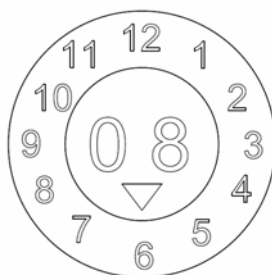
6.5.2.1.1.7 In the footnote replace the existing reference "6.5.4.6.4" with "6.5.6.6.4".

### 6.5.2.2 Additional marking

6.5.2.2.4 Replace the existing paragraph with the following:

"6.5.2.2.4 The inner receptacle of composite IBCs manufactured after 1 January 2011 shall bear the markings indicated in 6.5.2.1.1.2, .3, .4 where this date is that of the manufacture of the plastics inner receptacle, .5 and .6. The UN packaging symbol shall not be applied. The marking shall be applied in the sequence shown in 6.5.2.1.1. It shall be durable, legible and placed in a location so as to be readily visible when the inner receptacle is placed in the outer casing.

The date of the manufacture of the plastics inner receptacle may alternatively be marked on the inner receptacle adjacent to the remainder of the marking. An example of an appropriate marking method is:



".

6.5.2.4 Add a new paragraph 6.5.2.4 to read as follows:

#### "6.5.2.4 Marking of remanufactured composite IBCs (31HZ1)

The marking specified in 6.5.2.1.1 and 6.5.2.2 shall be removed from the original IBC or made permanently illegible and new markings shall be applied to an IBC remanufactured in accordance with these provisions of this Code."

## 6.5.4 Testing, certification and inspection

### 6.5.4.1 Quality assurance

6.5.4.1 At the beginning, after "manufactured" insert ", remanufactured, repaired". And at the end, after "manufactured" insert ", remanufactured or repaired".

#### **6.5.4.5 Repaired IBCs**

6.5.4.5.5 Renumber as "6.5.4.4.4".

#### **6.5.6.7.3 Method of testing and pressure to be applied**

**6.5.6.7.3** The second sentence is replaced with the following:

"The airtightness of the IBC shall be determined by a suitable method such as air-pressure differential test or by immersing the IBC in water, or for metal IBCs, by coating the seams and joints with a soap solution."

### **Chapter 6.6 – Provision for the construction and testing of large packagings**

#### **6.6.1 General**

6.6.1.2 Replace "and tested" with ", tested and remanufactured" and, at the end, after "each manufactured" insert "or remanufactured large".

#### **6.6.3 Marking**

##### **6.6.3.1 Primary marking**

6.6.3.1 (a) Replace the second sentence with the following:

"This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant provisions in chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7."

#### **6.6.5 Test provisions for large packagings**

##### **6.6.5.1 Performance and frequency of test**

6.6.5.1.3 Replace "6.6.5.2.3" with "6.6.5.2.4".

##### **6.6.5.2 Preparation for testing**

6.6.5.2.2 Replace the existing paragraph with the following:

"6.6.5.2.2 In the drop tests for liquids, when another substance is used, it shall be of similar relative density and viscosity to those of the substance being transported. Water may also be used for the liquid drop test under the conditions in 6.6.5.3.4.4."

##### **6.6.5.3 Test provisions**

###### **6.6.5.3.4 Drop test**

###### **6.6.5.3.4.4 Drop height**

6.6.5.3.4.4 Replace the existing paragraph with the following:

**"6.6.5.3.4.4 Drop height**

**Note:** Large packagings for substances and articles of class 1 shall be tested at the packing group II performance level.

6.6.5.3.4.4.1 For inner packagings containing solid or liquid substances or articles, if the test is performed with the solid, liquid or articles to be transported, or with another substance or article having essentially the same characteristics:

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

6.6.5.3.4.4.2 For inner packagings containing liquids if the test is performed with water:

(a) Where the substances to be transported have a relative density not exceeding 1.2:

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

(b) Where the substances to be transported have a relative density exceeding 1.2, the drop height shall be calculated on the basis of the relative density (d) of the substance to be carried, rounded up to the first decimal, as follows:

Packing group I	Packing group II	Packing group III
$d \times 1.5 \text{ (m)}$	$d \times 1.0 \text{ (m)}$	$d \times 0.67 \text{ (m)}$

"

## **Chapter 6.7 – Provisions for the design, construction, inspection and testing of portable tanks and multiple-element gas containers (MEGCs)**

### **6.7.2 Provisions for the design, construction, inspection and testing of portable tanks intended for the transport of substances of class 1 and classes 3 to 9**

#### **6.7.2.1 Definitions**

6.7.2.1 In the definition of "Portable tank", delete the word "transport" in the last but one sentence.

6.7.2.2.12 Replace four times "\*" with "1" and amend the footnote accordingly.

#### **6.7.2.6 Bottom openings**

6.7.2.6.2.1 Replace existing paragraph with the following:

".1 An external stop-valve, fitted as close to the shell as reasonably practicable, and so designed as to prevent any unintended opening through impact or other inadvertent act; and".

