

**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals**

**19 June 2015**

**Sub-Committee of Experts on the Transport of Dangerous Goods**

**Forty-seventh session**

Geneva, 22 – 26 June 2015

Item 7 of the provisional agenda

**Global harmonization of transport of dangerous goods  
regulations with the Model Regulations**

**Amendments to the IMDG Code and Supplements**

**Report of the twenty-third session of the Editorial and  
Technical Group**

**Transmitted by the International Maritime Organization**

Attached is the report of the IMO Editorial and Technical Group on its 23<sup>rd</sup> session

Some of the paragraphs deserve attention from the Sub-Committee: 2.3, 2.7, 2.8, 3.7, 3.8,  
3.11, 3.13, 3.21.

SUB-COMMITTEE ON CARRIAGE OF  
CARGOES AND CONTAINERS  
2nd session  
Agenda item 6

CCC 2.....  
19 June 2015  
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## **AMENDMENTS TO THE IMDG CODE AND SUPPLEMENTS**

### **Report of the twenty-third session of the Editorial and Technical Group**

#### **Note by the Secretariat**

#### **SUMMARY**

*Executive summary:* This document contains the discussions and decisions taken by E&T 23 in the context of amendments to the International Maritime Dangerous Goods (IMDG) Code

*Strategic direction:* 5.2

*High-level action:* 5.2.3

*Planned output:* 5.2.3.4

*Action to be taken:* Paragraph 6.1

*Related documents:* CCC 1/13

## **1 GENERAL**

### **Introduction**

1.1 The twenty-third session of the Editorial and Technical Group of the Sub-Committee on Carriage of Cargoes and Containers met from 18 to 22 May 2015 under the chairmanship of Mrs. Gudula Schwan (Germany).

1.2 The group was attended by delegations from the following Member Governments:

BELGIUM  
CANADA  
CHINA  
DENMARK  
FINLAND  
FRANCE

NIGERIA  
NORWAY  
PHILIPPINES  
REPUBLIC OF KOREA  
SPAIN  
SWITZERLAND

GERMANY  
JAPAN  
MARSHALL ISLANDS  
NETHERLANDS

TURKEY  
UNITED KINGDOM  
UNITED STATES

1.3 The meeting was also attended by observers from the following non-governmental organizations in consultative status:

INTERNATIONAL CHAMBER OF SHIPPING (ICS)  
ICHCA INTERNATIONAL LTD.  
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)  
DANGEROUS GOODS ADVISORY COUNCIL (DGAC)  
INTERNATIONAL VESSEL OPERATORS DANGEROUS GOODS ASSOCIATION,  
INC. (IVODGA)  
INTERNATIONAL PAINT AND PRINTING INK COUNCIL (IPPIC)

### **Instructions to the E&T Group**

1.4 The Sub-Committee (CCC 1) authorized E&T 23 to prepare the next set of draft amendments (38-16) to the IMDG Code, based on documents submitted to CCC 1 and taking into account comments made and decisions taken by the Sub-Committee at that session. E&T 23 should also take into consideration the outcome of the UN TDG Sub-Committee with regard to the nineteenth revised edition of the UN Recommendations on the Transport of Dangerous Goods, Model Regulations. The group was also instructed to identify and correct any editorial mistakes concerning the amendment 37-14, adopted by resolution MSC.372(93), and submit a written report to CCC 2.

### **Adoption of the agenda**

1.5 Noting that the provisional agenda contained in document E&T 23/1 was based on the instructions of CCC 1, the group adopted the agenda.

1.6 The list of participants is contained in document E&T 23/INF.1.

## **2 PREPARATION OF DRAFT EDITORIAL CORRECTIONS TO THE AMENDMENTS TO THE IMDG CODE (AMENDMENT 37-14)**

### **Editorial corrections**

2.1 On the basis of documents E&T 23/INF.2 (Germany and United Kingdom) and E&T 23/INF.4 (Republic of Korea), the group prepared draft editorial corrections to the IMDG Code (amendment 37-14), as set out in annex 1, and requested the Secretariat to refer these to the Sub-Committee for consideration.

### **Special Provision 326**

2.2 The group noted that, in amendment 37-14 of the IMDG Code for UN 3332, the Special Provision (SP) 326 is assigned with reference to fissile uranium hexafluoride, while SP 325 references non-fissile or fissile excepted uranium hexafluoride. Considering that UN 3332 is a non-fissile or excepted entry, the group expressed concerns that SP 325 may be more appropriate for this entry.

2.3 The group further noted that, in the UN Model Regulations, neither SP 325 nor 326 are assigned to this entry. Therefore, the group agreed to invite the TDG Sub-Committee to consider which SP, if either, should be assigned to the UN 3332.

### **Packing instructions concerning IBC100**

2.4 The group noted that the wording of the new special packing provision B2 in IBC 100 as included in amendment 37-14 of the Code does not correspond to the wording of B2 as used in other IBC instructions in the IMDG Code.

2.5 In this context, the group was of the view that B2 as shown in IBC100 should not be amended according to the wording of the B2 as used in other IBC instructions. Then the existing B2, as used in other IBC instructions with the text deviating from the UN Model Regulations, could be adapted in a new special packing provision specific for sea transport.

2.6 Due to time constraints the group was not able to draft an appropriate text at this session.

### **Steel drums**

2.7 The group concurred that TDG Sub-Committee should be informed in regard to the note in provision 6.1.4.1.1, in particular, the title of the reference for ISO 11951:1995, "*electrolytic chromium/chromium-oxide coated steel*", which apparently should be corrected as "*electrolytic chromium/chromium oxide-coated steel*". Finally, the group agreed to include the above modification in the draft editorial corrections for amendment 37-14, as set out in annex 1.

### **Provisions for the construction and testing of large packagings**

2.8 The group agreed that the TDG the Sub-Committee be informed regarding the note in provision 6.6.3.3, specifically on the term "all IBC's manufactured", which is to be replaced by "all large packagings manufactured".

## **3 PREPARATION OF DRAFT AMENDMENT 38-16 TO THE IMDG CODE**

### **Harmonization with the amendments to the UN Recommendations on the transport of dangerous goods, eighteenth revised edition**

3.1 The group considered document E&T 23/3/1 (Secretariat), containing the amendments related to the IMDG Code, based on the outcome of the seventh session of the UN Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals, which was held in Geneva on 12 December 2014.

3.2 For this purpose, the Report of the UN Committee of Experts (ST/SG/AC.10/42/Add.1 and ST/SG/AC.10/42/Add.1/Corr.1) containing the amendments to the eighteenth revised edition to the UN Recommendations on the Transport of Dangerous Goods (Model Regulations and the Manual of Tests and Criteria) was also used. The outcome of main issues and actions taken thereon by the group are contained in paragraphs hereunder.

## **Viscous Liquids**

3.3 In discussing the matter of viscous liquids, the group noted that the provisions in 2.3.2.5 of the IMDG Code are not fully harmonized with the UN Model Regulations, which contain an exemption from all provisions for the viscous liquids.

3.4 Following the discussion, the group agreed that, for the time being, this harmonization issue could not be solved without a formal proposal to CCC 2.

## **Packing Instructions for UN 2983**

3.5 The group discussed the decision of the UN TDG Committee to replace in the dangerous goods list the packing provision P200 by P001 for UN 2983. In this context, the group noted that the boiling point for this substance (ETHYLENE OXIDE AND PROPYLENE OXIDE MIXTURE with not more than 30% ethylene oxidenoted) is between 23°C and 28°C. Thus, the group agreed that the stowage code SW1 (protected from sources of heat) had to be assigned in the draft amendment 38-16.

## **UN 2815, 2977, 2978**

3.6 The group agreed to amend the stowage requirements and the text in column 17 of the dangerous goods list for UN 2815 and to amend the stowage category for UN 2977 and UN 2978 in order to adjust for the new subsidiary hazard.

## **New entries for Engines**

3.7 In considering the new entries for engines (UN Nos. 3528, 3529 and 3530) contained in the UN TDG Committee's report (ST/SG/AC.10/42/Add.1), the group found that the word "or" after UN No. 3530 (ENGINE, INTERNAL COMBUSTION or MACHINERY, INTERNAL COMBUSTION) should not be incorporated in 2.9.2.2 of the IMDG Code. Therefore, the group agreed to inform the TDG Sub-Committee to proceed accordingly.

## **Polymerizing substances**

3.8 In discussing the matter of polymerizing substances, some views were expressed in regard to the title "Gases not accepted for transport" in for provision 2.2.4 and the title "Substances not accepted for transport" in provisions 2.3.5, 2.6.2.5 and 2.8.3, which do not reflect the description contained in the corresponding paragraph. The group agreed to invite the TDG Sub-Committee to consider this matter.

3.9 In addition, having considered the new entries (ST/SG/AC.10/42/Add.1) for polymerizing substances to be input within the IMDG Code, the group noted that, in the case of UN Nos. 3533 and 3534, the tank instruction T23 (temperature controlled substances) is not being assigned in column 13 of the DGL.

3.10 In this context, the group concurred that T23 provides the control temperatures which shall be maintained by the refrigerating system of the tank. The group also noted that for existing polymerizing substances in the DGL, tank instruction T7 is assigned, without any indication on temperature settings.

3.11 Therefore, the group proposed to amend provision 5.4.1.5.5, which requires to state the emergency and control temperature in the transport document, in order to also apply this provision to polymerizing substances under temperature control and to inform the TDG Sub-Committee to proceed accordingly.

## **Transport of vehicles, battery powered equipment, engines and machinery**

3.12 In considering amendments (ST/SG/AC.10/42/Add.1) to the existing SP 240, 312 and 363 and the new special provision 385, the group agreed that the requirements for lithium batteries as specified in those SPs need further clarification with regard to the transport of prototypes and damaged batteries. It was noted that the referenced special provisions 310 and 376 are not assigned to the entries for vehicles and engines and machinery, and that, furthermore, the exemption from 2.9.4 of the Code, according to SP 310 and 376, presupposes the compliance with further conditions, i.e. packaging requirements which seem to be not suitable for the relevant transports.

3.13 In this context, the group agreed to invite the TDG Sub-Committee to further consider the issue of lithium batteries and agreed to invited interested delegations to submit further proposals on this matter.

3.14 The group having drafted amendments to special provisions 961 and 962 to adapt them specifically for the transport of vehicles, agreed to delete SP 970 and developed a new special provision 971 for the transport of battery powered equipment and assigned it to UN No. 3171.

### **SP 363**

3.15 The group considered amendments (ST/SG/AC.10/42/Add.1) to SP 363 in the context of engines or machinery powered by fuels classified as dangerous goods.

3.16 As a result, the group agreed that Part 7 and stowage and segregation requirements should be applicable to the new entries for engines and machinery. Accordingly, the group considered it necessary to develop and insert a new stowage code (SW29 - For engines or machinery containing fuels with flash point equal or greater than 23 °C, stowage Category A) in the general provisions for Part 7. Additionally, the group agreed that UN 3530 should be marked with a Marine Pollutant mark according to 5.2.1.6 of the IMDG Code.

3.17 The group noted that SP 363 refers to the marking/placarding of engine or machinery it selves, but does not make reference to placarding requirements for CTU's containing engines or machinery.

3.18 The group further noted that, regardless of the deviation from the UN Model Regulations, a transport document for those engines or machinery is necessary in order to ensure compliance with the SOLAS Convention.

3.19 The wording of SP 363 was adjusted and amended accordingly; and included in the draft amendment 38-16 as set out in annex 2.

### **Packing instruction P200**

3.20 The group considered amendments (ST/SG/AC.10/42/Add.1) to Packing instruction P200 (3) and noted that, by inserting the proposed paragraph (3), it could be assumed that paragraph (4) had to be deleted, considering that its contents are already being included in the new paragraph (3).

3.21 The group agreed to inform the TDG Sub-Committee in order to verify the correct instruction and to amend in future this inconvenience if applicable.

**Placarding for CTU (Lithium Batteries)**

3.22 The group agreed that the new label Model No. 9A should not be used for the purposes of placarding CTU and drafted appropriate text for inclusion in provision 5.3.1.1.2 of the Code, as set out in annex 2.

**Incorporation of proposals agreed in principle at CCC 1*****Packing provisions on water-reactive materials***

3.23 The group considered document CCC 1/6 (Secretariat), in particular annex 2, which contains draft amendments to packing provisions on water-reactive materials, prepared by E&T 20, for incorporation in draft amendment 37-14 of the Code.

3.24 Recalling that DSC 18 had agreed to defer the amendments to packing provisions on water-reactive materials to the draft amendment 38-16 of the IMDG Code, the group agreed to include those draft amendments in annex 2.

**Consideration of proposals referred to E&T 23 by CCC 1*****Definition of closed cargo transport unit for class 1***

3.25 The group considered the following documents:

- .1 CCC 1/6/8 (Canada), proposing to amend the definition for "closed cargo transport unit for class 1", which is based on the amendments (36-12) to part 7 of the Code, in particular, to the deletion of the term for "magazines" and the new "note" for magazine requirements (provision 7.1.2 of the Code), in relation to the definition for "closed cargo transport unit for class 1"; and
- .2 E&T 23/3 (United States), proposing to modify the existing stowage provisions (Chapters 7.1 and 7.6) for transport of goods of Class 1, as an alternative solution.

3.26 The group noted that the insertion of the revised stowage categories for Class 1 led to stricter stowage requirements for some substances, which previously did not require stowage in CTUs for Class 1. The revised stowage categories were assigned using a rationalized approach based on divisions and compatibility groups.

3.27 The group further noted that the examples of magazines currently in use may comply with the description of a closed cargo transport unit for Class 1. In this context, different opinions were expressed within the group regarding the question if the current stricter provisions for some explosives (introduced by amendment 36-12) could be justified from the safety point of view. Some delegations were supportive of the current provisions, as a need to ensure safe transport, but other delegations expressed their view that for some substances the requirements had become unnecessarily strict.

3.28 Based on the above, the group did not support the proposal (E&T 23/3) to modify the existing stowage provisions (Chapters 7.1 and 7.6) for transport of goods of Class 1. On the other hand, the group agreed that, if amendments to the provisions for the stowage of Class 1 are considered, then the stowage categories assigned to the concerned entries should be reviewed as well. Therefore, the group invited interested delegations to submit proposals to CCC 2 on the matter for further consideration.

3.29 The group, having concurred that “cargo holds” cannot be interpreted as “closed cargo transport units”, agreed to include the proposed text (CCC 1/6/8) as Note 2, and to locate it above the section 7.1.2 Definitions, as set out in annex 2.

#### ***Transport of flammable, toxic powdered metals***

3.30 The group considered document CCC 1/6/2 (France), informing about some of the regulatory and technical difficulties posed by the transport (maritime and intermodal) of cobalt powder. The group noted that, in order to solve such difficulties, France, based on provision 7.9.1.1 of the Code, has provisionally authorized the transport of cobalt powder through an exemption covering non-compliance with special provision 915.

3.31 In document E&T 23/INF.3, France proposed to create new entries for metal powders. France informed that an additional draft proposal in this regard will be submitted to the next session of the UN TDG Sub-Committee in a view to amending in future the IMDG Code and other modal dangerous goods regulations accordingly.

3.32 In this regard, the group noted that UN 3179 is the most appropriate entry for the shipment for cobalt powder until new entries are available and agreed to delete special provision 915.

#### ***Stowage of polymerizing substances***

3.33 The group considered documents CCC 1/6/3 and CCC 1/INF.2 (Germany), proposing some amendments concerning the stowage of polymerizing substances contained within the IMDG Code. The group noted that the proposed amendments were based on the casualty investigation report on the fire and explosion on board the **MSC Flaminia** (CCC 1/INF.2).

3.34 Having discussed the proposal (CCC 1/6/3), the group concurred with the corresponding amendments. Additionally, the group discussed if a new special stowage code should be drafted in order to allow polymerizing substances (in smaller commodities) to be shipped under less stringent stowage requirements. Different views were expressed on the need to develop such a new stowage code. Therefore, the group agreed to invite interested delegations to submit proposals to CCC 2 in this regard.

3.35 Furthermore, the group recalled that some issues concerning polymerizing substances had been resolved at United Nations level (ST/SG/AC.10/42/Add.1), which include various amendments in the context of polymerizing substances, i.e. Definitions in 1.2.1, Chapter 2.2 (new 2.2.4), Chapter 2.3 (2.3.5), Chapter 2.4; Chapter 2.6 (2.6.2.5), Chapter 2.8 (new 2.8.3), new UN Numbers 3531, 3532, 3533, 3534 and assignment of SP 386 to various entries.

3.36 As a result, the group agreed to incorporate the proposed amendments (CCC 1/6/3 annex 1), in the draft amendment 38-16, taking also into account the outcome of the UN Sub-Committee regarding polymerizing substances.

#### ***Special Provision for generic and "not otherwise specified" entries***

##### ***Technical name supplementing the proper shipping – MARPOL requirements***

3.37 The group considered document CCC 1/6/4 (Belgium), proposing to add a special provision (SP) to generic and “not otherwise specified” entries in order to indicate that the



proper shipping name for marine pollutants needs to be supplemented with the recognized chemical name of the marine pollutant.

3.38 In this context and based on the current provisions, the group noted that it might be a problem to indicate the marine pollutant constituent if the mixture itself has been tested and classified as marine pollutant. Moreover, the group noted that, for some UN numbers, it might be not useful to supplement the recognized technical name, as it will be the same as the proper shipping name of the entry.

3.39 Several delegates expressed their concern that the proposed new special provision could be misunderstood and may lead to further confusion. As a result, the group did not support the proposal.

3.40 The delegation of Belgium invited interested delegations to provide them with comments on the list contained in the annex of document CCC 1/6/4.

### ***Definition of IMO Type 5 Portable Tanks***

3.41 The group considered document CCC 1/6/6 (Belgium), proposing to correct an editorial omission in the definition of "IMO type 5 portable tank". The document explains that, in amendment 29-98 to the IMDG Code (and all earlier amendments), it was clearly stated that an IMO type 5 portable tank was intended for the transport of liquefied gases. During the reformatting of the Code, in the definition for IMO type 5 tank (Chapter 4.2), the qualifying word 'liquefied' before "gases" had been overseen.

3.42 The group supported the proposal and agreed to incorporate such a correction in the draft amendment 38-16, as set out in annex 2.

### ***Revision of DSC/Circ.12***

3.43 The group considered documents CCC 1/6/1 and CCC 1/INF.8 (United States) containing the report of the correspondence group on revision of DSC/Circ.12 on Guidance on the continued use of existing IMO type portable tanks and road tank vehicles for the transport of dangerous goods.

3.44 The group reviewed the text in CCC.1/INF. 8 and agreed to some amendments which were incorporated in the draft text as set out in annex 3. The group concurred, that the text should be further reviewed and could be finalized by a drafting group during CCC 2.

3.45 The group also considered document CCC 1/6/9 (United States), proposing additional amendments to paragraph 4.2.0.3 of the IMDG Code, concerning portable tanks and MEGCs manufactured before 1 January 2012. In this context the group recalled that, at CCC 1, the majority of the interventions supported option 1 as contained in the document (paragraph 4.1).

3.46 Hence, the group concurred with the proposed amendments to Chapter 4.2 (Use of portable tanks and multiple-element gas containers (MEGCs)) as contained in option 1. After adding some specification with regard to the date for the transitional period, the group agreed to incorporate them in the draft amendment 38-16, as set out in annex 2.

### ***Transport of substances of UN 2211 and UN 3314***

3.47 The group considered document CCC 1/6/10 (IVODGA), presenting some concerns regarding the transport of UN 2211 and UN 3314 substances in ventilated containers

(authorized within the IMDG Code), in relation to SP 932 and the newly designated "ventilated containers" within the recently adopted CTU Code.

3.48 The group considered IVODGA's proposal that, in addition to the conditions for transport allowed in SP 965, the assignment of special provision SP 932 could be an alternative for the transport of UN 2211 and UN 3314, when using the standard vented containers.

3.49 In this context, the group recalled that the UN TDG Sub-Committee had considered to introduce a test method that would enable to declassify products in question that not evolve sufficient gases to pose concern during transport. The group noted that the report of the UN TDG Committee (ST/SG/AC.10/42/Add.1) includes amendments to UN 2211 and a new

SP 382 in this regard. As a result, the group agreed that it is not appropriate to assign SP 932 to those UN numbers.

### ***Transport provisions for UN 3166***

3.50 The group considered document CCC 1/6/12 (IACS), examining the application of the requirements of the IMDG Code and SOLAS chapter II-2, related to spaces carrying vehicles with fuel in their tanks. The group noted that SP 961 and 962 are associated with the transport of vehicles as dangerous goods and that IACS believes that there is a confusion and a potential conflict between the provisions of SOLAS and these SPs.

3.51 The group further noted that, in order to address this issue, the document provides a draft unified interpretation of SOLAS regulation II-2/3.49 in terms of "vehicle spaces".