### 6.7.2.8 Pressure relief devices

6.7.2.8.4 At the end, add the following sentence:

"In addition, fusible elements conforming to 6.7.2.10.1 may also be used."

### 6.7.2.10 Fusible elements

6.7.2.10.1 In the first sentence, replace "110°C" with "100°C". In the second sentence, replace "in no case shall they" with "when used for transport safety purposes, they shall not". In the third sentence, replace "utilized" with "used" and at the end of the sentence, add "unless specified by special provision TP36 in Column 14 of the Dangerous Goods List of chapter 3.2."

### 6.7.2.20 Marking

6.7.2.20.1 Replace existing paragraph with the following:

"6.7.2.20.1 Every portable tank shall be fitted with a corrosion-resistant metal plate permanently attached to the portable tank in a conspicuous place readily accessible for inspection. When for reasons of portable tank arrangements the plate cannot be permanently attached to the shell, the shell shall be marked with at least the information required by the pressure vessel code. As a minimum, at least the following information shall be marked on the plate by stamping or by any other similar method:

(a) Owner information

(i) Owner's registration number;

(b) Manufacturing information

(i) Country of manufacture;

(ii) Year of manufacture;

(iii) Manufacturer's name or mark;

(iv) Manufacturer's serial number;

(c) Approval information

(i) The United Nations packaging symbol



;

This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant requirements in chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7;

(ii) Approval country;

(iii) Authorized body for the design approval;

(iv) Design approval number;

(v) Letters 'AA', if the design was approved under alternative arrangements (see 6.7.1.2);

(vi) Pressure vessel code to which the shell is designed;

(d) Pressures

- (i) MAWP (in bar gauge or kPa gauge)<sup>2</sup>;
- (ii) Test pressure (in bar gauge or kPa gauge)<sup>2</sup>;
- (iii) Initial pressure test date (month and year);
- (iv) Identification mark of the initial pressure test witness;
- (v) External design pressure<sup>3</sup> (in bar gauge or kPa gauge)<sup>2</sup>;
- (vi) MAWP for heating/cooling system (in bar gauge or kPa gauge)<sup>2</sup> (when applicable);

(e) Temperatures

- (i) Design temperature range (in °C)<sup>2</sup>;

(f) Materials

- (i) Shell material(s) and material standard reference(s);
- (ii) Equivalent thickness in reference steel (in mm)<sup>2</sup>; and
- (iii) Lining material (when applicable);

(g) Capacity

- (i) Tank water capacity at 20°C (in litres)<sup>2</sup>;  
This indication is to be followed by the symbol "S" when the shell is divided by surge plates into sections of not more than 7,500 litres capacity;
- (ii) Water capacity of each compartment at 20°C (in litres)<sup>2</sup> (when applicable, for multi-compartment tanks).  
This indication is to be followed by the symbol "S" when the compartment is divided by surge plates into sections of not more than 7,500 litres capacity;

(h) Periodic inspections and tests


- (i) Type of the most recent periodic test (2.5-year, 5-year or exceptional);
- (ii) Date of the most recent periodic test (month and year);
- (iii) Test pressure (in bar gauge or kPa gauge)<sup>2</sup> of the most recent periodic test (if applicable);
- (iv) Identification mark of the authorized body who performed or witnessed the most recent test.

---

<sup>2</sup> The unit used shall be indicated.

<sup>3</sup> See 6.7.2.2.10.

Figure 6.7.2.20.1: Example of identification plate marking

Owner's registration number			
<b>MANUFACTURING INFORMATION</b>			
Country of manufacture			
Year of manufacture			
Manufacturer			
Manufacturer's serial number			
<b>APPROVAL INFORMATION</b>			
	Approval country		
	Authorized body for design approval		
	Design approval number		'AA' (if applicable)
Shell design code (pressure vessel code)			
<b>PRESSURES</b>			
MAWP		bar or kPa	
Test pressure		bar or kPa	
Initial pressure test date:	(mm/yyyy)	Witness stamp:	
External design pressure		bar or kPa	
MAWP for heating/cooling system (when applicable)		bar or kPa	
<b>TEMPERATURES</b>			
Design temperature range		°C to °C	
<b>MATERIALS</b>			
Shell material(s) and material standard reference(s)			
Equivalent thickness in reference steel		mm	
Lining material (when applicable)			
<b>CAPACITY</b>			
Tank water capacity at 20°C		litres	'S' (if applicable)
Water capacity of compartment ____ at 20°C (when applicable, for multi-compartment tanks)		litres	'S' (if applicable)
<b>PERIODIC INSPECTIONS/TESTS</b>			
Test type	Test date	Witness stamp and test pressure <sup>a</sup>	Test type
	(mm/yyyy)	bar or kPa	

<sup>a</sup> Test pressure if applicable."

6.7.2.20.2 Insert at the end of the list, "Portable tank instruction in accordance with 4.2.5.2.6".



### **6.7.3 Provisions for the design, construction, inspection and testing of portable tanks intended for the transport of non-refrigerated liquefied gases of class 2**

6.7.3.2.9 Replace four times "\*" with "1" and amend the footnote accordingly.

6.7.3.8.1.1 Replace "\*" with "4" and amend the footnote accordingly.

#### **6.7.3.16 Marking**

6.7.3.16.1 Replace the existing paragraph with the following:

"6.7.3.16.1 Every portable tank shall be fitted with a corrosion-resistant metal plate permanently attached to the portable tank in a conspicuous place readily accessible for inspection. When for reasons of portable tank arrangements the plate cannot be permanently attached to the shell, the shell shall be marked with at least the information required by the pressure vessel code. As a minimum, at least the following information shall be marked on the plate by stamping or by any other similar method:

(a) Owner information

(i) Owner's registration number;

(b) Manufacturing information

(i) Country of manufacture;

(ii) Year of manufacture;

(iii) Manufacturer's name or mark;

(iv) Manufacturer's serial number;

(c) Approval information

(i) The United Nations packaging symbol



This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant requirements in chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7;

(ii) Approval country;

(iii) Authorized body for the design approval;

(iv) Design approval number;

(v) Letters 'AA', if the design was approved under alternative arrangements (see 6.7.1.2);

(vi) Pressure vessel code to which the shell is designed;

(d) Pressures

(i) MAWP (in bar gauge or kPa gauge)<sup>2</sup>;

(ii) Test pressure (in bar gauge or kPa gauge)<sup>2</sup>;

(iii) Initial pressure test date (month and year);


(iv) Identification mark of the initial pressure test witness;

- (v) External design pressure<sup>5</sup> (in bar gauge or kPa gauge)<sup>2</sup>;
- (e) Temperatures
  - (i) Design temperature range (in °C)<sup>2</sup>;
  - (ii) Design reference temperature (in °C)<sup>2</sup>;
- (f) Materials
  - (i) Shell material(s) and material standard reference(s);
  - (ii) Equivalent thickness in reference steel (in mm)<sup>2</sup>;
- (g) Capacity
  - (i) Tank water capacity at 20°C (in litres)<sup>2</sup>;
- (h) Periodic inspections and tests
  - (i) Type of the most recent periodic test (2.5-year, 5-year or exceptional);
  - (ii) Date of the most recent periodic test (month and year);
  - (iii) Test pressure (in bar gauge or kPa gauge)<sup>2</sup> of the most recent periodic test (if applicable);
  - (iv) Identification mark of the authorized body who performed or witnessed the most recent test.

---

<sup>2</sup> The unit used shall be indicated.  
<sup>5</sup> See 6.7.3.2.8.

Figure 6.7.3.16.1: Example of identification plate marking

Owner's registration number			
<b>MANUFACTURING INFORMATION</b>			
Country of manufacture			
Year of manufacture			
Manufacturer			
Manufacturer's serial number			
<b>APPROVAL INFORMATION</b>			
	Approval country		
	Authorized body for design approval		
	Design approval number		'AA' (if applicable)
Shell design code (pressure vessel code)			
<b>PRESSURES</b>			
MAWP		bar or kPa	
Test pressure		bar or kPa	
Initial pressure test date:	(mm/yyyy)	Witness stamp:	
External design pressure		bar or kPa	
<b>TEMPERATURES</b>			
Design temperature range		°C to °C	
Design reference temperature		°C	
<b>MATERIALS</b>			
Shell material(s) and material standard reference(s)			
Equivalent thickness in reference steel		mm	
<b>CAPACITY</b>			
Tank water capacity at 20°C		litres	
<b>PERIODIC INSPECTIONS/TESTS</b>			
Test type	Test date	Witness stamp and test pressure <sup>a</sup>	Test type
	(mm/yyyy)	bar or kPa	(mm/yyyy)

<sup>a</sup> Test pressure if applicable."

6.7.3.16.2 Insert at the end of the list, "Portable tank instruction in accordance with 4.2.5.2.6".

#### 6.7.4 Provisions for the design, construction, inspection and testing of portable tanks intended for the transport of refrigerated liquefied gases of class 2

6.7.4.2.12 Replace four times "\*" with "1" and amend the footnote accordingly.

6.7.4.7.4 Replace "\*" with "6" and amend the footnote accordingly.

#### **6.7.4.14 Inspection and testing**

6.7.4.14.4 In the first sentence the words "inspection and test" are replaced with "inspections and tests". And the second sentence is replaced with the following:

"In the case of non-vacuum insulated tanks, the jacket and insulation shall be removed during the 2.5-year and the 5-year periodic inspections and tests, but only to the extent necessary for a reliable appraisal."