3.52 The group agreed that the criterion "loaded/unloaded through the spaces' hatchway" in the proposed interpretation is not appropriate. A cargo space not meeting the requirements of SOLAS II-2/20 shall not be considered as "vehicle space" and the vehicles in such a space have to be shipped as dangerous goods in compliance with SP 961 or SP 962 of the IMDG Code. Additionally, some experts expressed the view that a unified interpretation might not be suitable to prevent the misunderstanding as the provisions seem to be clear enough.

### **Consideration of new proposals submitted to E&T 23**

#### ***Labels, placards and marks on packages and CTUs***

3.53 The group considered document E&T 23/INF.5 (Republic of Korea), proposing to produce a unified interpretation related to the IMDG Code in regard to provision 5.3.2.1.1.2.

3.54 Having confirmed that the UN Number marking requirement applies irrespective the amount of non-dangerous goods in the CTU, the group agreed to the content of the proposed interpretation, nevertheless, no further action was taken by the group.

### **Draft amendment 38-16**

3.55 Subsequently, the group prepared draft amendments (38-16) to the IMDG Code, as set out in annex 2.

## **4 PREPARATION OF DRAFT AMENDMENTS TO IMDG CODE SUPPLEMENT**

### **Consequential amendments to the EmS-Guide**

4.1 The group prepared consequential amendments to the Emergency response procedures for ships carrying dangerous goods (EmS Guide) in order to prepare the draft MSC circular containing the corresponding amendments to MSC/Circ.1025. The draft amendments prepared by the group are set out in annex 4.

#### **Non-Declared and Misdeclared Dangerous Goods**

4.2 The group considered document CCC 1/6/11 (ICS), proposing amendments to MSC.1/Circ.1442 on inspection programmes for cargo transport units carrying dangerous goods. The group noted that the proposal aims to improve the capacity of States and industry to address the problem of non-declared and misdeclared dangerous goods cargoes.

4.3 Therefore, the group agreed to the proposed amendments in document CCC 1/6/11. The draft amendments to MSC.1/Circ.1442 as prepared by the group are set out in annex 5.

#### **Revision of MSC/Circ.860**

4.4 The group considered document E&T 23/5/1 (United Kingdom), proposing some editorial amendments to MSC/Circ.860 on Guidelines for the approval of offshore containers handled in open seas.

4.5 In this context, the group agreed to amend the text of the circular in order to harmonize its contents with the current IMDG Code provisions.

4.6 Following further discussions, the group concurred that this is an issue that should be dealt by CCC 2, taking into account the comments made during the group's discussions. Therefore, the group agreed to invite interested delegations to submit a proposal to the Sub-Committee.

### **5 OTHER MATTERS REFERRED TO THE E&T GROUP**

#### **Revision of FAL Form 7**

5.1 As requested by MSC 94 (MSC 94/21, paragraph 11.9), the group considered document E&T 23/5 (Secretariat), containing the proposed amendments to FAL Form 7 (FAL 39/4, annex 2), based on the proposal by the FAL Committee's correspondence group on the revision of the FAL Convention, established at FAL 38.

5.2 The group drafted the necessary amendments to FAL Form 7 in order to create a sequence of information that complies with the requirement of the IMDG Code. In this context, the group noted that it would be helpful for users to have additional guidance specifying further on which type and format of information is required in each of the columns (i.e. stowage position as indicated in the stowage plan). Therefore, the group invited FAL 40 to consider including such guidance/information within the FAL Form itself (i.e. footnotes, rear page of the FAL Form) or within the FAL manual.

5.3 The group agreed to delete the columns for information on the master, since the name and signature of the master is not required according to the IMDG Code or SOLAS. The group recommended to amend the standard, contained in FAL Convention (Section 2), accordingly.

5.4 The draft FAL Form 7, as prepared by the group, is set out in annex 6.

## **6 ACTION REQUESTED OF THE SUB-COMMITTEE**

6.1 The Sub-Committee is invited to approve the report in general and, in particular, to:

- .1 approve, in principle, the draft editorial corrections to amendment 37-14 of the IMDG Code, and instruct E&T 24 to finalize it (paragraphs 2.1 to 2.8 and annex 1);
- .2 approve, in principle, the draft amendment 38-16 of the IMDG Code, taking into account that some amendments are being hold between square brackets, and instruct E&T 24 to finalize it (paragraphs 3.1 to 3.55 and annex 2);
- .3 note that the group invited the UN TDG Sub-Committee to consider several issues identified by the group (paragraphs 2.3, 2.7, 2.8, 3.7, 3.8, 3.11, 3.13 and 3.21);
- .4 with regard to the revision of DSC/Circ.12 on Guidance on the continued use of existing IMO type portable tanks and road tank vehicles for the transport of dangerous goods, agree to the draft amendments prepared by the group, noting that such revision could be finalized at CCC 2 by a drafting group (paragraphs 3.42 to 3.45 and annex 3);
- .5 approve, in principle, the draft amendments to MSC/Circ.1025 on Emergency response procedures for ships carrying dangerous goods (EmS Guide), and instruct E&T 24 to finalize it (paragraph 4.1 and annex 4);
- .6 regarding non-declared and misdeclared dangerous goods cargoes, approve the draft amendments to MSC.1/Circ.1442 on Inspection programmes for cargo transport units carrying dangerous goods (paragraphs 4.2 and 4.3 and annex 5);
- .7 note the recommendations of the group that the issue of the guidelines for the approval of offshore containers handled in open seas should be dealt by CCC 2, and invite interested delegations to present documents to the Sub-Committee in future sessions with regards to possible revision to MSC/Circ.860 (paragraph 4.4 to 4.6); and
- .8 note the deliberations and recommendations of the group with regard to the revision of FAL form 7 and agree to the corresponding draft amendments for submission to FAL 40 (paragraphs 5.1 to 5.4 and annex 6).

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## **ANNEX 1\***

### **DRAFT EDITORIAL CORRECTIONS TO THE ENGLISH VERSION OF THE IMDG CODE AMENDMENT 37-14 ADOPTED BY RESOLUTION MSC.372(93)**

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

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

##### **1.1.1 Application and implementation of the Code**

##### **1.1.1.9 Lamps containing dangerous goods**

1.1.1.9.3 In the note delete "Lamps containing gases of class 2.2 are addressed in 2.2.2.6.4 and"

##### **Chapter 1.2 Definitions, units of measurement and abbreviations**

##### **1.2.1 Definitions**

*Design* Replace "2.7.3.5.6" with "2.7.2.3.5.6".

*GHS* Replace "fourth" with "fifth"

##### **Chapter 1.5 General provisions concerning radioactive material**

##### **1.5.1 Scope and application**

1.5.1.1 In paragraph 1.5.1.1, 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 (2012 Edition)", IAEA Safety Standards Series No. SSG-26, IAEA, Vienna (2014)."

##### **1.5.3 Management system**

In the heading for 1.5.3 replace "Quality assurance" by "Management system".

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\* Shaded text indicates that the amendment is applicable to the published or electronic version of the Code only.

## **PART 2 CLASSIFICATION**

### **Chapter 2.0 Introduction**

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

##### **2.0.3.6 Precedence of hazards**

2.0.3.6 In the sentence below the table replace "2.0.3" by "2.0.3.4 and 2.0.3.5"

### **Chapter 2.6 Class 6 – Toxic and infectious substances**

#### **2.6.3 Class 6.2 – Infectious substances**

##### **2.6.3.2 Classification of infectious substances**

###### **2.6.3.2.3 Exemptions**

2.6.3.2.3.8 In the paragraph replace the words "'Exempt human specimen" or "Exempt animal specimen"' by "'EXEMPT HUMAN SPECIMEN" or "EXEMPT ANIMAL SPECIMEN"'

### **Chapter 2.7 Class 7 – Radioactive material**

#### **2.7.2 Classification**

##### **2.7.2.1 General provisions**

2.7.2.1.1 Replace "2.7.2.4.2 to 2.7.2.5" with "2.7.2.4 and 2.7.2.5".

##### **2.7.2.3 Determination of other material characteristics**

###### **2.7.2.3.5 Fissile material**

2.7.2.3.5.5 In subparagraph .5 delete "and"

### **Chapter 2.9 Miscellaneous dangerous substances and articles (class 9) and environmentally hazardous substances**

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

2.9.2.2 In paragraph 2.9.2.2, under "Life-saving appliances" add the following UN entries accordingly:

“2990	LIFE-SAVING APPLIANCES, SELF-INFLATING	
3072	LIFE-SAVING APPLIANCES, NOT SELF-INFLATING	containing dangerous goods as equipment”

## 2.9.4 Lithium batteries

In the Note under subparagraph ".5" replace the words "the procedures listed in ( i ) to ( ix ) above" by the words "the procedures listed in .1 to .9 above"

### PART 3 DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND EXCEPTIONS

#### Chapter 3.2 Dangerous goods list:

In the dangerous goods list, amend the following entries as follows:

"

0190	In column (17) replace "See glossary of terms in appendix B" by "Substance or article. Division and compatibility group as classified by the competent authority"
0219	In column (16b), replace "SG 27" with "SG 31"
0224	In column (17) replace "See glossary of terms in appendix B" by "Sensitive substance used in detonators, which becomes extremely sensitive if the wetting agents are lost. This substance, when containing less alcohol, water or phlegmatizer than specified, shall not be transported, unless specifically authorized by the competent authority"
0285	in column (15) replace "S-Y" by "S-X"
0449	In column (2) replace "TORPEDOES, LIQUID-FUELLED" by "TORPEDOES, LIQUID FUELLED"
0450	In column (2) replace "TORPEDOES, LIQUID-FUELLED" by "TORPEDOES, LIQUID FUELLED"
1183	In column (16b), delete "SG 7".
1242	In column (16b), delete "SG 7".
1295	In column (16b), delete "SG 7".
1333	In column (16b), delete "SG 15"
1439	In column (16b), replace with "SG 35" with "SG 75".
1507	In column (15), between "F-A, S-Q" add ", "
1512	In column (16a) replace "Category" by "-"
1826	In column (15) replace "S-Q" by "S-B"
1942	In Column (2), delete the word "total" before combustible
2008 PG I	In column (16a) insert "H1" and column 16b insert "SG26"
2280	In column (7b) replace "E1" by "E0"
2653	In column (16a) insert "SW 1".
2749	In column 15 replace "S-D" with " <u>S-D</u> "
2845	In column 9 replace "PP31" with "-"
2956	In column (6), delete "132"
2965	In column (16b), delete "SG 7".
2988	In column (16b), delete "SG 7".



3066 PG II	In column (14) replace "TP 2 TP 27 TP 28" with "TP 2 TP 28"
3066 PG III	In column (14) replace "TP 1 TP 27 TP 29" with "TP 1 TP 29" and in column (6) insert "367"
3082	In column (14) replace "TP2" by "TP1"
3089 PG III	In column (16a) replace "Category B" with "Category A"
3105	In column (16b) one of the two entries for "SG 36" is replaced by "SG35" electronic version only
3490	In column (16b), delete "SG 7".
3491	In column (16b), delete "SG 7".
3251	In column (16a) insert "SW2"
3316 PG II	In column (2) insert "CHEMICAL KIT or FIRST AID KIT"
3316 PG II and III	In column (15) replace "S-P" with " <u>S-P</u> ".
3332	In column (6) insert "317"
3332	In column (6) insert "317" and "326" electronic version only
3508	In column (15) replace "-" with "F-A, S-I"
3511	In column (7a) insert "0".
3523	In column (3), replace "-" by "2.3" and in column (4), replace "-" by "2.1"

### Chapter 3.3

#### Special provisions applicable to certain substances materials or articles

Amend the following Special Provisions

SP 373 In subparagraph .3 replace the reference to "paragraph (a)" with "paragraph .1" and in the last sentence replace "Nuclear radiation detectors" with "Neutron radiation detectors".

SP 943 Insert the word "label" after "subsidiary risk".

SP 970 After the words "(including machinery or equipment powered by such engines)" insert ",."

### Chapter 3.4

#### Dangerous goods packed in limited quantities

##### 3.4.1 General

3.4.1.2.7 In subparagraph ".7" the reference for "7.3.3.16" is replaced by "7.3.3.15"

##### 3.4.4 Segregation

3.4.4.2 Replace "column 16" with "column 16b".

## **PART 4 PACKING AND TANK PROVISIONS**

### **Chapter 4.1 Use of packagings, including intermediate bulk containers (IBCs) and large packagings**

#### **4.1.4 List of packing instructions**

##### **4.1.4.1 Packing instructions concerning the use of packagings (except IBCs and large packagings)**

P208 In the heading of table 1 replace "name and description" with "proper shipping name".

P802 (2) Replace the words "(2) Composite packagings: Glass receptacle in steel, aluminium or plywood drum (6PA1, 6PB1 or 6PD1) or in a steel, aluminium or wood box or in wickerwork hamper (6PA2, 6PB2, 6PC or 6PD2) or in solid plastics packaging (6PH2); maximum capacity: 60 L." with  
"(2) Combination packagings  
Outer packagings : 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G or 4H2; maximum net mass : 125 kg  
Inner packagings: metal; maximum capacity : 40 L"

P802 (3) Replace the words "(3) Composite packagings: Glass receptacle in steel, aluminium, plywood or solid plastics drum (6PA1, 6PB1, 6PD1 or 6PH2) or in a steel, aluminium, wood or plywood box (6PA2, 6PB2, 6PC or 6PD2); maximum capacity: 60 L." by "(3) Composite packagings: Glass receptacle in steel, aluminium or plywood drum (6PA1, 6PB1 or 6PD1) or in a steel, aluminium or wood box or in wickerwork hamper (6PA2, 6PB2, 6PC or 6PD2) or in solid plastics packaging (6PH2); maximum capacity: 60 L."

##### **4.1.4.2 Packing instructions concerning the use of IBCs**

Amend the following packing instructions as indicated:

IBC07 In subparagraph "(1)", replace "and 21N" by ", 21N, 31A, 31B and 31N"

IBC07 In subparagraph "(2)", replace "and 21H2" with ", 21H2, 31H1 and 31H2"

IBC07 In subparagraph "(3)", replace "and 21HZ2" with "21HZ2 and 31HZ1"

IBC08 In subparagraph "(1)", replace "and 21N" by ", 21N, 31A, 31B and 31N"

IBC08 In subparagraph "(2)", replace "and 21H2" with ", 21H2, 31H1 and 31H2"

IBC08 In subparagraph "(3)", replace "and 21HZ2" with "21HZ2 and 31HZ1"

#### **4.1.9 Special packing provisions for radioactive material**

##### **4.1.9.2 Provisions and controls for transport of LSA material and SCO**

4.1.9.2.4.3 In subparagraph .3, in the reference "SCwO-I" the letter "w" is deleted

#### **4.2.5 Portable tank instructions and special provisions**

##### **4.2.5.2 Portable tank instructions**

###### **4.2.5.2.6 Portable tank instructions**

**T23** The first sentence for tank instruction T23, is replaced by the following:

"This portable tank instruction applies to self-reactive substances of class 4.1 and organic peroxides of class 5.2"

**T50** In the heading of the table, replace "Filling ratio (kg/l)" with "Maximum filling ratio (kg/l)"

##### **4.2.5.3 Portable tank special provisions**

**TP32** The item "(c)" is renamed as ".3"

### **Chapter 5.2 Marking and labelling of packages including IBCs**

#### **5.2.1 Marking of packages including IBCs**

**5.2.1.1** The second sentence is replaced by the following:

"The UN number and the letters "UN" shall be at least 12 mm high, except for packages of 30 litres capacity or less or of 30 kg maximum net mass or less and for cylinders of 60 litres water capacity or less when they shall be at least 6 mm in height and except for packages of 5 litres or 5 kg or less when they shall be of an appropriate size."

#### **5.2.2 Labelling of packages including IBCs**

##### **5.2.2.2 Provisions for labels**

###### **5.2.2.2.2 Specimen labels**

In the label for FISSILE replace "FISIONABLE" by "FISSILE"

### **Chapter 5.3 Placarding and marking of cargo transport units**

#### **5.3.1 Placarding**

##### **5.3.1.1 Placarding provisions**

###### **5.3.1.1.5 Special provisions for class 7**

**5.3.1.1.5.1** Replace the words "in figure 5.3.1" with "in the figure under 5.3.1.2.2".

#### **5.3.2 Marking of cargo transport units**

### 5.3.2.1 Display of UN numbers

5.3.2.1.2.1 Replace the word "label" by "placard".

### 5.3.2.2 Elevated temperature substances

5.3.2.2.1 After "100 °C" replace "," with "or".

## **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 6.2**

**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**

### **6.2.2 Provisions for UN pressure receptacles**

#### **6.2.2.10 Marking of bundles of cylinders**

6.2.2.10 Amend the heading to read as follows: "Marking of UN bundles of cylinders"

#### **6.2.4 Provisions for aerosol dispensers, small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied gas**

6.2.4 The instruction to amend the heading of 6.2.4 is deleted.

6.2.4 In the heading insert the word "flammable" after the word "liquefied".

### **Chapter 6.4**

**Provisions for the construction, testing and approval of packages  
and radioactive material**

### **6.1.4 Provisions for packagings**

#### **6.1.4.1 Steel drums**

6.1.4.1.1 In the third paragraph, the reference for "*electrolytic chromium/chromium-oxide coated steel.*" is replaced by "*electrolytic chromium/chromium oxide-coated steel.*"

#### **6.4.24 Transitional measures for class 7**

6.4.24.1 Replace "shall meet these Regulations in full" with "shall meet the provisions of this Code in full".

6.4.24.4 Delete "6.4.24.4" in the line of the heading.

## **Chapter 6.6**

### **Provisions for the construction and testing of large packagings**

#### **6.6.3 Marking**

6.6.3.3 In the Note, replace the words "all IBC's manufactured" by "all large packagings manufactured"

## **Chapter 6.7**

### **Provisions for the design, construction, inspection and testing of portable tanks and multiple-element gas containers (MEGCs)**

#### **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**

6.7.5.2.4.1 In subparagraph .1, in the reference, replace "see ISO 11114-1:2000 and ISO 11114-2:2012" by "see ISO 11114-1:2012 and ISO 11114-2:2000"

## **PART 7**

### **PROVISIONS CONCERNING TRANSPORT OPERATIONS**

#### **Chapter 7.1**

##### **General stowage provisions**

##### **7.1.4 Special stowage provisions**

##### **7.1.4.5 Stowage of goods of class 7**

7.1.4.5.3 In subparagraph .3 replace the references "7.1.4.5.6.2 and 7.1.4.5.6.3" by "7.1.4.5.5.2 and 7.1.4.5.5.3"

#### **Chapter 7.2**

##### **General segregation provisions**

##### **7.2.8 Segregation codes**

7.2.8 In the description of SG 1 after the words "subsidiary risk" insert the word "label".

#### *Annex*

Under Examples, in example 4.1, replace "PG II " with "PG III "

#### **Chapter 7.5**

##### **Stowage and segregation on ro-ro ships**

Under the heading, in the "Note", the reference for "MSC/Circ.1/Circ.1440" is replaced by "MSC.1/Circ.1440"

## **Chapter 7.9**

### **Exemptions, approvals and certificates**

7.9.3 Replace the contact information for Belgium with the following:

*Antwerp office*

Federale Overheidsdienst Mobiliteit en Vervoer  
Directoraat-generaal Maritiem Vervoer  
Scheepvaartcontrole

Posthoflei 3

B-2000 Antwerpen (Berchem)

BELGIUM

Telephone: +32 3 229 0030

Fax: +32 3 229 0031

Email: HAZMAT.MAR@mobiliteit.fgov.be

*Oostende office*

Federale Overheidsdienst Mobiliteit en Vervoer  
Directoraat-generaal Maritiem Vervoer  
Scheepvaartcontrole

Natiënkaai 5

B-8400 Oostende

BELGIUM

Telephone: +32 59 56 1450

Fax: +32 59 56 1474

Email: HAZMAT.MAR@mobiliteit.fgov.be

7.9.3 In the contact information for Germany replace "[Ref-G24@bmvbs.bund.de](mailto:Ref-G24@bmvbs.bund.de)" with "[Ref-G24@bmvi.bund.de](mailto:Ref-G24@bmvi.bund.de)"

7.9.3 Replace the contact information for Republic of Korea with the following:

Marine Industry and Technology Division  
Marine Safety Bureau  
Ministry of Ocean and Fisheries (MOF)  
Government Complex Sejong, 5-Dong, 94,  
Dasom 2-Ro, Sejong-City,  
339-012, Republic of Korea  
TEL : +82 44 200 5836  
FAX : +82 44 200 5849

## APPENDICES

### Appendix A List of generic and N.O.S. proper shipping names

In the table for "Class 2" in the column for Proper shipping name, the new entries for ADSORBED GAS are relocated according to the sequence of the subsidiary risks.