#### **6.7.4.15 Marking**

6.7.4.15.1 Replace existing paragraph with the following:

"6.7.4.15.1 Every portable tank shall be fitted with a corrosion-resistant metal plate permanently attached to the portable tank in a conspicuous place readily accessible for inspection. When for reasons of portable tank arrangements the plate cannot be permanently attached to the shell, the shell shall be marked with at least the information required by the pressure vessel code. As a minimum, at least the following information shall be marked on the plate by stamping or by any other similar method:

(a) Owner information

(i) Owner's registration number;

(b) Manufacturing information

(i) Country of manufacture;

(ii) Year of manufacture;

(iii) Manufacturer's name or mark;

(iv) Manufacturer's serial number;

(c) Approval information

(i) The United Nations packaging symbol



;

This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant requirements in chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7;

(ii) Approval country;

(iii) Authorized body for the design approval;

(iv) Design approval number;

(v) Letters 'AA', if the design was approved under alternative arrangements (see 6.7.1.2);


(vi) Pressure vessel code to which the shell is designed;

- (d) Pressures
  - (i) MAWP (in bar gauge or kPa gauge)<sup>2</sup>;
  - (ii) Test pressure (in bar gauge or kPa gauge)<sup>2</sup>;
  - (iii) Initial pressure test date (month and year);
  - (iv) Identification mark of the initial pressure test witness;
- (e) Temperatures
  - (i) Minimum design temperature (in °C)<sup>2</sup>;
- (f) Materials
  - (i) Shell material(s) and material standard reference(s);
  - (ii) Equivalent thickness in reference steel (in mm)<sup>2</sup>;
- (g) Capacity
  - (i) Tank water capacity at 20°C (in litres)<sup>2</sup>;
- (h) Insulation
  - (i) Either "Thermally insulated" or "Vacuum insulated" (as applicable);
  - (ii) Effectiveness of the insulation system (heat influx) (in Watts)<sup>2</sup>;
- (i) Holding times – For each refrigerated liquefied gas permitted to be transported in the portable tank:
  - (i) Name, in full, of the refrigerated liquefied gas;
  - (ii) Reference holding time (in days or hours)<sup>2</sup>;
  - (iii) Initial pressure (in bar gauge or kPa gauge)<sup>2</sup>;
  - (iv) Degree of filling (in kg)<sup>2</sup>;
- (j) Periodic inspections and tests
  - (i) Type of the most recent periodic test (2.5-year, 5-year or exceptional);
  - (ii) Date of the most recent periodic test (month and year);
  - (iii) Identification mark of the authorized body who performed or witnessed the most recent test.

---

<sup>2</sup> The unit used shall be indicated.

Figure 6.7.4.15.1: Example of identification plate marking

Owner's registration number			
<b>MANUFACTURING INFORMATION</b>			
Country of manufacture			
Year of manufacture			
Manufacturer			
Manufacturer's serial number			
<b>APPROVAL INFORMATION</b>			
	Approval country		
	Authorized body for design approval		
	Design approval number		'AA' (if applicable)
Shell design code (pressure vessel code)			
<b>PRESSURES</b>			
MAWP		bar or kPa	
Test pressure		bar or kPa	
Initial pressure test date:	(mm/yyyy)	Witness stamp:	
<b>TEMPERATURES</b>			
Minimum design temperature		°C	
<b>MATERIALS</b>			
Shell material(s) and material standard reference(s)			
Equivalent thickness in reference steel		mm	
<b>CAPACITY</b>			
Tank water capacity at 20°C		litres	
<b>INSULATION</b>			
'Thermally insulated' or 'Vacuum insulated' (as applicable)			
Heat influx		Watts	
<b>HOLDING TIMES</b>			
Refrigerated gas(es) permitted	liquefied	Reference holding time	Initial pressure
		days or hours	bar or kPa
			Degree of filling
			kg
<b>PERIODIC INSPECTIONS / TESTS</b>			
Test type	Test date	Witness stamp	Test type
	(mm/yyyy)		

".

6.7.4.15.2 Insert "Portable tank instruction in accordance with 4.2.5.2.6" at the end of the list.

## **6.7.5 Provisions for the design, construction, inspection and testing of multiple-element gas containers (MEGCs) intended for the transport of non-refrigerated gases**

### **6.7.5.2 General design and construction provisions**

6.7.5.2.1 In the last sentence the words "cargo transport unit" are replaced by the word "vehicle".

6.7.5.2.8 Replace four times "\*" with "1" and amend the footnote accordingly.

### **6.7.5.4 Pressure relief devices**

6.7.5.4.1 Replace the third sentence with the following:

"If so required by the competent authority of the country of use, MEGCs for other gases shall be fitted with pressure relief devices as specified by that competent authority."

### **6.7.5.13 Marking**

6.7.5.13.1 Replace the existing paragraph with the following:

"6.7.5.13.1 Every MEGC shall be fitted with a corrosion-resistant metal plate permanently attached to the MEGC in a conspicuous place readily accessible for inspection. The metal plate shall not be affixed to the elements. The elements shall be marked in accordance with chapter 6.2. As a minimum, at least the following information shall be marked on the plate by stamping or by any other similar method:

(a) Owner information

(i) Owner's registration number;

(b) Manufacturing information

(i) Country of manufacture;

(ii) Year of manufacture;

(iii) Manufacturer's name or mark;

(iv) Manufacturer's serial number;

(c) Approval information

(i) The United Nations packaging symbol



This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant requirements in chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7;


- (ii) Approval country;
  - (iii) Authorized body for the design approval;
  - (iv) Design approval number;
  - (v) Letters 'AA', if the design was approved under alternative arrangements (see 6.7.1.2);
- (d) Pressures
  - (i) Test pressure (in bar gauge)<sup>2</sup>;
  - (ii) Initial pressure test date (month and year);
  - (iii) Identification mark of the initial pressure test witness;
- (e) Temperatures
  - (i) Design temperature range (in °C)<sup>2</sup>;
- (f) Elements/Capacity
  - (i) Number of elements;
  - (ii) Total water capacity (in litres)<sup>2</sup>;
- (h) Periodic inspections and tests
  - (i) Type of the most recent periodic test (5-year or exceptional);
  - (ii) Date of the most recent periodic test (month and year);
  - (iv) Identification mark of the authorized body who performed or witnessed the most recent test.

---

<sup>2</sup> The unit used shall be indicated.



Figure 6.7.5.13.1: Example of identification plate marking

Owner's registration number			
<b>MANUFACTURING INFORMATION</b>			
Country of manufacture			
Year of manufacture			
Manufacturer			
Manufacturer's serial number			
<b>APPROVAL INFORMATION</b>			
	Approval country		
	Authorized body for design approval		
	Design approval number		'AA' (if applicable)
<b>PRESSURES</b>			
Test pressure		bar	
Initial pressure test date:	(mm/yyyy)	Witness stamp:	
<b>TEMPERATURES</b>			
Design temperature range		°C to °C	
<b>ELEMENTS/CAPACITY</b>			
Number of elements			
Total water capacity		litres	
<b>PERIODIC INSPECTIONS/TESTS</b>			
Test type	Test date	Witness stamp	Test type
	(mm/yyyy)		(mm/yyyy)

## PART 7 – PROVISIONS CONCERNING TRANSPORT OPERATIONS

### Chapter 7.1 – Stowage

7.1.1.5 Replace "6.5.4.6.4" with "6.5.6.6.4".

7.1.7.1.1 Add "with complete and rigid surfaces" after permanent structures.

7.1.12.5 Add the following words at the end of the sentence:

"or flooding of the container with water".

### 7.1.14 Stowage of goods of class 7

7.1.14.2 Replace "inland water craft" with "inland waterway craft". And in the heading of the third column, replace "inland water craft" with "inland waterway craft".

## **Chapter 7.2 – Segregation**

### **7.2.7 Segregation of goods of class 1**

#### **7.2.7.1 Segregation from dangerous goods of other classes**

7.2.7.1.1 At the end, add the following new note:

**"NOTE:** Alkali metal nitrates include caesium nitrate (UN 1451), lithium nitrate (UN 2722), potassium nitrate (UN 1486), rubidium nitrate (UN 1477) and sodium nitrate (UN 1498). Alkaline earth metal nitrates include barium nitrate (UN 1446), beryllium nitrate (UN 2464), calcium nitrate (UN 1454), magnesium nitrate (UN 1474) and strontium nitrate (UN 1507).".

#### **Consequential amendment:**

*In the alphabetical index, add the following new entry:*

"Rubidium nitrate, see 5.1 1477".

#### **7.2.7.1.3 Dangerous goods of extreme flammability**

7.2.7.1.3 Delete all the section.

### **7.2.8 Segregation provisions for goods of class 4.1 and class 5.2**

7.2.8 Delete all the section including the title and insert "(Reserved)".

## **Chapter 7.4 – Transport of cargo transport units on board ships**

### **7.4.3 Fumigated units**

7.4.3 Delete the title "Fumigated units" and the all section and insert "(Reserved)".

## **Chapter 7.5 – Packing of cargo transport units**

7.5.4 Insert a new section "7.5.4 – Tracking and monitoring equipment" as follows:

### **"7.5.4 – Tracking and monitoring equipment**

7.5.4.1.1 When security devices, beacons or other tracking or monitoring equipment are used, they shall be securely installed to the cargo transport unit and shall be of a certified safe type\* for the dangerous goods that will be carried within the cargo transport unit"

and add to the footnote the following:

\* Refer to the Recommendations published by the International Electrotechnical Commission, in particular, to publication IEC 60079."

## **Chapter 7.6 – Transport of dangerous goods in shipborne barges on barges-carrying ships**

### **7.6.6 Ventilation and condensation**

7.6.6.3 Replace in the footnote "the Code of Safe practice for Solid Bulk Cargoes, 2004" with "the International Maritime Solid Bulk Cargo Code".