### Appendix B Glossary of terms

NIL

## INDEX

### Alphabetical Index

Amend the following entries as indicated hereunder:

In the entry for CALCIUM HYPOCHLORITE, DRY, CORROSIVE with more than 39% available chlorine (8,8% available oxygen) (UN 3485), insert "P" in the column for MP.

The entry for Mercurous chloride, see" (UN 3077), is deleted

In the entry for "Mercurous chloride, see" (UN 2025), insert "P" in the column for MP.

In the entry for CROTONALDEHYDE, insert a "P" in the column for MP

Replace "([3R-(3R,5aS,6S,8aS,9R,10R,12S,12aR\*\*)]-DECAHYDRO-10-METHOXY-3,6,9-TRIMETHYL-3,12-EPOXY-12H-PYRANO[4,3-j]-1,2-BENZODIOXEPIN)" by "([3R-(3R,5aS,6S,8aS,9R,10R,12S,12aR\*\*)]-Decahydro-10-methoxy-3,6,9-trimethyl-3,12-epoxy-12H-pyrano[4,3-j]-1,2-benzodioxepin), see"

The two entries for "2-Diazo-1-naphthol-4-sulphonic acid ester and for 2-Diazo-1-naphthol-5-sulphonic acid ester", are deleted

Replace "PAINT RELATED MATERIAL, CORROSIVE, FLAMMABLE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base)" by "PAINT RELATED MATERIAL, CORROSIVE, FLAMMABLE (including paint thinning or reducing compound)"

Replace "PAINT RELATED MATERIAL, FLAMMABLE, CORROSIVE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base)" by "PAINT RELATED MATERIAL, FLAMMABLE, CORROSIVE (including paint thinning or reducing compound)."

In the entry for "Fishmeal, stabilized", UN 2216, in the column for Class, replace "4.2" by "9".

Add the following entry:

<i>Name and description</i>	<i>Class</i>	<i>UN No.</i>
"2-Diazo-1-naphtholsulphonic acid ester mixtures Type D (concentration < 100%),	4.1	3226

<i>Name and description</i>	<i>Class</i>	<i>UN No.</i>
see		

\*\*\*





## ANNEX 2

### DRAFT AMENDMENTS TO THE INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG) CODE (AMENDMENT 38-16)

**NOTE:** The shaded text in this annex, indicates those parts that need to be reconsidered by the Editorial and Technical (E&T ) Group during its twenty-fourth session.

#### Table of Contents

### PART 1 GENERAL PROVISIONS, DEFINITIONS AND TRAINING

#### Chapter 1.1 General provisions

##### 1.1.1.6 Application of standards

1.1.1.6 Add the following new sentence at the end of the paragraph 1.1.1.6:

“The requirements of the standard that do not conflict with the provisions of this Code shall be applied as specified, including the requirements of any other standard, or part of a standard, referenced within that standard as normative.”.

#### Chapter 1.2 Definitions, units of measurement and abbreviations

##### 1.2.1 Definitions

The following definitions are amended as indicated hereunder:

In the definition of “*Aerosol or aerosol dispenser*”, after the words “means” insert the words “an article consisting of”.

In the definition of “GHS”, replace the words “fifth revised edition” by “sixth revised edition” and replace the reference “ST/SG/AC.10/30/Rev.5” by “ST/SG/AC.10/30/Rev.6”.

In the definition of “Liquids”, at the end, after the words “(ADR)”, replace the words “, as amended” by “\*” with the following footnote:

“United Nations Publication: ECE/TRANS/225 (Sales No. E.14.VIII.1)”

In the definition of “Manual of Tests and Criteria”, replace the words “fifth revised edition” by “sixth revised edition” and replace the reference “ST/SG/AC.10/11/Rev.5, Amend.1 and Amend.2” by “ST/SG/AC.10/11/Rev.6”.

In the definition of “Large salvage packaging”, replace the words “or leaking” by “, leaking or non-conforming”.

In the definition of “Salvage pressure receptacle” replace the value “1 000” by “3 000”.

The existing definition of “Tubes”, is replaced by the following:

“*Tube* means a transportable pressure receptacle of seamless or composite construction having a water capacity exceeding 150 litres and of not more than 3000 litres.”

1.2.1 Add the following new definitions in alphabetical order:

[*CTU Code*, means the IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units (CTU Code) (MSC.1/Circ.1497). This is a joint instrument of the International Maritime Organization (IMO), the International Labour Organization (ILO) and the United Nations Economic Commission for Europe (UNECE) and was endorsed by these Organizations in 2014. It is a non-mandatory global Code of Practice for the handling and packing of cargo transport units for transport by sea and land. The CTU Code is an update of, and replaces, the 1997 IMO/ILO/UNECE Guidelines for Packing of Cargo Transport Units\*]

and at the end insert a footnote “\*” with the following:

“\* Further practical guidance and background information related to the CTU Code are available as informative material (MSC.1/Circ.1498). This Informative material has not been endorsed by UNECE or ILO and it does not constitute part of the CTU Code.”]

“*Design life*, for composite cylinders and tubes, means the maximum life (in number of years) to which the cylinder or tube is designed and approved in accordance with the applicable standard.”

“*Self-accelerating polymerization temperature (SAPT)* means the lowest temperature at which polymerization may occur with a substance in the packaging, IBC or portable tank as offered for transport. The SAPT shall be determined in accordance with the test procedures established for the self-accelerating decomposition temperature for self-reactive substances in accordance with Part II, Section 28 of the Manual of Tests and Criteria.”

“*Service life*, for composite cylinders and tubes, means the number of years the cylinder or tube is permitted to be in service.”

### 1.2.3 List of abbreviations

The following abbreviation is amended as indicated:

Under the abbreviation of “CGA”, between the brackets, amend the address to read as follows:

“(CGA, 14501 George Carter Way, Suite 103, Chantilly, VA 20151, United States of America)”.

## **Chapter 1.3 Training**

### **1.3.1.5 Recommended training needs for shore-side personnel involved in the transport of dangerous goods under the IMDG Code**

In the table, in line 4, in the column for “Specific training requirements” replace “Cargo securing requirements (as contained in the IMO/ILO/UNECE Guidelines)” by “Cargo securing requirements (as contained in CTU Code)”

In the table, in line 11, in the column for “Specific training requirements” replace the in reference “IMO/ILO/UNECE Guidelines)” by “CTU Code”

### **1.3.1.7 Related Codes and publications which may be appropriate for function-specific training**

In subparagraph “.6” replace the words “IMO/ILO/UNECE Guidelines for Packing of Cargo Transport Units (CTUs)” by “CTU Code”

## **PART 2 CLASSIFICATION**

### **Chapter 2.0 Introduction**

#### **2.0.0 Responsibilities**

2.0.0 The existing text under 2.0.0, is renumbered as 2.0.0.1.

2.0.0.2 A new paragraph 2.0.0.2 is added with the following:

“2.0.0.2 A consignor who has identified, on the basis of test data, that a substance listed by name in column 2 of the Dangerous Goods List in Chapter 3.2 meets classification criteria for a hazard class or division that is not identified in the list, may, with the approval of the competent authority, consign the substance:

- Under the most appropriate generic or not otherwise specified (N.O.S.) entry reflecting all hazards; or
- Under the same UN number and name but with additional hazard communication information as appropriate to reflect the additional subsidiary risk(s) (documentation, label, placard) provided that the primary hazard class remains unchanged and that any other transport conditions (e.g. limited quantity, packaging and tank provisions) that would normally apply to substances possessing such a combination of hazards are the same as those applicable to the substance listed.

**Note:** When a competent authority grants such approvals, it should inform the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods accordingly and submit a relevant proposal of amendment to the Dangerous Goods List. Should the proposed amendment be rejected, the competent authority should withdraw its approval.”.

[and at the end, insert a footnote with the following:

“\*UNECE United Nations Economic Commission for Europe, Dangerous Goods and Special Cargoes Section, Transport Division. Palais des Nations, Bureau 418, CH-1211 Geneva 10, Switzerland. Tel: +41 22 917 24 56, Fax: +41 22 917 00 39. [www.unece.org/trans/danger/danger.html](http://www.unece.org/trans/danger/danger.html)]

## **2.0.1 Classes, divisions, packing groups**

### **2.0.1.1 Definitions**

Under Class 4.1, after the words “self-reactive substances” replace the word “and” by “,” and at the end add “and polymerizing substances”

## **2.0.2 UN numbers and proper shipping names**

2.0.2.2 At the end of the first paragraph, add a new sentence to read as follows:

“The substances listed by name in column (2) of the Dangerous Goods List of Chapter 3.2 shall be transported according to their classification in the list or under the conditions specified in 2.0.0.2.”

## **Chapter 2.1 Class 1 – Explosives**

### **2.1.1.4 Hazard divisions**

2.1.1.4 Under “Division 1.6” amend the paragraph before the Note to read as follows:

“This division comprises articles which predominantly contain extremely insensitive substances and which demonstrate a negligible probability of accidental initiation or propagation.”.

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

2.1.2.2 The description for Compatibility Group “N” is replaced by the following:

“Articles predominantly containing extremely insensitive substances”.

### **2.1.3 Classification procedure**

#### **2.1.3.5 Assignment of fireworks to hazard divisions**

2.1.3.5.1 The existing text of 2.1.3.5.1 is replaced by the following:

“2.1.3.5.1 Fireworks shall normally be assigned to hazard divisions 1.1, 1.2, 1.3, and 1.4 on the basis of test data derived from Test Series 6 of the Manual of Tests and Criteria. However:

- .1 waterfalls giving a positive result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria shall be classified as 1.1G regardless of the results of Test Series 6;

- .2 since the range of fireworks is very extensive and the availability of test facilities may be limited, assignment to hazard divisions may also be made in accordance with the procedure in 2.1.3.5.2.”

2.1.3.5.5 In the table, for the entry “Fountain” in the column “Includes: / Synonym”, delete the word “showers”.

in the third column, at the end, add the following Note:

**“Note:** Fountains intended to produce a vertical cascade or curtain of sparks are considered to be waterfalls (see row below).”

and after the row for “Fountain”, insert a new row to read as follows:

Type	Includes: / Synonym:	Definition	Specification	Classification
Waterfall	cascades, showers	pyrotechnic fountain intended to produce a vertical cascade or curtain of sparks	containing a pyrotechnic substance which gives a positive result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria regardless of the results of Test Series 6 (see 2.1.3.5.1 .1)	1.1G
			containing a pyrotechnic substance which gives a negative result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria	1.3G

Add a new section 2.1.3.6 to read as follows:

#### **“2.1.3.6 Classification documentation**

2.1.3.6.1 A competent authority assigning an article or substance into Class 1 should confirm with the applicant that classification in writing.

2.1.3.6.2 A competent authority classification document may be in any form and may consist of more than one page, provided pages are numbered consecutively. The document should have a unique reference.

2.1.3.6.3 The information provided shall be easy to identify, legible and durable.

2.1.3.6.4 Examples of the information that may be provided in the classification documents are as follows:

- .1 the name of the competent authority and the provisions in national legislation under which it is granted its authority;
- .2 the modal or national regulations for which the classification document is applicable;

- .3 confirmation that the classification has been approved, made or agreed in accordance with the United Nations Recommendations on the Transport of Dangerous Goods or the relevant modal regulations;
- .4 the name and address of the person in law to which the classification has been assigned and any company registration which uniquely identifies a company or other body corporate under national legislation;
- .5 the name under which the explosives will be placed onto the market or otherwise supplied for transport;
- .6 the Proper Shipping Name, UN number, Class, Hazard Division and corresponding compatibility group of the explosives;
- .7 where appropriate, the maximum net explosive mass of the package or article;
- .8 the name, signature, stamp, seal or other identification of the person authorised by the competent authority to issue the classification document is clearly visible;
- .9 where safety in transport or the hazard division is assessed as being dependent upon the packaging, the packaging mark or a description of the permitted:
  - Inner packagings
  - Intermediate packagings
  - Outer packagings
- .10 the classification document states the part number, stock number or other identifying reference under which the explosives will be placed onto the market or otherwise supplied for transport;
- .11 the name and address of the person in law who manufactured the explosives and any company registration which uniquely identifies a company or other body corporate under national legislation;
- .12 any additional information regarding the applicable packing instruction and special packing provisions where appropriate;
- .13 the basis for assigning the classification, i.e. whether on the basis of test results, default for fireworks, analogy with classified explosive, by definition from the Dangerous Goods List etc.;
- .14 any special conditions or limitations that the competent authority has identified as relevant to the safety for transport of the explosives, the communication of the hazard and international transport; and
- .15 the expiry date of the classification document is given where the competent authority considers one to be appropriate.”.

## Chapter 2.2

## Class 2 – Gases

2.2.4 Insert a new Section 2.2.4 to read as follows:

### “2.2.4 Gases not accepted for transport

Chemically unstable gases of Class 2 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport or unless transported in accordance with special packing provision (r) of packing instruction P200 (5) of 4.1.4.1, as applicable. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.”

## Chapter 2.3 Class 3 – Flammable liquids

### 2.3.2 Assignment of packing group

2.3.2.2 Replace sub-paragraph “.1” with the following:

“.1 The viscosity\* and flash-point are in accordance with the following table:

Kinematic viscosity (extrapolated) $\nu$ (at near-zero shear rate) $\text{mm}^2/\text{s}$ at 23 °C	Flow-time $t$ in seconds	Jet diameter (mm)	Flash-point, closed-cup (°C)
$20 < \nu \leq 80$	$20 < t \leq 60$	4	above 17
$80 < \nu \leq 135$	$60 < t \leq 100$	4	above 10
$135 < \nu \leq 220$	$20 < t \leq 32$	6	above 5
$220 < \nu \leq 300$	$32 < t \leq 44$	6	above -1
$300 < \nu \leq 700$	$44 < t \leq 100$	6	above -5
$700 < \nu$	$100 < t$	6	No limit

and the corresponding footnote “\*” is added with the following:

“\* Viscosity determination: Where the substance concerned is non-Newtonian, or where a flow cup method of viscosity determination is otherwise unsuitable, a variable shear-rate viscometer shall be used to determine the dynamic viscosity coefficient of the substance, at 23 °C, at a number of shear rates. The values obtained are plotted against shear rate and then extrapolated to zero shear rate. The dynamic viscosity thus obtained, divided by the density, gives the apparent kinematic viscosity at near-zero shear rate.”.

2.3.2.5 Viscous liquids which:

2.3.2.5 under the words “Viscous liquids which:”, the existing second indent is replaced by the following two new indents:



- “- are not toxic or corrosive;”
- are not environmentally hazardous or are environmentally hazardous transported in single or combination packagings containing a net quantity per single or inner packaging of 5 litres or less, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8;”

2.3.5 Insert a new section 2.3.5 with the following:

**“2.3.5 Substances not accepted for transport**

Chemically unstable substances of Class 3 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.”

**Chapter 2.4**

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

**2.4.1 Definition and general provisions**

2.4.1.1 In the paragraph for “Class 4.1”, after the words “through friction; self-reactive substances (solids and liquids)”, insert the words “and polymerizing substances”.

2.4.1.2 Insert a new sub-paragraph .3 to read as follows:

“.3 Polymerizing substances (Class 4.1);”.

and the remaining subparagraphs “.3 to .6” are renumber as “.4 to .7” respectively.

2.4.1.2 In the last sentence after the sub-paragraphs, insert “and polymerizing substances” after “self-reactive substances”.

**2.4.2 Class 4.1 – Flammable solids, self-reactive substances and solid desensitized explosives**

2.4.2 In the heading, replace “and” by “,” and insert “and polymerizing substances” at the end.

**2.4.2.1 General**

2.4.2.1 In sub-paragraph .2, at the end delete the word “and”; at the end of sub-paragraph .3 replace “.” by “; and” and a new sub-paragraph .4 add is added with the following:

“.4 Polymerizing substances (see 2.4.2.5).”.

Insert a new section 2.4.2.5 to read as follows:

**“2.4.2.5 Class 4.1 Polymerizing substances and mixtures (stabilized)**

#### 2.4.2.5.1 Definitions and properties

*Polymerizing substances* are substances which, without stabilization, are liable to undergo a strongly exothermic reaction resulting in the formation of larger molecules or resulting in the formation of polymers under conditions normally encountered in transport. Such substances are considered to be polymerizing substances of Class 4.1 when:

- .1 Their self-accelerating polymerization temperature (SAPT) is 75 °C or less under the conditions (with or without chemical stabilization as offered for transport) and in the packaging, IBC or portable tank in which the substance or mixture is to be transported;
- .2 They exhibit a heat of reaction of more than 300 J/g; and
- .3 They do not meet any other criteria for inclusion in Classes 1 to 8.

A mixture meeting the criteria of a polymerizing substance shall be classified as a polymerizing substance of Class 4.1.

2.4.2.5.2 Polymerizing substances are subject to temperature control in transport if their self-accelerating polymerization temperature (SAPT) is:

- .1 When offered for transport in a packaging or IBC, 50 °C or less in the packaging or IBC in which the substance is to be transported; or
- .2 When offered for transport in a portable tank, 45 °C or less in the portable tank in which the substance is to be transported."

### 2.4.4 Class 4.3 – Substances which, in contact with water, emit flammable gases

2.4.4.3.3 Replace "equal to or greater than 1 litre" by "greater than 1 litre".

## Chapter 2.5

### Class 5 – Oxidizing substances and organic peroxides

#### 2.5.3 Class 5.2 – Organic peroxides

##### 2.5.3.2 Classification of organic peroxides

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

"

Organic peroxide		Column	Amendment
DIBENZOYL PEROXIDE	(first row)	Concentration (%)	Replace: ">51 - 100" by ">52 - 100"
tert-BUTYL PEROXIDE	CUMYL (first row)	Number (Generic entry)	Replace: "3107" by "3109"

Organic peroxide		Column	Amendment
DICETYL PEROXYDICARBONATE	(first row)	Packing Method	Replace: "OP7" by "OP8"
DICETYL PEROXYDICARBONATE	(first row)	Number (Generic entry)	Replace: "3116" by "3120"
tert-BUTYL PEROXY-3,5,5-TRIMETHYLHEXANOATE	(first row)	Concentration (%)	Replace: ">32-100" by ">37-100"
tert-BUTYL PEROXY-3,5,5-TRIMETHYLHEXANOATE	(third row)	Concentration (%)	Replace: "≤ 32" by "≤37"
tert-BUTYL PEROXY-3,5,5-TRIMETHYLHEXANOATE	(third row)	Diluent type B (%)	Replace: "≥ 68" by "≥ 63"

“

## Chapter 2.6 Class 6 – Toxic and infectious substances

### 2.6.2 Class 6.1 – Toxic substances

2.6.2.5 Insert a new 2.6.2.5 to read as follows:

#### **“2.6.2.5 Substances not accepted for transport**

Chemically unstable substances of Class 6.1 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.”.

## Chapter 2.7 Class 7 – Radioactive material

### 2.7.2.4 Classification of packages or unpacked materials

#### 2.7.2.4.1 Classification as expected package

2.7.2.4.1.3.2 Replace “marking “RADIOACTIVE”” by “mark “RADIOACTIVE”” wherever it appears.

2.7.2.4.1.4.2 Replace “marking “RADIOACTIVE”” by “mark “RADIOACTIVE””.

## Chapter 2.8 Class 8 – Corrosive substances

Insert a new section 2.8.3 with the following:

#### **“2.8.3 Substances not accepted for transport**

Chemically unstable substances of Class 8 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.”

## **Chapter 2.9**

### **Miscellaneous dangerous substances and articles (class 9) and environmentally hazardous substances**

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

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

After “3151 POLYHALOGENATED BIPHENYLS, LIQUID or”, add a new entry to read as follows:

“3151 HALOGENATED MONOMETHYLDIPHENYLMETHANES, LIQUID or”.

After “3152 POLYHALOGENATED BIPHENYLS, SOLID or”, add a new entry to read as follows:

“3152 HALOGENATED MONOMETHYLDIPHENYLMETHANES, SOLID or”.

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

The following entries are deleted:

“3166 ENGINE, INTERNAL COMBUSTION or  
3166 ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or  
3166 ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or”.

and the following new entries are added:

3530 ENGINE, INTERNAL COMBUSTION or  
3530 MACHINERY, INTERNAL COMBUSTION”.

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

##### **2.9.3.2 Definitions and data requirements**

2.9.3.2.5 In the second paragraph, in the first sentence, amend the end to read as follows:  
“... OECD Test Guidelines 107, 117 or 123.”