### **Appendix A – Class 4.1**

For UN 3344 In column "Proper Shipping Name", add "(PENTAERYTHRITOL TETRANITRATE; PETN) before "MIXTURE".

### **Appendix B**

#### **Glossary**

Insert the following:

"POWDER, SMOKELESS

Substances bases on nitrocellulose use as propellant. The term includes propellants with a single base (nitrocellulose (NC) alone), those with a double base (such as NC and nitroglycerin (NC)) and those with a triple base (such as NC/NG/ nitroguanidine). Cast, pressed or bag-charges of smokeless powder are listed under "CHARGES, PROPELLING" or "CHARGES, PROPELLING FOR CANNON".

#### **Alphabetical index**

In the entry for "Fuze combination, percussion or time", insert "or FUZES, IGNITING" after "DETONATING".

For SODIUM HYDROSULPHIDE HYDRATED (UN 2949) in the column "Substance, material article" insert ", " after "HYDROSULPHIDE".

\*\*\*

**ANNEX 4**

**RESOLUTION MSC.310(88)  
(adopted on 3 December 2010)**

**ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CONVENTION  
FOR SAFE CONTAINERS (CSC), 1972**

THE MARITIME SAFETY COMMITTEE,

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

NOTING article X of the International Convention for Safe Containers, 1972 (hereinafter referred to as "the Convention"), concerning the special procedure for amending the Annexes to the Convention,

HAVING CONSIDERED, at its eighty-eighth session, proposed amendments to the Convention in accordance with the procedure set forth in paragraphs 1 and 2 of article X of the Convention,

1. ADOPTS the amendments to the Annexes of the Convention, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with paragraph 3 of article X of the Convention, that the said amendments shall enter into force on 1 January 2012 unless, prior to 1 July 2011, five or more of the Contracting Parties notify the Secretary-General of their objection to the amendments;
3. REQUESTS the Secretary-General, in conformity with paragraph 2 of article X of the Convention, to communicate the certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Parties for their acceptance;
4. FURTHER REQUESTS the Secretary-General to inform all Contracting Parties and Members of the Organization of any request and communication under article X of the Convention and of the date on which the amendments enter into force.

ANNEX

**AMENDMENTS TO  
THE INTERNATIONAL CONVENTION FOR SAFE CONTAINERS, 1972, AS AMENDED**

**ANNEX I  
REGULATIONS FOR THE TESTING, INSPECTION, APPROVAL  
AND MAINTENANCE OF CONTAINERS**

**Chapter I  
Regulations common to all systems of approval**

**Regulation 1 – Safety Approval Plate**

- 1 A new sentence is added at the end of paragraph 3 as follows:

"Where the stacking or racking values are less than 192,000 kg or 150 kN, respectively, the container shall be considered as having limited stacking or racking capacity and shall be conspicuously marked, as required under the relevant standards\*.

---

\* Refer to standard ISO 6346, Freight containers – Coding, identification and marking."

**Regulation 2 – Maintenance and examination**

- 2 After the existing paragraph 3, new paragraphs 4 and 5 are added as follows and the existing paragraph 4 is renumbered as paragraph 6:

"4 As a minimum, approved programmes should be reviewed once every 10 years to ensure their continued viability. In order to ensure uniformity by all involved in the inspection of containers and their ongoing operational safety, the Contracting Party concerned shall ensure the following elements are covered in each prescribed periodic or approved continuous examination programme:

- .1 methods, scope and criteria to be used during examinations;
- .2 frequency of examinations;
- .3 qualifications of personnel to carry out examinations;
- .4 system of keeping records and documents that will capture:
  - .1 the owner's unique serial number of the container;
  - .2 the date on which the examination was carried out;
  - .3 identification of the competent person who carried out the examination;
  - .4 the name and location of the organization where the examination was carried out;

- .5 the results of the examination; and
  - .6 in the case of a Periodic Examination Scheme (PES), the Next Examination Date (NED);
  - .5 a system for recording and updating the identification numbers of all containers covered by the appropriate examination scheme;
  - .6 methods and systems for maintenance criteria that addresses the design characteristics of the specific containers;
  - .7 provisions for maintaining leased containers if different than those used for owned containers; and
  - .8 conditions and procedures for adding containers into an already approved programme.
- 5 The Contracting Party shall carry out periodic audits of approved programmes to ensure compliance with the provisions approved by the Contracting Party. The Contracting Party shall withdraw any approval when the conditions of approval are no longer complied with."
- 3 After the renumbered paragraph 6, a new paragraph 7 is added as follows:
- "7 Administrations shall make information on approved Continuous Examination Programmes publicly available."