## **PART 3**

### **DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND EXCEPTIONS**

#### **Chapter 3.1**

## **General**

### **3.1.2 Proper shipping names**

3.1.2.2 At the end of the first sentence, replace “package marking” by “package marks”.

3.1.2.6 In the introductory sentence, before sub-paragraphs .1 and .2, at the end, before the word “then:” insert the following:

“or the evolution of excessive heat, or when chemical stabilization is used in combination with temperature control,”

3.1.2.6.1 Replace existing subparagraph .1 with the following:

“.1 For liquids and solids where the SAPT (measured without or with inhibitor, when chemical stabilization is applied) is less than or equal to that prescribed in 2.4.2.5.2, special provision 386 of Chapter 3.3 and the provisions of 7.3.7 apply;”

## **Chapter 3.2 Dangerous Goods List**

In the dangerous goods list, amend the following entries as follows:

1005	in column (6), add “379”
1006	in column (6), add “378”
1010	in column (6), add “386” and in column (16a) add “SW1”
1013	in column (6), add “378
1046	in column (6), add “378
1051	in column (6), add “386” and in column (16a) add “SW1”
1056	in column (6), add “378
1060	in column (6), add “386” and in column (16a) add “SW1”
1065	in column (6), add “378
1066	in column (6), add “378
1956	in column (6), add “378
1081	in column (6), add “386” and in column (16a) add “SW1”
1082	in column (6), add “386” and in column (16a) add “SW1”

1085	in column (6), add "386", and in column (16a) add "SW1"
1086	in column (6), add "386" and in column (16a) add "SW1"
1087	in column (6), add "386" and in column (16a) add "SW1"
1092	in column (6), add "386" and in column (16a) add "SW1"
1093	in column (6), add "386", in column (16a) replace "Category E" with "Category D" and add "SW1"
1143	in column (6), add "386" and in column (16a) add "SW1"
1167	in column (6), add "386"
1183 PG I	in column (15) replace "F-G" by "F-G"
1185	in column (6), add "386" and in column (16a) add "SW1"
1202	in column (6), delete "363"
1203	in column (6), delete "363"
[1208	In column (4) insert "P"]
1218	in column (6), add "386", in column (16a) replace "Category E" with "Category D" and add "SW1"
1223	in column (6), delete "363"
1242 PG I	in column (15) replace "F-G" by "F-G"
1246	in column (6), add "386, in column (16a) replace Category B" with „Category C" and add "SW1"
1247	in column (6), add "386", in column (16a) replace Category B" with "Category C" and add "SW1"
1251	in column (6), add "386" and in column (16a) add "SW1"
1268 PGs I, II and III	in column (6), delete "363"
1295 PG I	in column (15) replace "F-G" by "F-G"
1301	in column (6), add "386", in column (16a) replace "Category B" with "Category C" and add "SW1"
1302	in column (6), add "386" and in column (16a) add "SW1"
1303	in column (6), add "386", in column (16a) replace "Category E" by "Category D" and add "SW1"

1304	in column (6), add "386", in column (16a) replace "Category B" by "Category C" and add "SW1"
1309	in column (9), add "PP100"
1309 PG III	in column (9) add "L3" and in column (11) replace "B3" by "B4"
1323	in column (9), add "PP100"
1325	in column (6) delete "915"
1333	in column (9), add "PP100"
1360 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1376	in column (9), add "PP100"
1376 PG III	in column (9) add "L3" and in column (11) replace "B3" by "B4"
1389 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1390 PG II	in column (11) add "B4"
1391 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1392 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1393 PG II	in column (11) add "B4"
1394 PG II	in column (11) add "B4"
1395	in column (9), "PP31" and "PP40".
1396 PG II	in column (9), add "PP31" and in column (11) add "B4"
1396 PG III	in column (9), add "PP31" and "PP40".
1397 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1398	in column (9), add "PP31" and "PP40".
1400 PG II	in column (11) add "B4"
1401 PG II	in column (11) add "B4"
1402 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1402 PG II	in column (9), add "PP31" and in column (11) add "B4"
1403	in column (9), add "PP31" and "PP40".
1404 PG I	in column (15) replace "F-G" by " <u>F-G</u> "

1405 PG II	in column (11) add "B4"
1407 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1408	in column (9), add "PP100"
1409 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1409 PG II	in column (9), add "PP31"
1410 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1411 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1413 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1414 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1415	in column (13), add "T9" and in column (14), add "TP7" and "TP33"
1415 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1417 PG II	in column (11) add "B4"
1418 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1418 PG II and III	in column (9), add "PP31"
1419 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1420 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1421 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1422 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1423 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1426 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1427 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1428 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1432 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1433 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
1435	in column (9), "PP100"
1436 PG I	in column (9), add "PP31" and in column (15) replace "F-G" by " <u>F-G</u> "



1436 PGs II and III	in column (9), add "PP31"
1449	in column (9), "PP100"
1457	in column (9), "PP100"
1472	in column (9), "PP100"
1476	in column (9), "PP100"
1483	in column (9), "PP100"
1483 PG III	in column (9) add "L3" and in column (11) replace "B3" by "B4"
1509	in column (9), "PP100"
1516	in column (9), "PP100"
1545	in column (6), add "386" and in column (16a) add "SW1"
1567	in column (9), "PP100"
1589	in column (6), add "386" and in column (16a) add "SW1"
1614	in column (6), add "386"
1714 PG I	in column (15) replace "F-G" by "F-G"
1724	in column (6), add "386" and in column (16a) add "SW1"
1791 PG II and III	In column (4) insert "P"
1829	in column (6), add "386" and in column (16a) add "SW1"
1860	in column (6), add "386" and in column (16a) add "SW1"
1863 PGs I, II and III	in column (6), delete "363"
1869	in column (9), add "PP100"
1869 PG III	in column (9) add "L3" and in column (11) replace "B3" by "B4"
1870 PG I	in column (15) replace "F-G" by "F-G"
1917	in column (6), add "386", in column (16a) replace Category B" with „Category C" and add "SW1_
1919	in column (6), add "386", in column (16a) replace Category B" with „Category C" and add "SW1_

1921	in column (6), add "386", in column (16a) replace Category B" with „Category D”" and add "SW1"
1928 PG I	in column (15) replace "F-G" by "F-G"
1932 PG III	in column (9) add "L4" and in column (11) replace "B3" by "B4"
1950	in column (6), add "381" and in column (8), replace "LP02" by "LP200"
1966	in column (14) delete "TP23"
1991	in column (6), add "386" and in column (16a) add "SW1"
2000	in column (6), add "383"
2008 PG III	in column (9) add "L4" and in column (11) replace "B3" by "B4"
2009 PG III	in column (9) add "L4"
2010 PG I	in column (15) replace "F-G" by "F-G"
2011 PG I	in column (15) replace "F-G" by "F-G"
2012 PG I	in column (15) replace "F-G" by "F-G"
2013 PG I	in column (15) replace "F-G" by "F-G"
2036	in column (6), add "378"
2055	in column (6), add "386", in column (16a) replace "Category A" with "Category C" and add "SW1"
2200	in column (6), add "386", and in column (16a) add "SW1"
2210	in column (9), add "PP100"
2211	in column (6), replace "207" by "382"
2213	in column (6), insert "223"
2218	in column (6), add "386"
2227	in column (6), add "386", in column (16a) replace "Category A" with "Category C" and add "SW1"
2251	in column (6), add "386" and in column (16a) add "SW1"
2257 PG I	in column (15) replace "F-G" by "F-G"
2277	in column (6), add "386", in column (16a) replace "Category B" with „Category C" and add "SW1"

2283	in column (6), add "386", in column (16a) replace "Category A" with "Category C" and add "SW1"
2348	in column (6), add "386", in column (16a) replace "Category A" with "Category C" and add "SW1"
2352	in column (6), add "386", in column (16a) replace "Category B" with „Category C" and add "SW1_
2383	in column (6), add "386"
2396	in column (6), add "386", in column (16a) replace "Category E" with Category D" and in column (16a) add "SW1_
2452	in column (6), add "386" and in column (16a) add "SW1_
2463 PG I	in column (15) replace "F-G" by "F-G"
2521	in column (6), add "386" and in column (16a) add "SW1_
2527	in column (6), add "386", in column (16a) replace "Category A" with "Category C" and add "SW1"
2531	in column (6), add "386", and in column (16a) add "SW1_
2545 PG III	in column (9) add "L4" and in column (11) replace "B3" by "B4"
2546 PG III	in column (9) add "L4" and in column (11) replace "B3" by "B4"
2607	in column (6), add "386", in column (16a) replace "Category A" with "Category C" and add "SW1"
2618	in column (6), add "386", in column (16a) replace "Category A" with "Category C" and add "SW1"
2624 PG II	in column (11) add "B4"
2793	in column (9), add "PP100"
2793 PG III	in column (9) add "L3" and in column (11) replace "B3" by "B4"
2806 PG I	in column (15) replace "F-G" by "F-G"
2813 PG I	in column (9), delete "PP83" and in column (15) replace "F-G" by "F-G"
2813 PG II	in column (9), delete "PP83" and in column (11) add "B4"
2813 PG III	in column (9), delete "PP83"
2815	in column (4) insert "6.1", in column (16a) replace "Category A" by "Category B", in column (16a) insert "SW2" and in column (17) insert at the end "Toxic if swallowed, by skin contact or by inhalation"

2830 PG II	in column (11) add "B4"
2838	in column (6), add "386", in column (16a) replace "Category B" with "Category C" and add "SW1"
2858	in column (9), add "PP100"
2870 PG I	in column (15) replace "F-G" by "F-G"
2878	in column (9), add "PP100"
2878 PG III	in column (9) add "L3" and in column (11) replace "B3" by "B4"
2881 PG III	in column (9) add "L4" and in column (11) replace "B3" by "B4"
2925	in column (6) delete "915"
2926	in column (6) delete "915"
2950	in column (9), add "PP100"
2965 PG I	in column (15) replace "F-G" by "F-G"
2968	in column (9), add "PP100"
2977	in column (4) replace "8" by "6.1/8", in column (16a) replace "Category A" by "Category B" and add "SW2"
2978	in column (4) replace "8" by "6.1/8", in column (16a) replace "Category A" by "Category B" and add "SW2"
2983	in column (8) replace "P200" by "P001" and in column (16a) add "SW1"
2988 PG I	in column (15) replace "F-G" by "F-G"
3022	in column (6) add "386", in column (16a) replace "Category B" with "Category C" and add "SW1"
3073	in column (6) add "386", in column (16a) add "SW1"
3078 PG II	in column (11) add "B4"
3079	in column (6) add "386", in column (16a) add "SW1"
3089	in column (9) add "PP100"
3090	in column (6), insert "384" and in column (8), insert "P910"
3091	in column (6), insert "310" and "384" and in column (8), insert "P910"
3096	in column (9), add "PP100"

3125	in column (9), add "PP100"
3129 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3130 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3131 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3131 PGs II and III	in column (9), add "PP31"
3132 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3132 PGs II and III	in column (9), add "PP31"
3134 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3134 PGs II and III	in column (9), add "PP31"
3135 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3135 PGs II and III	in column (9), add "PP31"
3148 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3151	in column (2), replace the proper shipping name by: "POLYHALOGENATED BIPHENYLS, LIQUID or HALOGENATED MONOMETHYLDIPHENYLMETHANES, LIQUID or POLYHALOGENATED TERPHENYLS, LIQUID"
3152	in column (2), replace the proper shipping name by: "POLYHALOGENATED BIPHENYLS, SOLID or HALOGENATED MONOMETHYLDIPHENYLMETHANES, SOLID or POLYHALOGENATED TERPHENYLS, SOLID"
3166	in column (2), replace the proper shipping name by: "VEHICLE, FLAMMABLE GAS POWERED or VEHICLE, FLAMMABLE LIQUID POWERED or VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED" in column (6) insert "380" and "385"; in column (17) replace the existing first sentence by "Types of articles transported under this entry include, but are not limited to motor vehicles, hybrid vehicles, fuel cell powered vehicles, motorcycles and boats."
3170 PG II	in column (11) add "B4"
3171	in column (6) insert "971"
3178	in column (6) delete "915"

3179	in column (6) delete "915"
3180	in column (6) delete "915"
3189 PG III	in column (9) add "L4" and in column (11) replace "B3" by "B4"
3208 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3208 PG II	in column (11) add "B4"
3209 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3269 PG II	in column (2) add the following text at the end of the description ", liquid base material" in column (17) delete ", packaging group II"
3269 PG III	in column (2) add the following text at the end of the description ", liquid base material"
3395 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3395 PG II and III	in column (9), add "PP31"
3396 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3396 PG II and III	in column (9), add "PP31"
3397 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3397 PG II and III	in column (9), add "PP31"
3398 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3399 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3401 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3404 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3475	in column (6), delete "363"
3480	in column (6), insert "384" and in column (8), insert "P910"
3481	in column (6), insert "310" and "384" and in column (8), insert "P910"
3402 PG I	in column (15) replace "F-G" by " <u>F-G</u> "
3507	in column (3), replace "8" by "6.1", in column (4) replace "7" by "7/8" and in column (8) replace "P805" by "P603"

3516	in column (6), add “379”
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### 3.2.1 Dangerous Goods List

Add the following entries:

(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16a)	(16b)	(17)
0510	ROCKET MOTORS	1.4C	-	-	-	0	E0	P130 LP101	PP67 L1	-	-	-	-	-	F-B, S-X	Category 02 SW1	-	See glossary of terms in Appendix B.
3527	POLYESTER RESIN KIT, solid base material	4.1	-	II	236 340	5kg	E0	P412	-	-	-	-	-	-	F-A, S-G	Category B	-	Polyester resin kits consist of two components: a base material (flammable solid) and an activator (organic peroxide), each separately packed in an inner packaging.
3527	POLYESTER RESIN KIT, solid base material	4.1	-	III	236 340	5kg	E0	P412	-	-	-	-	-	-	F-A, S-G	Category B	-	See entry above.
3528	ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED	3	-	-	363	0	E0	P005	-	-	-	-	-	-	F-E, S-E	Category E [SW29]	-	Types of articles transported under this entry include engines or machinery, powered by fuels classified as dangerous goods via internal combustion systems or fuel cells (e.g. combustion engines, generators, compressors, turbines, heating units, etc.).
3529	ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or MACHINERY, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or MACHINERY, FUEL CELL, FLAMMABLE GAS POWERED	2.1	-	-	363	0	E0	P005	-	-	-	-	-	-	F-D, S-U	Category E	-	See entry above.



(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16a)	(16b)	(17)
3530	ENGINE, INTERNAL COMBUSTION or MACHINERY, INTERNAL COMBUSTION	9	P	-	363	0	E0	P005	-	-	-	-	-	-	F-A, S-F	Category A	-	See entry above.
3531	POLYMERIZING SUBSTANCE, SOLID, STABILIZED N.O.S.	4.1	-	III	274 386	0	E0	P002	PP92	IBC07	B18	-	T7	TP4 TP6 TP3 3	F-J, S-G	Category D SW1	SG35 SG36	Polymerizes at elevated temperatures or in a fire. Burns vigorously. Insoluble in water. Contact with alkalis or acids may cause dangerous polymerization. The products of combustion or self-accelerating polymerization may be toxic by inhalation.
3532	POLYMERIZING SUBSTANCE, LIQUID, STABILIZED, N.O.S.	4.1	-	III	274 386	0	E0	P001	PP93	IBC03	B19	-	T7	TP4 TP6	F-J, S-G	Category D SW1	SG35 SG36	Polymerizes at elevated temperatures or in a fire. Burns vigorously. Immiscible with water. Contact with alkalis or acids may cause dangerous polymerization. The products of combustion or self-accelerating polymerization may be toxic by inhalation.
3533	POLYMERIZING SUBSTANCE, SOLID, TEMPERATURE CONTROLLED, N.O.S.	4.1	-	III	274 386	0	E0	P002	PP92	IBC07	B18	-	T7	TP4 TP6 TP3 3	F-F, S-K	Category D SW1 SW3	SG35 SG36	Polymerizes at temperatures higher than the self-accelerating polymerization temperature or in a fire. Burns vigorously. Insoluble in water. Contact with alkalis or acids may cause dangerous polymerization. The products of combustion or self-accelerating polymerization may be toxic by inhalation. Control and emergency temperatures can be found in the transport document as required in 5.4.1.5.5. The temperature must be checked regularly.
3534	POLYMERIZING SUBSTANCE, LIQUID, TEMPERATURE CONTROLLED, N.O.S.	4.1	-	III	274 386	0	E0	P001	PP93	IBC03	B19	-	T7	TP4 TP6	F-F, S-K	Category D SW1 SW3	SG35 SG36	Polymerizes at temperatures higher than the self-accelerating polymerization temperature or in a fire. Burns vigorously. Immiscible with water. Contact with alkalis or acids may cause dangerous polymerization. The products of combustion or self-accelerating polymerization may be toxic by inhalation. Control and emergency temperatures can be found in the transport document as required in 5.4.1.5.5. The temperature must be checked regularly.

### Chapter 3.3

#### Special provisions applicable to certain substances, materials or articles

3.3.1 In the introductory paragraph, at the end replace “.” by “.” and add a new second sentence with the following:

“Where a special provision includes a requirement for package marking, the provisions of 5.2.1.2.1 to .4 shall be met. If the required mark is in the form of specific wording indicated in quotation marks, such as “Damaged Lithium Batteries”, the size of the mark shall be at least 12 mm, unless otherwise indicated in the special provision or elsewhere in this Code.”

SP 188 Amend subparagraph “.6” to read as follows:

“.6 Each package shall be marked with the appropriate lithium battery mark, as illustrated in 5.2.1.10;

**Note:** The provisions concerning marking in special provision 188 of amendment 37-14 of the Code may continue to be applied until 31 December 2018.

This requirement does not apply to:

- .1 packages containing only button cell batteries installed in equipment (including circuit boards); and
- .2 packages containing no more than four cells or two batteries installed in equipment, where there are not more than two packages in the consignment.”

subparagraph “.7” is deleted;

subparagraphs “.8” and “.9” are renumbered as “.7” and “.8” respectively;

and the following new paragraph is added at the end:

“A single cell battery as defined in Part III, sub-section 38.3.2.3 of the *Manual of Tests and Criteria* is considered a “cell” and shall be transported according to the requirements for “cells” for the purpose of this special provision.”

SP 204 At the end, add a new paragraph with the following:

“Articles containing smoke-producing substance(s) toxic by inhalation according to the criteria for Class 6.1 shall be labelled with a “TOXIC” subsidiary risk label (Model No 6.1, see 5.2.2.2.2), except that those manufactured before 31 December 2016 may be transported until 1 January 2019 without a “TOXIC” subsidiary label.”

SP 207 Delete the words “Polymeric beads and”.

SP 225 After the second sentence after the words “of manufacture”, insert the following **Note:**

**Note:** “Provisions applied in the country of manufacture” means the provisions applicable in the country of manufacture or those applicable in the country of use.”

SP 225 At the end, insert the following **Note**:

**Note:** Pressure receptacles which contain gases for use in the above-mentioned extinguishers or for use in stationary fire-fighting installations shall meet the requirements in Chapter 6.2 and all requirements applicable to the relevant dangerous goods when these pressure receptacles are transported separately.”

SP 236 Replace existing text with the following:

“236 Polyester resin kits consist of two components: a base material (either Class 3 or Class 4.1, packing group II or III) and an activator (organic peroxide). The organic peroxide shall be type D, E, or F, not requiring temperature control. The packing group shall be II or III, according to the criteria of either Class 3 or Class 4.1, as appropriate, applied to the base material. The quantity limit shown in column 7a of the Dangerous Goods List of Chapter 3.2 applies to the base material.”

[SP 240 At the end of the first paragraph, insert the following sentence:

“Lithium batteries shall meet the requirements of 2.9.4, except when otherwise provided in this Code (e.g. for prototype batteries and small production runs under special provision 310 or damaged batteries under special provision 376).”]

in the second paragraph, replace the words “Examples of such vehicles are electrically-powered cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, e-bikes, wheel-chairs, lawn tractors, boats and aircraft.” by the following:

“Examples of such vehicles are electrically-powered cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, trucks, locomotives, bicycles (pedal cycles with an electric motor) and other vehicles of this type (e.g. self-balancing vehicles or vehicles not equipped with at least one seating position), wheel chairs, lawn tractors, self-propelled farming and construction equipment, boats and aircraft. This includes vehicles transported in a packaging. In this case some parts of the vehicle may be detached from its frame to fit into the packaging”

and at the end, insert the following new paragraph:

“Vehicles may contain other dangerous goods than batteries (e.g. fire extinguishers, compressed gas accumulators or safety devices) required for their functioning or safe operation without being subject to any additional requirements for these other dangerous goods, unless otherwise specified in this Code.”

SP 244 At the end, add the following paragraph:

“Before loading, these by-products shall be cooled to ambient temperature, unless they have been calcined to remove moisture. Cargo transport units containing bulk loads shall be adequately ventilated and protected against ingress of water throughout the journey.”

SP 310 Replace existing text with the following:

“310 The testing requirements in the Manual of Tests and Criteria, part III, sub-section 38.3 do not apply to production runs, consisting of not more than 100 cells and batteries, or to pre-production prototypes of cells and batteries when these prototypes are transported for testing when packaged in accordance with packing instruction P910 of 4.1.4.1.

The transport document shall include the following statement: “Transport in accordance with special provision 310”.

Damaged or defective cells, batteries, or cells and batteries contained in equipment shall be transported in accordance with special provision 376 and packaged in accordance with packing instructions P908 of 4.1.4.1 or LP904 of 4.1.4.3, as applicable.

Cells, batteries or cells and batteries contained in equipment transported for disposal or recycling may be packaged in accordance with special provision 377 and packing instruction P909 of 4.1.4.1.”

SP 312 Replace the existing first sentence to read:

“Vehicles powered by a fuel cell engine shall be consigned under the entries UN No. 3166 VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or UN No. 3166 VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED, as appropriate.”

[and at the end, add a new paragraph to read as follows:

“Lithium batteries shall meet the requirements of 2.9.4, except when otherwise provided for in these Regulations (e.g. for prototype batteries and small production runs under special provision 310 or damaged batteries under special provision 376).”]

SP 327 In the second sentence, after the words “protected against” insert “movement and”.

SP 327 In the third sentence, replace “LP02” by “LP200”.

SP 361 Replace existing sub-paragraph “.5” to read as follows:

“.5 Capacitors manufactured after 31 December 2013, shall be marked with the energy storage capacity in Wh.”

SP 363 Replace existing text with the following:

“363 .1 This entry applies to engines or machinery, powered by fuels classified as dangerous goods via internal combustion systems or fuel cells (e.g. combustion engines, generators, compressors, turbines, heating units, etc.), except those which are assigned under UN 3166 or UN 3363.

.2 Engines or machinery which are empty of liquid or gaseous fuels and which do not contain other dangerous goods, are not subject to this Code.

**Note 1:** An engine or machinery is considered to be empty of liquid fuel when the liquid fuel tank has been drained and the engine or machinery cannot be operated due to a lack of fuel. Engine or machinery components such as fuel lines, fuel filters and injectors do not need to be cleaned, drained or purged to be considered empty of liquid fuels. In addition, the liquid fuel tank does not need to be cleaned or purged.

**Note 2:** An engine or machinery is considered to be empty of gaseous fuels when the gaseous fuel tanks are empty of liquid (for liquefied gases), the positive pressure in the tanks does not exceed 2 bar and the fuel shut-off or isolation valve is closed and secured.

.3 Engines and machinery containing fuels meeting the classification criteria of Class 3, shall be consigned under the entries UN No. 3528 ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or

UN 3528 ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or UN 3528 MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or UN 3528 MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED, as appropriate.

.4 Engines and machinery containing fuels meeting the classification criteria of Class 2.1, shall be consigned under the entries UN 3529 ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or UN 3529 ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or UN 3529 MACHINERY, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or UN 3529 MACHINERY, FUEL CELL, FLAMMABLE GAS POWERED, as appropriate.

Engines and machinery powered by both a flammable gas and a flammable liquid shall be consigned under the appropriate UN 3529 entry.

.5 Engines and machinery containing liquid fuels meeting the classification criteria of 2.9.3 for environmentally hazardous substances and not meeting the classification criteria of any other Class or Division, shall be consigned under the entries UN 3530 ENGINE, INTERNAL COMBUSTION or UN 3530 MACHINERY, INTERNAL COMBUSTION, as appropriate.

.6 Engines or machinery may contain other dangerous goods than fuels (e.g. batteries, fire extinguishers, compressed gas accumulators or safety devices) required for their functioning or safe operation without being subject to any additional requirements for these other dangerous goods, unless otherwise specified in this Code. [However, lithium batteries shall meet the requirements of 2.9.4, except when otherwise specified by this Code (e.g. for prototype batteries and small production runs under special provision 310 or damaged batteries under special provision 376).]

.7 The engines or machinery are not subject to any other provisions of this Code, except for Part 7 and column 16a and 16b in the dangerous goods list, if the following conditions are met:

- .1 the engine or machinery, including the means of containment containing dangerous goods, shall be in compliance with the construction requirements specified by the competent authority;
- .2 any valves or openings (e.g. venting devices) shall be closed during transport;
- .3 the engines or machinery shall be oriented to prevent inadvertent leakage of dangerous goods and secured by means capable of restraining the engines or machinery to prevent any movement during transport which would change the orientation or cause them to be damaged;
- .4 for UN 3528 and UN 3530:
  - where the engine or machinery contains more than 60 L of liquid fuel and has a capacity of not more than 450 L, the labelling requirements of 5.2.2 shall apply.
  - where the engine or machinery contains more than 60 L of liquid fuel and has a capacity of more than 450 / but not more than 3,000 L, it shall be labelled on two opposing sides in accordance with 5.2.2.
  - where the engine or machinery contains more than 60 L of liquid fuel and has a capacity of more than 3,000 L, it shall be placarded on two opposing sides in accordance with 5.3.1.1.2;
  - For UN 3530, in addition the marking requirements of 5.2.1.6 apply.
- .5 for UN 3529:
  - where the fuel tank of the engine or machinery has a water capacity of not more than 450 L, the labelling requirements of 5.2.2 shall apply.
  - where the fuel tank of the engine or machinery has a water capacity of more than 450 L but not more than 1,000 L, it shall be labelled on two opposing sides in accordance with 5.2.2.
  - where the fuel tank of the engine or machinery has a water capacity of more than 1,000 L, it shall be placarded on two opposing sides in accordance with 5.3.1.1.2;
- .6 A transport document in accordance with 5.4 is required and shall contain the following additional statement "Transport in accordance with special provision 363".

SP 369 Amend the first paragraph to read as follows:

"In accordance with 2.0.3.5, this radioactive material in an excepted package possessing toxic and corrosive properties is classified in Class 6.1 with radioactive material and corrosivity subsidiary risks."

and replace the existing third paragraph with the following:

“In addition to the provisions applicable to the transport of Class 6.1 substances with a corrosivity subsidiary risk, the provisions of 5.1.3.2, 5.1.5.2.2, 5.1.5.4.1.2, 7.1.4.5.9, 7.1.4.5.10, 7.1.4.5.12, and 7.8.4.1 to 7.8.4.6 shall apply.”

SP 370 In the second indent, replace the words “that is not too sensitive for acceptance into Class 1” by “that gives a positive result”.

SP 372 Replace the existing sub-paragraph “.3” with the following:

“.3 Capacitors manufactured after 31 December 2015, shall be marked with the energy storage capacity in Wh.”

SP 373 In Sub-paragraphs “.2.1” and “.3.2”, after “absorbent” insert the words “or adsorbent” and after “absorb” insert the words “or adsorb”.

SP 915 Is deleted.

SP 961 The existing text is replaced by the following:

“961 Vehicles are not subject to the provisions of this Code if any of the following conditions are met:

- .1 vehicles are stowed on the vehicle, special category and ro-ro spaces or on the weather deck of a ro-ro ship or a cargo space designated by the Administration (flag State) in accordance with SOLAS 74, chapter II-2, regulation 20 as specifically designed and approved for the carriage of vehicles, and there are no signs of leakage from the battery, engine, fuel cell, compressed gas cylinder or accumulator, or fuel tank when applicable. When packed in a cargo transport unit the exception does not apply to container cargo spaces of a ro-ro ship. Vehicles powered solely by lithium batteries and hybrid electric vehicles powered by both an internal combustion engine and lithium metal or ion batteries, [the battery is of a type proved to meet the requirements of the Manual of Tests and Criteria, part III], subsection 38.3, unless otherwise approved by the competent authority;]
- .2 vehicles powered by a flammable liquid fuel with a flashpoint of 38°C or above, there are no leaks in any portion of the fuel system, the fuel tank(s) contains 450 L of fuel or less and installed batteries are protected from short-circuit;
- .3 vehicles powered by a flammable liquid fuel with a flashpoint less than 38°C, the fuel tank(s) are empty and installed batteries are protected from short circuit. Vehicles are considered to be empty of flammable liquid fuel when the fuel tank has been drained and the vehicles cannot be operated due to a lack of fuel. Engine components such as fuel lines, fuel filters and injectors do not need to be cleaned, drained or purged to be considered empty. The fuel tank does not need to be cleaned or purged;
- .4 vehicles powered by a flammable gas (liquefied or compressed), the fuel tank(s) are empty and 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;

- .5 vehicles solely powered by a wet or dry electric storage battery or a sodium battery, and the battery is protected from short circuit;

SP 962 Replace existing text with the following:

“962 vehicles, not meeting the conditions of special provision 961 shall be assigned to class 9 and shall meet the following requirements:

- .1 vehicles 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 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 unless otherwise approved by the competent authority;
- .3 for flammable gas powered vehicles, 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 be of a type proved to meet the requirements of the Manual of Tests and Criteria, part III, subsection 38.3, unless otherwise approved by the competent authority;]

The provisions of this Code relevant to marking, labelling, placarding and marine pollutants shall not apply.”

SP 970 Is deleted:

**Add the following new special provisions:**

“378 Radiation detectors containing this gas in non-refillable pressure receptacles not meeting the requirements of Chapter 6.2 and packing instruction P200 of 4.1.4.1 may be transported under this entry provided:

- .1 The working pressure in each receptacle does not exceed 50 bar;
- .2 The receptacle capacity does not exceed 12 litres;
- .3 Each receptacle has a minimum burst pressure of at least 3 times the working pressure when a relief device is fitted and at least 4 times the working pressure when no relief device is fitted;
- .4 Each receptacle is manufactured from material which will not fragment upon rupture;
- .5 Each detector is manufactured under a registered quality assurance programme;

**Note:** ISO 9001:2008 may be used for this purpose.

- .6 Detectors are transported in strong outer packagings. The complete package shall be capable of withstanding a 1.2 metre drop test without breakage of the detector or rupture of the outer packaging. Equipment that includes a detector shall be packed in a strong outer packaging unless the detector is afforded equivalent protection by the equipment in which it is contained; and



- .7 The transport document includes the following statement "Transport in accordance with special provision 378".

Radiation detectors, including detectors in radiation detection systems, are not subject to any other requirements of this Code if the detectors meet the requirements in .1 to .6 above and the capacity of detector receptacles does not exceed 50 ml."

"379 Anhydrous ammonia adsorbed or absorbed on a solid contained in ammonia dispensing systems or receptacles intended to form part of such systems are not be subject to the other provisions of this Code if the following conditions are observed:

- .1 The adsorption or absorption presents the following properties:
- .1 the pressure at a temperature of 20 °C in the receptacle is less than 0.6 bar;
  - .2 the pressure at a temperature of 35 °C in the receptacle is less than 1 bar;
  - .3 the pressure at a temperature of 85 °C in the receptacle is less than 12 bar.
- .2 The adsorbent or absorbent material shall not have dangerous properties listed in Classes 1 to 8;
- .3 The maximum contents of a receptacle shall be 10 kg of ammonia; and
- .4 Receptacles containing adsorbed or absorbed ammonia shall meet the following conditions:
- .1 receptacles shall be made of a material compatible with ammonia as specified in ISO 11114-1:2012;
  - .2 receptacles and their means of closure shall be hermetically sealed and able to contain the generated ammonia;
  - .3 each receptacle shall be able to withstand the pressure generated at 85 °C with a volumetric expansion no greater than 0.1%;
  - .4 each receptacle shall be fitted with a device that allows for gas evacuation once pressure exceeds 15 bar without violent rupture, explosion or projection; and
  - .5 each receptacle shall be able to withstand a pressure of 20 bar without leakage when the pressure relief device is deactivated.

When transported in an ammonia dispenser, the receptacles shall be connected to the dispenser in such a way that the assembly is guaranteed to have the same strength as a single receptacle.

The properties of mechanical strength mentioned in this special provision shall be tested using a prototype of a receptacle and/or dispenser filled to nominal capacity, by increasing the temperature until the specified pressures are reached.

The test results shall be documented, shall be traceable and shall be communicated to the relevant authorities upon request."

"380 If a vehicle is powered by a flammable liquid and a flammable gas internal combustion engine, it shall be assigned to UN 3166 VEHICLE, FLAMMABLE GAS POWERED."

- “381 Large packagings conforming to the packing group III performance level used in accordance with packing instruction LP02 of 4.1.4.3, as prescribed in the IMDG Code (amendment 37-14), may be used until 31 December 2022.”.
- “382 Polymeric beads may be made from polystyrene, poly (methyl methacrylate) or other polymeric material. When it can be demonstrated that no flammable vapour, resulting in a flammable atmosphere, is evolved according to test U1 (Test method for substances liable to evolve flammable vapours) of Part III, sub-section 38.4.4 of the Manual of Tests and Criteria, polymeric beads, expandable need not be classified under this UN number. This test should only be performed when de-classification of a substance is considered.”
- “383 Table tennis balls manufactured from celluloid are not subject to this Code where the net mass of each table tennis ball does not exceed 3.0 g and the total net mass of table tennis balls does not exceed 500 g per package.”
- “384 The label to be used is Model No 9A, see 5.2.2.2.2.

**Note:** The Class 9 label (Model No 9) may continue to be used until 31 December 2018.”

- “385 This entry applies to vehicles powered by flammable liquid or gas internal combustion engines or fuel cells.

Hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the batteries installed shall be consigned under this entry. Vehicles powered by wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the batteries installed, shall be consigned under the entry UN No. 3171 BATTERY-POWERED VEHICLE (see special provision 240).

For the purpose of this special provision, vehicles are self-propelled apparatus designed to carry one or more persons or goods. Examples of such vehicles are cars, motorcycles, trucks, locomotives, scooters, three- and four-wheeled vehicles or motorcycles, lawn tractors, self-propelled farming and construction equipment, boats and aircraft.

Dangerous goods such as batteries, air bags, fire extinguishers, compressed gas accumulators, safety devices and other integral components of the vehicle that are necessary for the operation of the vehicle or for the safety of its operator or passengers, shall be securely installed in the vehicle and are not otherwise subject to this Code. [However, lithium batteries shall meet the requirements of 2.9.4, except when otherwise specified by this Code (e.g. for prototype batteries and small production runs under special provision 310 or damaged batteries under special provision 376).”]

- “386 When substances are stabilized by temperature control, the provisions of 7.3.7 apply. When chemical stabilization is employed, the person offering the packaging, IBC or tank for transport shall ensure that the level of stabilization is sufficient to prevent the substance in the packaging, IBC or tank from dangerous polymerization at a bulk mean temperature of 50 °C, or, in the case of a portable tank, 45 °C. Where chemical stabilization becomes ineffective at lower temperatures within the anticipated duration of transport, temperature control is required. In making this determination factors to

be taken into consideration include, but are not limited to, the capacity and geometry of the packaging, IBC or tank and the effect of any insulation present, the temperature of the substance when offered for transport, the duration of the journey and the ambient temperature conditions typically encountered in the journey (considering also the season of year), the effectiveness and other properties of the stabilizer employed, applicable operational controls imposed by regulation (e.g. requirements to protect from sources of heat, including other cargo transported at a temperature above ambient) and any other relevant factors.”

“971 Battery powered equipment may only be transported provided that the battery shows no sign of leakage and is protected from short-circuit. In this case, no other provisions of this Code apply.”

### **Chapter 3.4**

#### **Dangerous goods packed in limited quantities**

##### **3.4.5 Marking and placarding**

3.4.5.1 Replace “marking” by “mark” wherever it appears (5 times) and the Note at the end is deleted.

3.4.5.2 Replace “marking” by “mark” wherever it appears (5 times) and the Note at the end is deleted.

##### **3.4.5.3. Multimodal recognition of marks**

3.4.5.3.1 Replace “marking” by “mark” wherever it appears (2 times) and in the second line replace “markings” by “mark”.

3.4.5.3.2 At the end of the first sentence, replace “marking” by “mark”.

3.4.5.4 Replace “marking” by “mark” and “markings” by “marks” (twice)” and after the words “in the overpack are visible.” insert a new sentence with the following:

“The lettering of the “OVERPACK” mark shall be at least 12 mm high.”

##### **3.4.5.5 Placarding and marking of cargo transport units**

3.4.5.5.4 In the first sentence replace the word “marking” by “mark”.

### **Chapter 3.5**

#### **Dangerous goods packed in excepted quantities**

##### **3.5.2 Packagings**

3.5.2.1.2 After the first sentence, replace the remaining text with the following:

“3.5.2.1.2 For liquid dangerous goods, the intermediate or outer packaging shall contain sufficient absorbent material to absorb the entire contents of the inner packagings. When placed in the intermediate packaging, the absorbent material may be the cushioning material. Dangerous goods shall not react dangerously with cushioning, absorbent material and packaging material or reduce the integrity or function of the materials.

Regardless of its orientation, the package shall completely contain the contents in case of breakage or leakage;

3.5.2.1.5 Replace “markings” by “marks”.

#### **3.5.4 Marking of packages**

3.5.4.2 In the paragraph after the figure, replace “marking” by “mark”.

3.5.4.3 Replace existing text under 3.5.4.3 including the Note with the following:

“When packages containing dangerous goods packed in excepted quantities are placed in an overpack or in a unit load, the overpack or the unit load shall be marked with the mark required by this chapter unless the marks 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 marks representative of all dangerous goods, as required by this chapter, in the overpack are visible. The lettering of the “OVERPACK” mark shall be at least 12 mm high. The other provisions of 5.1.2.1 apply only if other dangerous goods which are not packed in excepted quantities are contained in the overpack or in a unit load and only in relation to these other dangerous goods.”

### **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**

4.1.1.5 In the second sentence, replace “markings” by “marks” and the reference “5.2.1.7” is replaced by “5.2.1.7.1”.

4.1.1.12 Replace the existing introductory sentence to read as follows:

“Every packaging as specified in Chapter 6.1 intended to contain liquids shall successfully undergo a suitable leakproofness test. This test is part of a quality assurance programme as stipulated in 6.1.1.3 which shows the capability of meeting the appropriate test level indicated in 6.1.5.4.4”.

4.1.1.18 Amend the heading to read as follows: **“Use of salvage packagings and large salvage packagings”**.

4.1.1.18.1 In the first sentence, insert “and 6.6.5.1.9” after “6.1.5.1.11” and replace the second sentence with the following:

“This does not prevent the use of a larger size packaging or large packaging of appropriate type and performance level and under the conditions of 4.1.1.18.2 and 4.1.1.18.3.”

4.1.1.18.4 The paragraph is deleted

4.1.1.19.1 In the Note, replace “markings” by “marks”.

4.1.1.19.2 Add a second sentence to read as follows:

“The maximum size of the placed pressure receptacle is limited to a water capacity of 1 000 litres.”. Add a penultimate sentence to read as follows: “In this case the total sum of water capacities of the placed pressure receptacles shall not exceed 1,000 litres.”.

#### **4.1.2 Additional general provisions for the use of IBCs**

4.1.2.4 At the end, before the sub-paragraphs, replace “marking” by “mark”.

#### **4.1.4 List of packing instructions**

##### **4.1.4.1 Packing instructions concerning the use of packagings (except IBCs and large packagings)**

**4.1.4.1 P002** The following new special packing provision is inserted: “PP 100 For UN Nos.1309, 1323, 1333, 1376, 1435, 1449, 1457, 1472, 1476, 1483, 1509, 1516, 1567, 1869, 2210, 2858, 2878, 2968, 3089, 3096 and 3125, flexible, fibreboard or wooden packagings shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner.”

4.1.4.1 P003 The following new special packing provision is inserted: “PP 100 For UN Nos. 1408 and 2793 flexible, fibreboard or wooden packagings shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner.”

4.1.4.1 P 403: Under special packing provision PP 31, the following UN 1436 is inserted.

4.1.4.1 P410: Under special packing provision PP 31, the following UN Nos are inserted: 1395, 1396, 1398, 1402, 1409, 1418, 1436, 3131, 3132, 3134, 3135, 3395, 3396, 3397 and under special packing provision PP 40 the following UN Nos are inserted: 1395, 1398 and 1403. The following new special packing provision is inserted: “PP 100 For UN 2950 flexible, fibreboard or wooden packagings shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner.”

4.1.4.1 For packing instruction P001, add a new special packing provision “PP93” to read:

“PP93 For UN Nos. 3532 and 3534, packagings shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the packagings in the event of loss of stabilization.”.

4.1.4.1 For packing instruction P002, add a new special packing provision “PP92” to read:

“PP92 For UN Nos. 3531 and 3533, packagings shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the packagings in the event of loss of stabilization.”.

4.1.4.1 In packing instructions P112 (c), P114 (b) and P406 for special packing provision PP48, add a new last sentence to read as follows:

“Packagings of other material with a small amount of metal, for example metal closures or other metal fittings such as those mentioned in 6.1.4, are not considered metal packagings.”