## **APPENDIX**

- 4 After the existing paragraph 9, new paragraphs 10 and 11 are added as follows:
- "10 One door off stacking strength to be indicated on plate only if the container is approved for one door off operation. The marking shall show: ALLOWABLE STACKING MASS ONE DOOR OFF FOR 1.8 g (... kg ... lbs). This marking shall be displayed immediately near the racking test value (see line 5).
- 11 One door off racking strength to be indicated on plate only if the container is approved for one door off operation. The marking shall show: RACKING TEST LOAD VALUE ONE DOOR OFF (... kg ... lbs). This marking shall be displayed immediately near the stacking test value (see line 6)."

## ANNEX II

### STRUCTURAL SAFETY REQUIREMENTS AND TESTS

#### Test loads and test procedures

5 After the existing section 7, a new section 8 is added as follows:

#### "8 ONE DOOR OFF OPERATION

1 Containers with one door removed have a significant reduction in their ability to withstand racking loads and, potentially, a reduction in stacking strength. The removal of a door on a container in operation is considered a modification of the container. Containers must be approved for one door off operation. Such approval should be based on test results as set forth below.

2 On successful completion of the stacking test the container may be rated for the allowable superimposed stacking mass, which should be indicated on the Safety Approval Plate immediately below line 5: ALLOWABLE STACKING MASS FOR 1.8 g (kg and lbs) ONE DOOR OFF.

3 On successful completion of the racking test the racking test load should be indicated on the Safety Approval Plate immediately below line 6: RACKING TEST LOAD VALUE (kg and lbs) ONE DOOR OFF.

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#### TEST LOADINGS AND APPLIED FORCES

#### TEST PROCEDURES

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##### Stacking

##### **Internal loading:**

A uniformly distributed load such that the combined mass of the container and test load is equal to 1.8R.

The test procedures should be as set forth under **2 STACKING**

##### **Externally applied forces:**

Such as to subject each of the four corner fittings to a vertical downward force equal to 0.25 x 1.8 x the allowable superimposed static stacking mass.

##### Transverse racking

##### **Internal loading:**

None.

The test procedures should be as set forth under **4 TRANSVERSE RACKING**

##### **Externally applied forces:**

Such as to rack the end structures of the container sideways. The forces shall be equal to those for which the container was designed."

6 After the existing annex II, new annex III is added as follows:

### **"ANNEX III**

#### **CONTROL AND VERIFICATION**

##### **1 Introduction**

Article VI of the Convention refers to the control measures that may be taken by Contracting Parties. Such control should be limited to verifying that the container carries a valid Safety Approval Plate, and an approved continuous examination programme (ACEP) or a valid Next Examination Date (NED) marking, unless there is significant evidence for believing that the condition of the container is such as to create an obvious risk to safety. This Annex provides specifics to enable authorized officers to assess the integrity of structurally sensitive components of containers and to help them decide whether a container is safe to continue in transportation or whether it should be stopped until remedial action has been taken. The criteria given are to be used to make immediate out of service determinations, and should not be used as repair or in-service criteria under a CSC ACEP or a periodic examination scheme.

##### **2 Control measures**

Authorized officers should consider the following:

- .1 control should be exercised on those containers that create an obvious risk to safety;
- .2 loaded containers with damages equal to, or in excess of, the criteria set forth below are deemed to place a person in danger. The authorized officer should stop those containers. However, the authorized officer may permit the onward movement of the container, if it is to be moved to its ultimate destination without lifting from its current means of transport;
- .3 empty containers with damages equal to, or in excess of, the criteria set forth below are also deemed to place a person in danger. Empty containers are typically repositioned for repair at an owner-selected depot provided they can be safely moved; this can involve either a domestic or an international move. Any damaged container being repositioned should be handled and transported with due regard to its structural deficiency;
- .4 authorized officers should notify the container owner, lessee or bailee, as appropriate, whenever a container is placed under control;
- .5 the provisions set forth in this Annex are not exhaustive for all types of containers or all possible deficiencies or combination of deficiencies;
- .6 damage to a container may appear serious without creating an obvious risk to safety. Some damage such as holes may infringe customs requirements but may not be structurally significant; and



- .7 major damage may be the result of significant impact which could be caused by improper handling of the container or other containers, or significant movement of the cargo within the container. Therefore, special attention should be given to signs of recent impact damage.

### 3 Training of authorized officers

The Contracting Party exercising control should ensure that authorized officers tasked to carry out these assessments and control measures receive the necessary training. This training should involve both theoretical and practical instruction.

### 4 Structurally sensitive components and definition of serious structural deficiencies in each

4.1 The following components are structurally sensitive and should be examined for serious deficiencies:

Structurally sensitive component	Serious structural deficiency
Top rail	Local deformation to the rail in excess of 60 mm or separation or cracks or tears in the rail material in excess of 45 mm in length. Note: On some designs of tank containers the top rail is not a structurally significant component.
Bottom rail	Local deformation perpendicular to the rail in excess of 100 mm or separation or cracks or tears in the rail's material in excess of 75 mm in length.
Header	Local deformation to the header in excess of 80 mm or cracks or tears in excess of 80 mm in length.
Sill	Local deformation to the sill in excess of 100 mm or cracks or tears in excess of 100 mm in length.
Corner posts	Local deformation to the post exceeding 50 mm or tears or cracks in excess of 50 mm in length.
Corner and intermediate fittings (Castings)	Missing corner fittings, any through cracks or tears in the fitting, any deformation of the fitting that precludes full engagement of securing or lifting fittings, any deformation of the fitting beyond 5 mm from its original plane, any aperture width greater than 66 mm, any aperture length greater than 127 mm, any reduction in thickness of the plate containing the top aperture that makes it less than 23 mm thick or any weld separation of adjoining components in excess of 50 mm in length.
Under structure	Two or more adjacent cross members missing or detached from the bottom rails. Twenty per cent (20%) or more of the total number of cross members are missing or detached. Note: If onward transportation is permitted, it is essential that detached cross members are precluded from falling free.
Locking rods	One or more inner locking rod is non-functional. Note: Some containers are designed and approved (and so recorded on the CSC Plate) to operate with one door open or removed.

4.2 The effect of two or more incidents of damage in the same structurally sensitive component, even though each is less than in the above table, could be equal to, or greater than, the effect of the single damage noted in the table. In such circumstances, the authorized officer may stop the container and seek further guidance from the Contracting Party.

4.3 For tank containers, the attachment of the shell to the container frame should also be examined for any readily visible serious structural deficiency comparable to that specified in the table. If any such serious structural deficiency is found in any of these attachments, the control officer should stop the container.

4.4 For platform containers with folding end frames, the end frame locking mechanism and the hinge pins about which the end frame rotates are structurally sensitive and should also be inspected for damage."

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**ANNEX 10**

**RESOLUTION MEPC.194(61)**

**Adopted on 1 October 2010**

**AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1997 TO AMEND THE  
INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM  
SHIPS, 1973, AS MODIFIED BY THE PROTOCOL OF 1978 RELATING THERETO**

**(Revised form of Supplement to the IAPP Certificate)**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention"), article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") and article 4 of the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (herein after referred to as the "1997 Protocol"), which together specify the amendment procedure of the 1997 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 and 1997 Protocols,

NOTING ALSO that, by the 1997 Protocol, Annex VI entitled Regulations for the Prevention of Air Pollution from Ships was added to the 1973 Convention (hereinafter referred to as "Annex VI"),

NOTING FURTHER that the revised Annex VI was adopted by resolution MEPC.176(58) and entered into force on 1 July 2010,

HAVING CONSIDERED draft amendments to the revised Annex VI,

1. ADOPTS, in accordance with article 16(2)(d) of the 1973 Convention, the amendments to Annex VI, the text of which is set out at annex to the present resolution;
2. DETERMINES, in accordance with article 16(2)(f)(iii) of the 1973 Convention, that the amendments shall be deemed to have been accepted on 1 August 2011, unless prior to that date, not less than one third of the Parties or Parties the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;
3. INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of the 1973 Convention, the said amendments shall enter into force on 1 February 2012 upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with article 16(2)(e) of the 1973 Convention, to transmit to all Parties to the 1973 Convention, as modified by the 1978 and 1997 Protocols, certified copies of the present resolution and the text of the amendments contained in the Annex;

5. REQUESTS FURTHER the Secretary-General to transmit to the Members of the Organization which are not Parties to the 1973 Convention, as modified by the 1978 and 1997 Protocols, copies of the present resolution and its Annex.

ANNEX

**AMENDMENTS TO APPENDIX I OF THE REVISED MARPOL ANNEX VI**  
**(REVISED FORM OF SUPPLEMENT TO THE INTERNATIONAL AIR POLLUTION**  
**PREVENTION CERTIFICATE)**

Paragraph 2.3 of the form of Supplement to the International Air Pollution Prevention Certificate is amended as follows:

"2.3 Sulphur oxides (SO<sub>x</sub>) and particulate matter (regulation 14)

2.3.1 When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:

- .1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
  - 4.50% m/m (not applicable on or after 1 January 2012); or .. ☐
  - 3.50% m/m (not applicable on or after 1 January 2020); or .. ☐
  - 0.50% m/m, and/or ..... ☐
- .2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SO<sub>x</sub> emission reductions as compared to using a fuel oil with a sulphur content limit value of:
  - 4.50% m/m (not applicable on or after 1 January 2012); or .. ☐
  - 3.50% m/m (not applicable on or after 1 January 2020); or .. ☐
  - 0.50% m/m ..... ☐

2.3.2 When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:

- .1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
  - 1.00% m/m (not applicable on or after 1 January 2015); or .. ☐
  - 0.10% m/m, and/or ..... ☐
- .2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SO<sub>x</sub> emission reductions as compared to using a fuel oil with a sulphur content limit value of:
  - 1.00% m/m (not applicable on or after 1 January 2015); or .. ☐
  - 0.10% m/m ..... ☐

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