4.1.4.1 In packing instruction P130 for special packing provision PP67 replace “and 0502” by “, 0502 and 0510”

4.1.4.1 In packing instruction P137 for special packing provision PP70, replace “the package marked THIS SIDE UP” by “the package shall be marked in accordance with 5.2.1.7.1”.

4.1.4.1 In packing instruction P200 (2), amend to read as follows:

"(2) The following three tables cover compressed gases (Table 1), liquefied and dissolved gases (Table 2) and substances not in Class 2 (Table 3). They provide:

- (a) The UN number, name and description, and classification of the substance;
- (b) The LC<sub>50</sub> for toxic substances;
- (c) The types of pressure receptacles authorised for the substance, shown by the letter “X”;
- (d) The maximum test period for periodic inspection of the pressure receptacles.

**Note:** For pressure receptacles which make use of composite materials, the maximum test period shall be 5 years. The test period may be extended to that specified in Tables 1 and 2 (i.e. up to 10 years), if approved by the competent authority of the country of use.

- (e) The minimum test pressure of the pressure receptacles;
- (f) The maximum working pressure of the pressure receptacles for compressed gases (where no value is given, the working pressure shall not exceed two thirds of the test pressure) or the maximum filling ratio(s) dependent on the test pressure(s) for liquefied and dissolved gases;
- (g) Special packing provisions that are specific to a substance."

4.1.4.1 In packing instruction P200 (3) insert a new sub-paragraph (e) to read as follows:

“(e) For liquefied gases charged with compressed gases, both components – the liquid phase and the compressed gas – have to be taken into consideration in the calculation of the internal pressure in the pressure receptacle.

The maximum mass of contents per litre of water capacity shall not exceed 0.95 times the density of the liquid phase at 50 °C; in addition, the liquid phase shall not completely fill the pressure receptacle at any temperature up to 60 °C.

When filled, the internal pressure at 65 °C shall not exceed the test pressure of the pressure receptacles. The vapour pressures and volumetric expansions of all substances in the pressure receptacles

shall be considered. When experimental data is not available, the following steps shall be carried out:

- (i) Calculation of the vapour pressure of the liquid component and of the partial pressure of the compressed gas at 15 °C (filling temperature);
- (ii) Calculation of the volumetric expansion of the liquid phase resulting from the heating from 15 °C to 65 °C and calculation of the remaining volume for the gaseous phase;
- (iii) Calculation of the partial pressure of the compressed gas at 65 °C considering the volumetric expansion of the liquid phase;  
NOTE: The compressibility factor of the compressed gas at 15 °C and 65 °C shall be considered.
- (iv) Calculation of the vapour pressure of the liquid component at 65 °C;
- (v) The total pressure is the sum of the vapour pressure of the liquid component and the partial pressure of the compressed gas at 65 °C;
- (vi) Consideration of the solubility of the compressed gas at 65 °C in the liquid phase;

The test pressure of the pressure receptacle shall not be less than the calculated total pressure minus 100 kPa (1bar).

If the solubility of the compressed gas in the liquid component is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph (vi)) into account.”.

**[4.1.4.1 In packing instruction P200 insert a new paragraph (4) to read as follows:**

**“(4) The filling of pressure receptacles shall be carried out by qualified staff using appropriate equipment and procedures.  
The procedures should include checks of:]**

- The conformity of receptacles and accessories with the provisions of this Code;
- Their compatibility with the product to be transported;
- The absence of damage which might affect safety;
- Compliance with the degree or pressure of filling, as appropriate;
- Marks and identification.

These requirements are deemed to be met if the following standards are applied:

ISO 10691: 2004	Gas cylinders – Refillable welded steel cylinders for liquefied petroleum gas (LPG) – Procedures for checking before, during and after filling.
ISO 11372: 2011	Gas cylinders – Acetylene cylinders – Filling conditions and filling inspection
ISO 11755: 2005	Gas cylinders – Cylinder bundles for compressed and liquefied gases (excluding acetylene) – Inspection at time of filling

ISO 13088: 2011	Gas cylinders – Acetylene cylinder bundles – Filling conditions and filling inspection
ISO 24431:2006	Gas cylinders – Cylinders for compressed and liquefied gases (excluding acetylene) – Inspection at time of filling

[4.1.4.1 In packing instruction P200 renumber existing paragraph “(4)” as “(5)” and replace this paragraph with the following:]

In special provision p, in the two first paragraphs, replace “or ISO 3807-2:2000” by “, ISO 3807-2:2000 or ISO 3807:2013”, twice. In the last paragraph, replace “conforming to ISO 3807-2:2000” by “fitted with a fusible plug”.

in special provision u, replace “ISO 7866:1999” by “ISO 7866:2012 + Cor 1:2014”.

4.1.4.1 In packing instruction P200, Table 3, at the end, delete the entry for UN No. 2983.

4.1.4.1 In packing instruction P205 (6) replace “markings” by “mark”.

[4.1.4.1 In packing instruction P206 paragraph (3), at the end the following text is added:]

“For liquids charged with a compressed gas both components – the liquid phase and the compressed gas – have to be taken into consideration in the calculation of the internal pressure in the pressure receptacle. When experimental data is not available, the following steps shall be carried out:

- (a) Calculation of the vapour pressure of the liquid component and of the partial pressure of the compressed gas at 15 °C (filling temperature);
- (b) Calculation of the volumetric expansion of the liquid phase resulting from the heating from 15 °C to 65 °C and calculation of the remaining volume for the gaseous phase;
- (c) Calculation of the partial pressure of the compressed gas at 65 °C considering the volumetric expansion of the liquid phase;

**Note:** The compressibility factor of the compressed gas at 15 °C and 65 °C shall be considered.

- (d) Calculation of the vapour pressure of the liquid component at 65 °C;
- (e) The total pressure is the sum of the vapour pressure of the liquid component and the partial pressure of the compressed gas at 65 °C;
- (f) Consideration of the solubility of the compressed gas at 65 °C in the liquid phase.

The test pressure of the cylinders or pressure drums shall not be less than the calculated total pressure minus 100 kPa (1bar).

If the solubility of the compressed gas in the liquid component is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph (f)) into account.”

[4.1.4.1 In packing instruction P206 paragraph (4), is deleted]

4.1.4.1 In packing instruction P207, in the last sentence before the special packing provision, after the word “to prevent” insert “excessive”.



4.1.4.1 In packing instruction P208 (1), amend to read as follows:

“(1) The following packagings are authorized provided the general packing requirements of **4.1.6.1** are met:

- (a) Cylinders constructed as specified in 6.2.2 and in accordance with ISO 11513:2011 or ISO 9809-1:2010; and
- (b) Cylinders constructed before 1 January 2016 in accordance with 6.2.3 and a specification approved by the competent authorities of the countries of transport and use.”.

4.1.4.1 In packing instructions P403 and P410, delete special packing provision “PP83” and insert “PP83      *Deleted*”.

4.1.4.1 Packing instruction P502, amend special packing provision “PP28” to read as follows:

“PP28      For UN No. 1873, parts of packagings which are in direct contact with perchloric acid shall be constructed of glass or plastics.”.

4.1.4.1 In packing instruction P650 (10), replace “markings” by “marks”.

4.1.4.1 Packing instruction P805, is renumbered as “P603” and relocated accordingly.

4.1.4.1 Packing instruction P906 (1), amend to read as follows:

“For liquids and solids containing or contaminated with PCBs, polyhalogenated biphenyls, polyhalogenated terphenyls or halogenated monomethyldiphenylmethanes: Packagings in accordance with P001 or P002, as appropriate.”

4.1.4.1 In packing instruction P906 (2) (b), amend the end of the first sentence to read as follows:

“PCBs, polyhalogenated biphenyls, polyhalogenated terphenyls or halogenated monomethyldiphenylmethanes present in them.”

4.1.4.1 In packing instruction P909 (3), amend the beginning of the last sentence to read: “Equipment may also be...”. Remainder unchanged.

Add the following new packing instructions:

P005	PACKING INSTRUCTION	P005
This instruction applies to UN Nos. 3528, 3529 and 3530.		
<p>If the engine or machinery is constructed and designed so that the means of containment containing the dangerous goods affords adequate protection, an outer packaging is not required.</p> <p>Dangerous goods in engines or machinery shall otherwise be packed in outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, and meeting the applicable requirements of 4.1.1.1, or they shall be fixed in such a way that they will not become loose during normal conditions of transport, e.g. in cradles or crates or other handling devices.</p> <p>In addition, the manner in which means of containment are contained within the engine or machinery, shall be such that under normal conditions of transport, damage to the means of containment containing the dangerous goods is prevented; and in the event of damage to the means of containment containing liquid dangerous goods, no leakage of the dangerous goods from the engine or machinery is possible (a leakproof liner may be used to satisfy this requirement).</p> <p>Means of containment containing dangerous goods shall be so installed, secured or cushioned as to prevent their breakage or leakage and so as to control their movement within the engine or machinery during normal conditions of transport. Cushioning material shall not react dangerously with the content of the means of containment. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material.</p>		
<p><b>Additional requirement:</b> Other dangerous goods (e.g. batteries, fire extinguishers, compressed gas accumulators or safety devices) required for the functioning or safe operation of the engine or machinery shall be securely mounted in the engine or machine.</p>		

P412	PACKING INSTRUCTION	P412
This instruction applies to UN No. 3527		
<p>The following combination packagings are authorized, provided that the general provisions of 4.1.1 and 4.1.3 are met:</p> <p>(1) Outer packagings: Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G); Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2) Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2);</p> <p>(2) Inner packagings: (a) The activator (organic peroxide) shall have a maximum quantity of 125 ml per inner packaging if liquid, and 500 g per inner packaging if solid. (b) The base material and the activator shall be each separately packed in inner packagings.</p> <p>The components may be placed in the same outer packaging provided that they will not interact dangerously in the event of a leakage.</p>		

<b>P412</b>	<b>PACKING INSTRUCTION</b>	<b>P412</b>
Packagings shall conform to the packing group II or III performance level according to the criteria for Class 4.1 applied to the base material.		

P910	PACKING INSTRUCTION	P910
	<p>This instruction applies to UN Nos. 3090, 3091, 3480 and 3481 production runs consisting of not more than 100 cells and batteries and to pre-production prototypes of cells and batteries when these prototypes are transported for testing.</p>	
	<p>The following packagings are authorized provided that the general provisions of <b>4.1.1</b> and <b>4.1.3</b> are met:</p> <p>(1) For cells and batteries, including when packed with equipment:</p> <p style="padding-left: 40px;">Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);</p> <p style="padding-left: 40px;">Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);</p> <p style="padding-left: 40px;">Jerricans (3A2, 3B2, 3H2).</p> <p>Packagings shall conform to the packing group II performance level and shall meet the following requirements:</p> <ul style="list-style-type: none"> <li>(a) Batteries and cells, including equipment, of different sizes, shapes or masses shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;</li> <li>(b) Each cell or battery shall be individually packed in an inner packaging and placed inside an outer packaging;</li> <li>(c) Each inner packaging shall be completely surrounded by sufficient non-combustible and non-conductive thermal insulation material to protect against a dangerous evolution of heat;</li> <li>(d) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the cells or batteries within the package that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and non-conductive may be used to meet this requirement;</li> <li>(e) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured;</li> <li>(f) A cell or battery with a net mass of more than 30 kg shall be limited to one cell or battery per outer packaging.</li> </ul> <p>(2) For cells and batteries contained in equipment:</p> <p style="padding-left: 40px;">Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);</p> <p style="padding-left: 40px;">Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);</p> <p style="padding-left: 40px;">Jerricans (3A2, 3B2, 3H2).</p> <p>Packagings shall conform to the packing group II performance level and shall meet the following requirements:</p> <ul style="list-style-type: none"> <li>(a) Equipment of different sizes, shapes or masses shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;</li> <li>(b) The equipment shall be constructed or packaged in such a manner as to prevent accidental operation during transport;</li> <li>(c) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the equipment within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it shall be non-combustible and non-conductive; and</li> <li>(d) Non-combustibility shall be assessed according to a standard recognized in the</li> </ul>	

P910	PACKING INSTRUCTION	P910
	country where the packaging is designed or manufactured.	
	<p>(3) The equipment or the batteries may be transported unpackaged under conditions specified by the competent authority. Additional conditions that may be considered in the approval process include, but are not limited to:</p> <p>(a) The equipment or the battery shall be strong enough to withstand the shocks and loadings normally encountered during transport, including transshipment between cargo transport units and between cargo transport units and warehouses as well as any removal from a pallet for subsequent manual or mechanical handling; and</p> <p>(b) The equipment or the battery shall be fixed in cradles or crates or other handling devices in such a way that it will not become loose during normal conditions of transport.</p>	
	<p><b>Additional requirements</b></p> <p>The cells and batteries shall be protected against short circuit; Protection against short circuits includes, but is not limited to,</p> <ul style="list-style-type: none"> <li>- individual protection of the battery terminals,</li> <li>- inner packaging to prevent contact between cells and batteries,</li> <li>- batteries with recessed terminals designed to protect against short circuits, or</li> <li>- the use of a non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging.</li> </ul>	

#### 4.1.4 List of packing instructions

##### 4.1.4.2 Packing instructions concerning the use of IBCs

4.1.4.2 In packing instruction IBC03, add a new special packing provision "B19" to read as follows:

"B19 For UN Nos. 3532 and 3534, IBCs shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the IBCs in the event of loss of stabilization."

4.1.4.2 In packing instruction IBC 04, add special packing provision "B4" to read as follows:

"B 4 Flexible, fibreboard or wooden IBCs shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner."

4.1.4.2 In packing instruction IBC 06, add special packing provision "B4" to read as follows:

"B 4 Flexible, fibreboard or wooden IBCs shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner."

4.1.4.2 In packing instruction IBC07, add a new special packing provision "B18" to read:

“B18 For UN Nos. 3531 and 3533, IBCs shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the IBCs in the event of loss of stabilization.”

and add special packing provision “B4” to read as follows:

“B 4 Flexible, fibreboard or wooden IBCs shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner.”

4.1.4.2 In packing instruction IBC520, add the following new entries:

<i>UN No.</i>	<i>Organic peroxide</i>	<i>Type of IBC</i>	<i>Maximum quantity (litres)</i>	<i>Control temperature</i>	<i>Emergency Temperature</i>
3109	tert-Butyl cumyl peroxide	31HA1	1000		
3119	1,1,3,3-Tetramethylbutyl peroxy-2-ethylhexanoate, not more than 67%, in diluent type A	31HA1	1000	+15 °C	+20 °C

4.1.4.2 In packing instruction IBC520, for UN No. 3119, in the entry for “Di-(2-ethylhexyl) peroxydicarbonate, not more than 62%, stable dispersion, in water”, add the following new row:

<i>Type of IBC</i>	<i>Maximum quantity (litres)</i>	<i>Control temperature</i>	<i>Emergency Temperature</i>
31HA1	1000	-20 °C	-10 °C

[4.1.4.3 LP 02 Add a new special large-packing provision "L3" to read as follows:

“L3 For UN Nos.1309, 1376, 1483, 1869, 2793, 2858 and 2878, flexible or fibre inner packagings shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner.”

4.1.4.3 LP 02 Add a new special large-packing provision "L4" to read as follows:

“L4 For UN Nos.1932, 2008, 2009, 2545, 2546, 2881 and 3189 flexible or fibre inner packagings shall be hermetically sealed.”]

4.1.4.3, packing instruction LP02, replace special packing instruction L2 by “L2 Deleted”.

4.1.4.3, packing instruction LP101 In special packing instruction L1, replace “and 0502” by “, 0502 and 0510”.

4.1.4.3 Add the following new packing instruction:

<b>LP200</b>	<b>PACKING INSTRUCTION</b>	<b>LP200</b>
This instruction applies to UN No. 1950.		
<p>The following large packagings are authorized for aerosols, provided that the general provisions of <b>4.1.1</b> and <b>4.1.3</b> are met:</p> <p>Rigid large packagings conforming to the packing group II performance level, made of:</p> <ul style="list-style-type: none"> <li>steel (50A);</li> <li>aluminium (50B);</li> <li>metal other than steel or aluminium (50N);</li> <li>rigid plastics (50H);</li> <li>natural wood (50C);</li> <li>plywood (50D);</li> <li>reconstituted wood (50F);</li> <li>rigid fibreboard (50G).</li> </ul>		
<p><b>Special packing provision:</b></p> <p><b>L2</b> The large packagings shall be designed and constructed to prevent dangerous movement of the aerosols and inadvertent discharge during normal conditions of transport. For waste aerosols transported in accordance with special provision 327, the large packagings shall have a means of retaining any free liquid that might escape during transport, e.g. absorbent material. The large packagings shall be adequately ventilated to prevent the creation of a flammable atmosphere and the build-up of pressure.</p>		

#### 4.1.6 Special packing provisions for goods of class 2

4.1.6.1.2 Replace the reference “ISO 11114-2:2000” by “ISO 11114-2:2013”.

4.1.6.1.8 In the penultimate paragraph, after “annex A of ISO 10297:2006”, insert “or annex A of ISO 10297:2014”.

4.1.6.1.12.3 Replace “markings” by “marks”.

4.1.6.1.13.4 Replace “markings” by “marks”.

#### 4.1.8 Special packing provisions for infectious substances of category A (Class 6.2, UN Nos. 2814 and 2900)

4.1.8.4 Replace “marking” by “mark”.

### Chapter 4.2 Use of portable tanks and multiple-element gas containers (MEGCs)

#### 4.2.0 Transitional provisions

4.2.0.1 The definition for *IMO type 5 tank* is replaced with the following:

"IMO type 5 tank means a portable tank fitted with pressure-relief devices which is used for non-refrigerated liquefied gases of Class 2."

4.2.0.3 At the end, add the following new paragraph:

"IMO portable tanks manufactured before 1 January 2003 shall be marked with an indication of the portable tank instruction for which it meets the minimum test pressure, minimum shell thickness, pressure relief requirements and bottom opening requirements as shown in 4.2.5.2.6 as required in 6.7.2.20.2, 6.7.3.16.2 and 6.7.4.15.2. These portable tanks need not be marked with the portable tank instruction until the next periodic inspection and test after 1 January 2018."

#### **4.2.1 General provisions for the use of portable tanks for the transport of substances of class 1 and classes 3 to 9**

##### **4.2.1.13 Additional provisions applicable to the transport of class 5.2 substances and class 4.1 self-reactive substances in portable tanks**

4.2.1.13.14 Replace "marking" by "mark".

#### **4.2.4 General provisions for the use of multiple-element gas containers (ME GCs)**

##### **4.2.4.5 Filling**

4.2.4.5.6.3 Replace "markings" by "marks".

##### **4.2.4.6 Filled MEGCs shall not be offered for transport;**

4.2.4.6.4 Replace "markings" by "marks".

#### **4.2.5 Portable tank instructions and special provisions**

##### **4.2.5.3 Portable tank special provisions**

4.2.5.3 Delete TP23 and insert "TP23 [Reserved]".

### **Chapter 4.3 Use of bulk containers**

#### **4.3.1 General provisions**

4.3.1.16.2 In the last sentence, insert "or the ingress of water" after "foreign substances".

## **PART 5 CONSIGNMENT PROCEDURES**

### **Chapter 5.1 General provisions**

#### **5.1.2 Use of overpacks and unit loads**

5.1.2.1 The existing Note at the end is deleted.



5.1.2.2 In the third sentence, replace “marking” by “mark”.

5.1.2.3 Replace “markings” by “marks” (twice) and replace the reference “5.2.1.7” by “5.2.1.7.1”.

## **Chapter 5.2**

### **Marking and labelling of packages including IBCs**

#### **5.2.1 Marking of packages including IBCs**

5.2.1.1 Replace “marking” by “mark” wherever it appears (twice).

5.2.1.2 In the introductory sentence and sub-paragraph .4, replace “markings” by “marks”.

5.2.1.3 In the second sentence replace “marking” by “mark” and the Note is deleted.

5.2.1.5.1 In the second sentence replace “markings” by “marks”.

5.2.1.5.7 Replace “marking” by “mark”.

5.2.1.6.2 Replace “markings” by “marks”.

5.2.1.6.3 In the paragraph after the figure, replace “marking” by “mark” (twice); Note 2 is deleted and “Note 1” becomes “Note”.

5.2.1.7 Insert a new heading **“5.2.1.7 Orientation arrows”**. The reference in the existing text in 5.2.1.7” is replaced by ““5.2.1.7.2”. The existing “5.2.1.7” is renumbered as “5.2.1.7.1” and the remaining paragraphs are renumbered accordingly.

5.2.1.10 Add a new paragraph 5.2.1.10 to read as follows:

#### **“5.2.1.10 Lithium battery mark**

5.2.1.10.1 Packages containing lithium cells or batteries prepared in accordance with special provision 188 shall be marked as shown in Figure below.

5.2.1.10.2 The mark shall indicate the UN number, preceded by the letters “UN”, i.e. ‘UN 3090’ for lithium metal cells or batteries or ‘UN 3480’ for lithium ion cells or batteries. Where the lithium cells or batteries are contained in, or packed with, equipment, the UN number preceded by the letters “UN”, i.e. ‘UN 3091’ or ‘UN 3481’ as appropriate shall be indicated. Where a package contains lithium cells or batteries assigned to different UN numbers, all applicable UN numbers shall be indicated on one or more marks.



Lithium battery mark

- \* Place for UN number(s)
- \*\* Place for telephone number for additional information

The mark shall be in the form of a rectangle with hatched edging. The dimensions shall be a minimum of 120 mm wide x 110 mm high and the minimum width of the hatching shall be 5 mm. The symbol (group of batteries, one damaged and emitting flame, above the UN number for lithium ion or lithium metal batteries or cells) shall be black on white. The hatching shall be red. If the size of the package so requires, the dimensions/line thickness may be reduced to not less than 105 mm wide x 74 mm high. Where dimensions are not specified, all features shall be in approximate proportion to those shown.”.

## 5.2.2 Labelling of packages including IBCs

5.2.2.1 Replace “markings” by “marks”.

5.2.2.1.6.1 Replace “marking” by “mark”.

5.2.2.1.6.2 Replace “marking” by “mark”.

5.2.2.1.12.1 In the penultimate sentence, replace “markings” by “marks”.

5.2.2.2.1.1 In the text under the figure, in note \*\*, after “text/number” insert “/symbol”.

5.2.2.2.1.1.3 Delete the Note

5.2.2.2.1.2 At the end, add a new Note to read as follows:

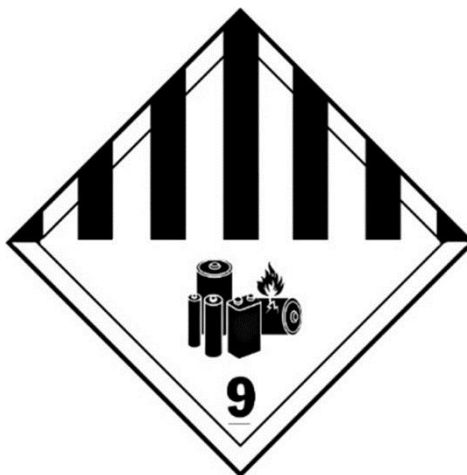
**“Note:** When the diameter of the cylinder is too small to permit the display of the reduced size labels on the non-cylindrical upper part of the cylinder, the reduced sized labels may be displayed on the cylindrical part.”.

5.2.2.2.1.3 In the second sentence, after “the hazard class (e.g. “flammable”)” insert “or for label No. 9A the symbol”.

5.2.2.2.1.5 At the end, add the following sentence: “For label 9A, no text other than the class mark shall be included in the bottom part of the label.”.

5.2.2.2.2 Under “CLASS 9 Miscellaneous dangerous substances and articles, including environmentally hazardous substances”, after the generic Class 9 label, add the following:

“



(No.9A)

Symbol (seven vertical black stripes in upper half; battery group, one broken and emitting flame in lower half): black;  
Background: white;  
Figure “9” underlined in bottom corner”.

## **Chapter 5.3**

### **Placarding and marking of cargo transport units**

#### **5.3.1 Placarding**

##### **5.3.1.1 Placarding provisions**

5.3.1.1.2 At the end, insert a new paragraph with the following:

“For dangerous goods of class 9 the placard shall correspond to the label model No.9 as in 5.2.2.2.2; label model No. 9A is not relevant for placarding purposes.”

##### **5.3.1.1.4 Placarding requirements**

5.3.1.1.4.1 In subparagraph .1 replace “less” by “ not more” and in subparagraph .3, at the end, after “relevant compartments” replace “; and” with the following:

“If all compartments are required to display the same placards, these placards need to be displayed only once along each side of the cargo transport unit; and”.

#### **5.3.2 Marking of cargo transport units**

##### **5.3.2.0 Display of proper shipping name**

5.3.2.0.2 Replace “less” by “not more”.

#### **5.3.2.1 Display of UN numbers**

5.3.2.1.2 In subparagraph .2, insert a new second sentence with the following:

“For portable tanks with a capacity of not more than 3,000 litres, the UN number may be displayed on an orange rectangular panel of appropriately reduced size on the external surface of the tank in characters not less than 25 mm high.”

#### **5.3.2.2 Elevated temperature substances**

5.3.2.2.1 In the paragraph under the figure, replace “marking” by “mark”; replace “less” by “not more” and the Note is deleted

#### **5.3.2.3 Marine pollutant mark**

5.3.2.3.2 Replace “less” by “not more”

### **Chapter 5.4 Documentation**

#### **5.4.1 Dangerous goods transport information**

##### **5.4.1.5 Information required in addition to the dangerous goods description**

##### **5.4.1.5.5 Self-reactive substances and organic peroxides**

5.4.1.5.5 Replace existing heading with the following:

“Self-reactive substances, polymerizing substances and organic peroxides”

5.4.1.5.5 In the introductory text, after the words “self-reactive substances” insert “and polymerizing substances”

5.4.1.5.16 Insert a new sub section 5.4.1.5.16 to read as follows:

##### **“5.4.1.5.16 Classification where new data is available (see 2.0.0.2)”**

For transport in accordance with 2.0.0.2, a statement to this effect shall be included in the transport document, as follows “Classified in accordance with 2.0.0.2”.

5.4.1.5.17 Insert a new sub section 5.4.1.5.17 to read as follows:

##### **“5.4.1.5.17 Transport of UN Nos. 3528, 3529 and 3530”**

For transport of UN Nos. 3528, 3529 and 3530, the transport document shall contain the following additional statement “Transport in accordance with special provision 363”.

#### **5.4.2 Container/vehicle parking certificate**

5.4.2.1.4 The footnote referencing “IMO/ILO/UNECE Guidelines.....” is replaced by “See CTU Code”

## **Chapter 5.5 Special provisions**

### **5.5.2 Special provisions applicable to fumigated cargo transport units (UN 3359)**

#### **5.5.2.3 Marking and placarding**

5.5.2.3.2 In the paragraph after the figure, replace “marking” by “mark” (twice) and the Note is deleted

### **5.5.3 Special provisions applicable to packages and cargo transport units containing substances presenting a risk of asphyxiation when used for cooling or conditioning purposes (such as dry ice (UN 1845) or nitrogen, refrigerated liquid (UN 1977) or argon, refrigerated liquid (UN 1951))**

#### **5.5.3.4 Marking of packages containing a coolant or conditioner**

5.5.3.4.2 Replace “markings” by “marks”.

#### **5.5.3.6 Marking of cargo transport units**

5.5.3.6.2 In the last paragraph before the Note, replace “marking” by “mark” and the Note is deleted.

## **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)**

#### **6.1.1 Applicability and general provisions**

##### **6.1.1.2 General provisions**

6.1.1.2.2 Amend the introductory sentence to read as follows:

“Every packaging intended to contain liquids shall successfully undergo a suitable leakproofness test. This test is part of a quality assurance programme as stipulated in 6.1.1.3 which shows the capability of meeting the appropriate test level indicated in 6.1.5.4.4.”.

##### **6.1.3 Marking**

6.1.3 In Note 1, amend the beginning to read as follows:

“The marks indicate that the packaging which bears them correspond to...”.

in the second sentence of Note 1, replace “mark does” by “marks do”;

in Note 2, replace “marking is” by “marks are” (twice).

and in Note 3, replace “marking does” by “marks do”. In the second sentence, replace “marking” by “mark”.

6.1.3.1 In the first paragraph, replace “markings” by “marks” (twice). In the heading of sub-paragraphs and in (e), replace “marking” by “marks”. In the figure note in (e), replace “marking” by “mark”.

6.1.3.2 In the first sentence replace “markings” by “marks”.

6.1.3.3 In the last sentence replace “markings” by “marks”.

6.1.3.4 Replace “markings” by “marks” (twice).

6.1.3.5 Replace “markings” by “marks”.

6.1.3.6 Replace “mark prescribed” by “marks prescribed”.

6.1.3.7 At the beginning, replace “Marking” by “Marks” and “element of the marking” by “mark”. In the second paragraph, amend the end to read as follows:

“...still enable the other marks required in 6.1.3.1 to be correctly identified.”

6.1.3.8 In the introductory sentence, amend the end to read as follows: “...in sequence, durable marks showing:”

6.1.3.9 Replace “markings” by “marks” (twice).

#### **6.1.3.10 Examples of markings for NEW packagings**

6.1.3.10 In the heading, replace “of markings for” by “for marking”.

#### **6.1.3.11 Examples of markings for RECONDITIONED packagings**

6.1.3.11 In the heading, replace “of markings for” by “for marking”.

#### **6.1.3.12 Examples of markings for SALVAGE packagings**

6.1.3.12 In the heading, replace “of markings for” by “for marking” and in the Note “markings” by “marking”.

6.1.5.1.6 In the Note, replace “assembling” by “using”. Add a new last sentence to read as follows:

“These conditions do not limit the use of inner packagings when applying 6.1.5.1.7.”

6.1.5.5.4 In the third sentence, replace “marking” by “mark”.

## **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**

## 6.2.1 General provisions

### 6.2.1.1 Design and construction

6.2.1.1.2 Replace “those that are marked with a UN certification marking” by “those that bear “UN” certification marks”

#### **6.2.1.1.9 Additional requirements for the construction of pressure receptacle for acetylene**

6.2.1.1.9 In the introductory sentence, after “and testing specified by” insert “a standard or technical code recognised by”.

### 6.2.1.5 Initial inspection and test

6.2.1.5.1.7 Amend the text before the Note to read as follows:

“.7 a hydraulic pressure test. Pressure receptacles shall meet the acceptance criteria specified in the design and construction technical standard or technical code;”

6.2.1.5.1.9 Replace “markings” by “marks”.

### 6.2.1.6 Periodic inspection and test

6.2.1.6.1.1 Replace “markings” by “marks”.

## 6.2.2 Provisions for UN pressure receptacles

### 6.2.2.1 Design, construction and initial inspection and test

6.2.2.1.1 After the entry for ISO 9809-3:2010 insert a new entry to read as follows:

ISO 9809-4:2014	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa	Until further notice
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6.2.2.1.1 In the table, for ISO 7866:1999, in the column “Applicable for manufacture”, replace “Until further notice” with “Until 31 December 2020”.

After the entry for ISO 7866:1999, insert a new entry to read as follows:

ISO 7866: 2012+ Cor 1:2014	Gas cylinders – Refillable seamless aluminium alloy gas cylinders – Design, construction and testing <b>NOTE:</b> Aluminium alloy 6351A or equivalent shall not be used.	Until further notice
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6.2.2.1.1 At the end of the table, replace the three last entries (corresponding to standards “ISO 11119-1:2002”, “ISO 11119-2:2002” and “ISO 11119-3:2002”) with the following entries:

ISO 11119-1:2002	Gas cylinders of composite construction – Specification and test methods – Part 1: Hoop wrapped composite gas cylinders	Until 31 December 2020
ISO 11119-1:2012	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 l	Until further notice
ISO 11119-2:2002	Gas cylinders of composite construction – Specification and test methods – Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners	Until 31 December 2020
ISO 11119-2:2012 + Amd 1:2014	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners	Until further notice
ISO 11119-3:2002	Gas cylinders of composite construction – Specification and test methods – Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners	Until 31 December 2020
ISO 11119-3:2013	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with non-load-sharing metallic or non-metallic liners	Until further notice

6.2.2.1.1, Note 1 Replace “unlimited service life” with “a design life of not less than 15 years.”.

6.2.2.1.1 Amend Note 2 to read as follows:

**“Note 2:** Composite cylinders with a design life longer than 15 years shall not be filled after 15 years from the date of manufacture, unless the design has successfully passed a service life test programme. The programme shall be part of the initial design type approval and shall specify inspections and tests to demonstrate that cylinders manufactured accordingly remain safe to the end of their design life. The service life test programme and the results shall be approved by the competent authority of the country of approval that is responsible for the initial approval of the cylinder design. The service life of a composite cylinder shall not be extended beyond its initial approved design life.”.

6.2.2.1.2 After the entry for standard “ISO 11120:1999”, add the following new entries:

ISO 11119-1:2012	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 l	Until further notice
ISO 11119-2:2012 + Amd 1:2014	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners	Until further notice



ISO 11119-3:2013	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with non-load-sharing metallic or non-metallic liners	Until further notice
ISO 11515:2013	Gas cylinders – Refillable composite reinforced tubes of water capacity between 450 L and 3 000 L – Design, construction and testing	Until further notice

6.2.2.1.2 Add the following NOTES after the table:

**“Note 1:** In the above referenced standards composite tubes shall be designed for a design life of not less than 15 years.

**Note 2:** Composite tubes with a design life longer than 15 years shall not be filled after 15 years from the date of manufacture, unless the design has successfully passed a service life test programme. The programme shall be part of the initial design type approval and shall specify inspections and tests to demonstrate that tubes manufactured accordingly remain safe to the end of their design life. The service life test programme and the results shall be approved by the competent authority of the country of approval that is responsible for the initial approval of the tube design. The service life of a composite tube shall not be extended beyond its initial approved design life.”

6.2.2.1.3 In the table, for standards “ISO 3807-1:2000” and “ISO 3807-2:2000”, amend the text in column “Applicable for manufacture” to read “Until 31 December 2020”. After these standards, add the following new row:

ISO 3807:2013	Gas cylinders – Acetylene cylinders – Basic requirements and type testing	Until further notice
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#### 6.2.2.2 Materials

6.2.2.2 In the table, replace the entry for “ISO 11114-2:2000” with the following entry:

ISO 11114-2:2013	Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 2: Non-metallic materials
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#### 6.2.2.3 Service equipment

6.2.2.3 In the table, for ISO 10297:2006, in the column “Applicable for manufacture”, replace “Until further notice” with “Until 31 December 2020”.

After the entry for ISO 10297:2006, insert a new entry to read as follows:

ISO 10297:2014	Gas cylinders – Cylinder valves – Specification and type testing	Until further notice
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#### 6.2.2.4 Periodic inspection and test

6.2.2.4 In the table, for ISO 10462: 2005, replace “Until further notice” by “Until 31 December 2018”.

6.2.2.4 In the table, after ISO 10462: 2005, insert a new row to read as follows:

ISO 10462:2013	Gas cylinders – Acetylene cylinders – Periodic inspection and maintenance.	Until further notice
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## 6.2.2.5 Conformity assessment system and approval for manufacture of pressure receptacles

### 6.2.2.5.2 General requirements

#### *Competent authority*

6.2.2.5.2.1 Replace “marking” by “marks”.

### 6.2.2.5.5 Production inspection and certification

6.2.2.5.5 In the fourth paragraph, second sentence, replace “marking” by “marks”. In the third sentence, replace “certification marking” by “certification marks”

## 6.2.2.6 Approval system for periodic inspection and testing of pressure receptacles

### 6.2.2.6.2 General provisions

#### *Competent authority*

6.2.2.6.2.1 Before the reference “(see 6.2.2.7)”, replace “marking” by “mark”.

### 6.2.2.6.5 Periodic inspection and test and certification

6.2.2.6.5 In the first paragraph, replace “marking” by “marks” (twice).

## 6.2.2.7 Marking of refillable UN pressure receptacles

6.2.2.7.4 Insert the following new sub-paragraphs and note at the end:

- “(q) For composite cylinders and tubes having a limited design life, the letters “FINAL” followed by the design life shown as the year (four digits) followed by the month (two digits) separated by a slash (i.e. “/”).
- “(r) For composite cylinders and tubes having a limited design life greater than 15 years and for composite cylinders and tubes having non-limited design life, the letters “SERVICE” followed by the date 15 years from the date of manufacture (initial inspection) shown as the year (four digits) followed by the month (two digits) separated by a slash (i.e. “/”).

**Note 1:** Once the initial design type has passed the service life test programme requirements in accordance with 6.2.2.1.1 NOTE 2 or 6.2.2.1.2.

**Note 2,** future production no longer requires this initial service life mark. The initial service life mark shall be made unreadable on cylinders and tubes of a design type that has met the service life test programme requirements.”

6.2.2.7.5 Add the following text at the end of the first indent: "...except for the marks described in 6.2.2.7.4 (q) and (r) which shall be adjacent to the periodic inspection and test marks of 6.2.2.7.7".

6.2.2.7.7 (a) In the second sentence, replace "marking" by "mark".

6.2.2.7.5 In the sentence after the sub-paragraphs, amend the end to read "...example of marking a cylinder."

#### **6.2.2.8 Marking of non-refillable UN pressure receptacles**

6.2.2.8.3 In the Note, amend the end to read as follows: "...substitute a label for these permanent marks."

#### **6.2.2.9 Marking of UN metal hydride storage systems**

6.2.2.9.4 (a) In the second sentence, replace "marking" by "mark".

### **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 In Note 1, amend the beginning to read as follows:

*"The marks indicate that the packaging which bears them correspond to..."*

in Note 2, replace "marking is" by "marks are";

and in Note 3, replace "marking does" by "marks do".

6.3.4.1 Replace "markings" by "marks" (twice).

6.3.4.2 (g) Replace "marking" by "mark".

6.3.4.3 At the beginning, replace "Marking" by "Marks" and "element of the marking" by "mark". In the second paragraph, amend the end to read as follows:

*"...still enable the marks required in 6.3.4.1 to be correctly identified."*

6.3.5.1.6.7 Replace "markings" by "marks".

### **Chapter 6.4 Provisions for the construction, testing and approval of packages and radioactive material**

#### **6.4.2 General provisions**

#### **6.4.23 Applications for approval and approvals for radioactive material transport**

6.4.23.12 (a) In the first sentence, replace "identification marking" by "identification marks".

## **Chapter 6.5**

### **Provisions for the construction and testing of intermediate bulk containers (IBCs)**

#### **6.5.2 Marking**

##### **6.5.2.1 Primary marking**

6.5.2.1.1 In the first paragraph, replace “markings” by “marks”.

6.5.2.1.1.1 At the end of the existing text, insert a new sentence with the following

“For metal IBCs on which the mark is stamped or embossed, the capital letters “UN” may be applied instead of the symbol”

6.5.2.1.1 Amend the text after sub-paragraph .8 to read as follows:

“The primary marks required above shall be applied in the sequence of the sub-paragraphs above. The marks required by 6.5.2.2 and any further mark authorized by a competent authority shall still enable the primary marks to be correctly identified.

Each mark applied in accordance with .1 to .8 and with 6.5.2.2 shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable.”

6.5.2.1.2 In the heading, replace “markings” by “marking”.

##### **6.5.2.2 Additional marking**

6.5.2.2.1 Replace “markings” by “marks”. In the table, in the heading of the first column, replace “marking” by “marks” and in table note b, replace “marking” by “mark”.

6.5.2.2.3 Replace “markings” by “marks”.

6.5.2.2.4 Amend the beginning of the first sentence to read as follows:

“Inner receptacles that are of composite IBC design type shall be identified by the application of the marks...”

the rest of the paragraph remain unchanged.

in the first paragraph, third sentence, replace “marking” by “marks”. In the second paragraph, replace “marking” by “marks” and “marking” by “mark”.

and renumber the existing Note as Note 1. Add a new Note 2 to read as follows:

**“Note 2:** The date of manufacture of the inner receptacle may be different from the marked date of manufacture (see 6.5.2.1), repair (see 6.5.4.5.3) or remanufacture (see 6.5.2.4) of the composite IBC.”.

##### **6.5.2.3 Conformity to design type**

6.5.2.3 Replace “marking indicates” by “marks indicate”.

#### **6.5.2.4 Marking of remanufactured composite IBCs (31HZ1)**

6.5.2.4 Replace “marking” by “marks” and “markings” by “marks”

#### **6.5.4 Testing, certification and inspection**

##### **6.5.4.4 Inspection and testing**

6.5.4.4.1.1.1 Replace “marking” by “marks”.

6.5.4.4.2 Amend the introductory sentence to read as follows:

“6.5.4.4.2 Every metal, rigid plastics and composite IBC for liquids, or for solids which are filled or discharged under pressure, shall undergo a suitable leakproofness test. This test is part of a quality assurance programme as stipulated in 6.5.4.1 which shows the capability of meeting the appropriate test level indicated in 6.5.6.7.3.”

##### **6.5.4.5 Repaired IBCs**

6.5.4.5.3 Replace “marking” by “marks”.

### **Chapter 6.6 Provisions for the construction and testing of large packagings**

#### **6.6.3 Marking**

##### **6.6.3.1 Primary marking**

6.6.3.1 In the first paragraph, replace “markings” by “marks”; in sub-paragraph (a), at the end add the following sentence:

“For metal large packagings on which the marks are stamped or embossed, the capital letters “UN” may apply instead of the symbol.”

In the sentences after the sub-paragraphs, replace “marking” by “mark”, “element of the marking” by “mark” and delete the Note.

##### **6.6.3.2 Examples of the marking**

6.6.3.2 In the heading, replace “the marking” by “marking”.

### **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**

##### **6.7.2.19 Inspection and testing**

6.7.2.19.8.1 Add a new last sentence to read as follows:

“The wall thickness shall be verified by appropriate measurement if this inspection indicates a reduction of wall thickness;”.

6.7.2.19.8.7 Replace “markings” by “marks”.

#### **6.7.2.20 Marking**

6.7.2.20.1 In the figure, amend the heading to read “Example of a plate for marking”.

### **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**

#### **6.7.3.15 Inspection and testing**

6.7.3.15.8.1 Add a new last sentence to read as follows:

“The wall thickness shall be verified by appropriate measurement if this inspection indicates a reduction of wall thickness;”

6.7.3.15.8.6 Replace “markings” by “marks”.

#### **6.7.3.16 Marking**

6.7.3.16.1 In the figure, amend the heading to read “Example of a plate for marking”.

### **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**

#### **6.7.4.14 Inspection and testing**

6.7.4.14.9.5 Replace “markings” by “marks”.

#### **6.7.4.15 Marking**

6.7.4.15.1 In the figure, amend the heading to read “Example of a plate for marking”.

### **6.7.5 Provisions for the design, construction, inspection and testing of multiple-element gas containers (ME GCs) intended for the transport of non-refrigerated gases**

#### **6.7.5.2 General design and construction provisions**

6.7.5.2.4.1 Replace “ISO 11114-2:2000” with “ISO 11114-2:2013”.

#### **6.7.5.12 Inspection and testing**

6.7.5.12.6.5 Replace “markings” by “marks”.

#### **6.7.5.13 Marking**

6.7.5.13.1 In the figure, amend the heading to read “Example of a plate for marking”.

**Chapter 6.9**  
**Provisions for the design, construction, inspection**  
**and testing of bulk containers**

**6.9.5 Requirements for the design, construction, inspection and testing of flexible bulk containers BK3**

**6.9.5.5 Marking**

6.9.5.5.1 In the first paragraph, replace “markings” by “marks”. In the last paragraph, replace “Marking” by “Marks” and “element of the marking” by “mark”.

**PART 7**  
**PROVISIONS CONCERNING TRANSPORT OPERATIONS**

**Chapter 7.1**  
**General stowage provisions**

**7.1.2 Definitions**

The existing introductory Note is renumbered as “Note 1” and insert a new Note 2 with the following:

**"Note 2:** Where stowage in closed cargo transport units is required, stowage in small fixed compartments in a ship such as deck-houses and mast lockers is an acceptable alternative. Cargo holds cannot be interpreted as closed cargo transport units".

**7.1.5 Stowage Codes**

In the table insert a new stowage code with the following:

“

SW29	For engines or machinery containing fuels with flash point equal or greater than 23 °C, stowage Category A
------	--

“

**7.3.3 Packing of cargo transport units**

7.3.3 Amend the corresponding footnote “See CTU Code”

7.3.3.10 Replace “markings” by “marks”

7.3.3.13 Replace “markings” by “marks”

7.3.3.14 In the paragraph replace “referenced guidelines” by “CTU Code” and the corresponding footnote is deleted

**7.3.7.5 Special provisions applicable to the transport of substances stabilized by temperature control (other than self-reactive substances and organic peroxides)**

7.3.7.5.1 Replace the existing text with the following:

“7.3.7.5.1 These provisions apply to the transport of substances for which:

- .1 The proper shipping name as indicated in column 2 of the Dangerous Goods List of Chapter 3.2 or according to 3.1.2.6 contains the word “STABILIZED”; and
- .2 The SADT or the SAPT\* determined for the substance (with or without chemical stabilization) as offered for transport is:
  - .1 50 °C or less for packagings and IBCs; or
  - .2 45 °C or less for portable tanks.”.

and insert the corresponding foot note with the following:

*”\* The self-accelerating polymerization temperature (SAPT) shall be determined in accordance with the Manual of Tests and Criteria. The SADT tests in Section 28, Series H as appropriate may be equally applied to determine a self-accelerating polymerization temperature.”*

7.3.7.5.2 At the end of the existing sentence add the following:

“, except that the term “SADT” as used in these paragraphs is understood to include also “SAPT” when the substance concerned reacts by polymerization”.

7.3.7.5.4 The paragraph is deleted.

7.3.7.5.5 The paragraph is renumbered as “7.3.7.5.4”

## APPENDICES

### Appendix A - List of generic and N.O.S. proper shipping names

Add the following new entries in appendix A under the appropriate class in the specific entries section:

Class or Division	Subsidiary Risk	UN No	Proper Shipping Name
4.1	-	3531	POLYMERIZING SUBSTANCE, SOLID, STABILIZED N.O.S.
4.1	-	3532	POLYMERIZING SUBSTANCE, LIQUID, STABILIZED, N.O.S.
4.1	-	3533	POLYMERIZING SUBSTANCE, SOLID, TEMPERATURE CONTROLLED, N.O.S.
4.1	-	3534	POLYMERIZING SUBSTANCE, LIQUID, TEMPERATURE CONTROLLED, N.O.S.

### Appendix B - Glossary of terms

[NIL]



## INDEX

### Alphabetic index

Amend the columns for “Class or Division” and “UN No.” for the following entries as indicated below:

Class or Division	Subsidiary Risk	UN No	Proper Shipping Name
2.1	-	3529	ENGINE, FUEL CELL, FLAMMABLE GAS POWERED
3	-	3528	ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED
9	-	3530	ENGINE, INTERNAL COMBUSTION

In the entries for “POLYESTER RESIN KIT” amend the columns “Class or Division” and “UN No.” to read as follows:

Class or Division	UN No	Proper Shipping Name
3	3269	POLYESTER RESIN KIT, liquid base material
4.1	3527	POLYESTER RESIN KIT, solid base material

In the entry for ROCKET MOTORS, insert “1.4C” after “1.3C” and “0510” after “0186”.

Add the following new entries in alphabetical order:

Class or Division	Subsidiary Risk	UN No	Proper Shipping Name
1.4C	-	0510	ROCKET MOTORS
4.1	-	3527	POLYESTER RESIN KIT, solid base material
3	-	3528	ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED
3	-	3528	MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED
3	-	3528	MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED
2.1	-	3529	ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED
2.1	-	3529	MACHINERY, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED
2.1	-	3529	MACHINERY, FUEL CELL, FLAMMABLE GAS POWERED
9	-	3530	MACHINERY, INTERNAL COMBUSTION

4.1	-	3531	POLYMERIZING SUBSTANCE, SOLID, STABILIZED N.O.S.
4.1	-	3532	POLYMERIZING SUBSTANCE, LIQUID, STABILIZED, N.O.S.
4.1	-	3533	POLYMERIZING SUBSTANCE, SOLID, TEMPERATURE CONTROLLED, N.O.S.
4.1	-	3534	POLYMERIZING SUBSTANCE, LIQUID, TEMPERATURE CONTROLLED, N.O.S.
9	-	3151	HALOGENATED MONOMETHYLDIPHENYLMETHANES, LIQUID
9	-	3152	HALOGENATED MONOMETHYLDIPHENYLMETHANES, SOLID
4.1	-	2000	Table Tennis Balls, see

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**ANNEX 3\***

**DRAFT DSC/CIRC.[12/REV.1]**

**REVISED GUIDANCE ON THE CONTINUED USE OF EXISTING IMO TYPE PORTABLE  
TANKS AND ROAD TANK VEHICLES FOR THE TRANSPORT OF  
DANGEROUS GOODS**

1 The United Nations Committee of Experts on the Transport of Dangerous Goods (CETDG) at its eighteenth session in December 1996 adopted proposals for a reformatted edition of the United Nations Recommendations on the Transport of Dangerous Goods – Model Regulations. At the same time, the CETDG adopted a series of recommendations for the revision of the provisions for the design, construction, inspection, testing, certification, retesting and use of portable tanks. These recommendations for portable tanks represented a major overhaul of the provisions included in the UN Recommendations dating back to the 1970s. The Sub-Committee on Dangerous Goods, Solid Cargoes and Containers (DSC), at its eighth session (22 to 26 September 2003), recalled that the Maritime Safety Committee, at its seventy-second session (17 to 26 May 2000), had adopted amendment 30-00 to the IMDG Code, which had been prepared in the revised, reformatted and harmonized form of the IMDG Code; and had agreed to an entry into force date of 1 January 2001 with a twelve-month transitional period until 31 December 2001. The reformatted Code included new provisions for the construction and use of multimodal UN portable tanks.

2 The CETDG at that time recommended the introduction of a system of specifying suitable portable tank instructions for those entries in the Dangerous Goods List of the Model Regulations where multi-modal transport should be permitted by a portable tank instruction (T-instruction **or T-code**). In certain instances, these T-instructions are modified and extended by portable tank special provisions (TPs).

3 The CETDG published these recommendations for portable tanks in the 10th revised edition of the Recommendations on the Transport of Dangerous Goods published in June 1997. These recommendations are in chapter 4.2 concerning their use and chapter 6.7 on their design and construction.

4 The CETDG invited all dangerous goods regulators, whether for international transport or national transport, to base their legal instruments on the latest edition of the Model Regulations.

5 In response to that request, the Maritime Safety Committee (MSC), at its seventy-second session (17 to 26 May 2000), adopted amendment 30-00 to the IMDG Code, which had been prepared in a revised, reformatted and harmonized form, similar to the Model Regulations. The reformatted Code included the new provisions for the construction and use of UN portable tanks from the 10<sup>th</sup> revised edition of the Model Regulations taking into account further amendments recommended in the 11<sup>th</sup> revised edition published in 1999.

6 The Sub-Committee on Dangerous Goods, Solid Cargoes and Containers (DSC), noting the significant changes to the provisions contained in Amendment 29-98 of the IMDG

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\* Shaded text indicates changes made by E&T 23 based on the report of the correspondence group on revision to DSC/CIRC.12. (see CCC 1/6/1 and CCC 1/INF.8).

Code concerning existing IMO type portable tanks, had to consider whether their continued use should be permitted and, if so, under what provisions.

7 DSC agreed to certain transitional arrangements for existing IMO portable tanks:

- During the period from 2000 to 2002 manufacturers of portable tanks could continue to produce IMO portable tanks in accordance with amendment 29-98.
- Until the end of 2009 portable tanks of a lower technical specification (lower T-instruction) than recommended in the Model Regulations could continue to be used for certain dangerous goods.
- IMO tanks built prior to 2003 may be used until the end of their life if in compliance with periodic testing requirements.

The first two transitional periods have now expired necessitating a revision of this guidance.

8 Where a lower specification portable tank was allowed during the period up to the end of 2009, an alternative T-instruction was given in column (12) of the provisions set out in 3.2.1 of the IMDG Code. All these alternative T-instructions were deleted from this column in amendment 34-08 of the IMDG Code in anticipation of the end of this transitional period. From 2010 onwards, both IMO portable tanks and UN portable tanks must be offered in accordance with the T-instruction specified in column (13) of the IMDG Code.

9 The MSC agreed that existing IMO type portable tanks and road tank vehicles may continue to be used for their life-time on the condition that they successfully pass the periodic inspection as described in the latest version of the IMDG code. However, the detailed provisions for such tanks, which were contained in section 13 of Amendment 29-98 of the IMDG Code, were not included in the IMDG Code, Amendment 30-00 and its subsequent editions. During the reformatting process, the Sub-Committee agreed that existing IMO type portable tanks and road tank vehicles may continue to be used for the life-time of the tank, provided they also comply with the provisions set out in 3.2.1 (column 12) and in 4.2.0 of the IMDG Code. However, the detailed provisions for such tanks, which were contained in section 13 of the IMDG Code, amendment 29-98, were not included in the IMDG Code, amendment 30-00, and its subsequent edition.

10 IMO portable tanks, road tank vehicles and UN portable tanks should be taken out of service for the transport of dangerous goods when they are no longer capable of passing a 2.5 year intermediate inspection and test or a 5 year inspection and test.

11 The DSC Sub-Committee, noting that the IMDG Code amendment 31-02 would attain mandatory status from 1 January 2004 developed the annexed Guidance explaining the provisions of 3.2.1(column 12) and 4.2.0 of the IMDG Code and reproducing the construction provisions applicable to such tanks. guidance as contained in DSC/Circ.12 to this Circular reproducing the construction provisions applicable to IMO portable tanks and road tank vehicles. It was accepted that IMO portable tanks and road tank vehicles would continue in use for many years to come, and that there was no reason to deny their continued use whilst they remain safe.

12 There will continue to be revisions to the recommendations for the construction and use of portable tanks as further editions of the Model Regulations are published. As a consequence the MSC will continue to authorise further amendments to the portable tank provisions in the IMDG Code. Where these provisions affect the T-instruction allocated to individual entries in 3.2.1 transitional arrangements for the continued use of the previously allocated T-instruction will be indicated by the use of additional portable tank special provisions (TPs).

13 Member Governments are invited to bring the attached Guidance to the attention of tank owners and operators, shipowners, ship operators, companies, seafarers, inspecting and certifying authorities, consignors and shippers, and all other parties concerned with the transport of dangerous goods in packaged form by sea.

14 This Circular supersedes DSC/Circ.12

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## ANNEX

### **REVISED** GUIDANCE ON THE CONTINUED USE OF EXISTING IMO TYPE PORTABLE TANKS AND ROAD TANK VEHICLES FOR THE TRANSPORT OF DANGEROUS GOODS

Note: Any reference to the Code refers to the IMDG Code, as amended. All other references refer to paragraphs within this circular.

#### **Contents:**

Section 1	Introduction
Section 2	<u>Continued Use</u> of IMO type portable tanks and road tank vehicles.
Section 3	Provisions for the design, construction, inspection and testing of IMO type portable tanks and road tank vehicles.

## **1 Section 1 – Introduction**

### **1.1 Purpose**

The purpose of this circular is to enable tank manufacturers, owners, operators, consignors, certifying and inspection authorities, and others engaged in the transport of dangerous goods in IMO type portable tanks and road tank vehicles designed, constructed and approved before 1 January 2003 to meet their duties.

The main objective is to clarify the use of such tanks taking into account their construction provisions which are given in section 3 of this circular.

The provisions of this Circular apply to IMO Type 1, 2, 5 and 7 portable tanks and road tank vehicles. and IMO Type 4, 6 and 8 road tank vehicles.

However, this circular does not apply to IMO type 4, 6 and 8 road tank vehicles that have been designed, constructed and approved in accordance with Chapter 6.8 from Amendment 30-00 of the IMDG Code onwards.

Definitions of the IMO tank types can be found in the **Note** to paragraph 4.2.0 of the Code.

Portable tanks designed, constructed, and approved in accordance with Chapters 4.2 and 6.7 of the Code are referred to as UN portable tanks in this circular.

~~———— This section has been expanded to explain how the transitional periods for continued use of the existing T-instruction are stated using special portable tank provisions (TPs) in Amendment 34-08 and future amendments to the Code.~~

### **1.2 Transitional provisions**

~~When the provisions for the construction and use of UN portable tanks were included in the Code, transitional provisions related to IMO type portable tanks and road tank vehicles were also included in order to:~~

- ~~– promote the construction and use of new UN portable tanks and~~
- ~~– take into account the existing IMO type tanks and the goods they were authorised to~~
- ~~– transport.~~

These transitional provisions are in paragraph 4.2.0 and in paragraph 3.2.1 (column 12) of the Code and are summarized below:

- .1 ~~The design, construction and approval of IMO type portable tanks and road tank vehicles in accordance with the provisions of Section 13 of Amendment 29-98 to the Code were permitted until 1 January 2003 (see 4.2.0 of the Code)~~
- .2 ~~The use of all IMO type portable tanks and road tank vehicles is permitted for the transport of dangerous goods in accordance with the Code until the end of their life provided that such tanks are inspected and tested in accordance with Chapter 6.7 of the Code. If evidence of any unsafe condition is found, the tank shall not be returned to service until the deficiency is corrected.~~
- .3 ~~Until 1st January 2010, the portable tank instruction that shall be used for each substance permitted in an IMO type portable tank or road tank vehicle is assigned in column (12) of the Dangerous Goods List in chapter 3.2 of the Code. If no T Code is indicated in column (12), the T Code in column (13) shall be used.~~
- .4 ~~Until 1st January 2010, the tank special provisions (TP note) applicable to dangerous goods authorized to be transported in IMO type portable tanks are indicated in column (12) and column (14) of the Dangerous Goods List. If no TP note is indicated in column (12) of the Dangerous Goods List, TP notes indicated in column (14) apply to the appropriate substance.~~
- .5 ~~From 1st January 2010, the transport of dangerous goods in IMO type portable tanks and road tank vehicles will be permitted in accordance with columns (13) and (14) only.~~

There is no requirement to re-certify IMO type portable tanks as UN portable tanks.

Examples:

Example No.	UN	Proper Shipping Name (PSN)	Packing Group	Tank Instructions		
				IMO	UN	Provisions
	(1)	(1)	(1)	(1)	(1)	(4)
1	1760	CORROSIVE LIQUID, N.O.S	I		T14	TP2 TP9 TP27
1	1760	CORROSIVE LIQUID, N.O.S	II		T11	TP2 TP27
2	1760	CORROSIVE LIQUID, N.O.S	III	T4	T7	TP1 TP28
3	1802	PERCHLORIC ACID	II	TP28	T7	TP2



**Example 1** — The IMO type portable tank used for UN1760 (Packing Group I and II) shall comply with the provisions of columns (13) and (14).

**Example 2** — ~~Until 1st January 2010, the IMO type portable tank complying with the provisions of column (12) and (14) may be used for UN1760 PG III. However, from~~  
~~1st January 2010 the IMO type portable tank used for UN1760 PG III shall comply with the provisions of columns (13) and (14) only.~~

**Example 3** — ~~Until 1st January 2010, the IMO type portable tank complying with the provisions of columns (12), (13) and (14) may be used for UN1802. However, from 1st January 2010 the IMO type portable tank used for UN1802 shall comply with the provisions of columns (13) and (14) only.~~

### **1.3 Transitional Provisions for Portable Tanks – 2010 and Onwards**

The Committee on the Transport of Dangerous Goods and the Globally Harmonized System of Classification and Labeling of Chemicals (CETDGGHS) will continue to update their recommendations for the construction and use of UN portable tanks as necessary on a two-year cycle. Changes to the allocated T-instructions for entries in The Dangerous Goods List, 3.2.1 of the United Nations Recommendations on the Transport of Dangerous Goods – Model Regulations will appear in each new published edition. These recommendations are likely to be adopted by the MSC for inclusion in the following Amendment to the IMDG Code. When this occurs, a transitional period for the continued use of the existing IMO or UN portable tanks conforming to the former T-instruction will normally be included. The transitional period will be indicated by the addition of a new special portable tank provision (TP) in 3.2.1 of the Code.

**There is no requirement to re-certify IMO type portable tanks as UN portable tanks.** Although there may be some technical differences in their design and construction, for the purposes of the IMDG Code they are deemed to be equivalent to each other. IMO type portable tanks retain their original data plates. While there is no requirement to re-certify IMO type portable tanks as UN portable tanks, doing so is not prohibited and is subject to design approval by the appropriate competent authority or its authorized body in accordance with 6.7.2.18.1 of the IMDG Code.

## **Section 2 - Continued Use of IMO type portable tanks and road tank vehicles**

### **2 Section 2 - Introduction**

This guidance applies to IMO type portable tanks and road tank vehicles on long international voyages approved prior to the entry into force of Amendment 30-00 of the IMDG Code. The provisions of chapter 6.8 of the Code as amended apply to IMO road tank vehicles approved on or after 01.01.2002. ~~Between 01.01.2001 and 31.12.2001 IMO road tank vehicles may have been approved according the provisions of Amendment 29-98 or Amendment 30-00 of the Code.~~

The purpose of this section is to clarify the application of the T-instructions and the portable tank special provision TP provision to IMO portable tanks and road tanks vehicle with respect to their design and construction provisions set out in section 3.

**Note:** IMO portable tanks and road tank vehicles are sometimes referred to as “first generation portable tanks and road tank vehicles”.

## 2.1 General

~~2.1.1 This section includes the portable tank instructions and special provisions applicable to dangerous goods authorized to be transported in IMO type portable tanks and road tank vehicles.~~

Each portable tank instruction is identified by an alphanumeric designation (T1 to T75). Column 13 in the dangerous goods list in 3.2.1 of the Code indicates the portable tank instruction that should be used for each substance permitted for transport in an IMO type portable tank or road tank vehicle. When no portable tank instruction appears in the Dangerous Goods List, transport of the substance in portable tanks or road tank vehicles is not permitted unless a competent authority approval is granted as set out in 6.7.1.3 of the Code. ~~Portable tank special provisions are assigned to specific dangerous goods in the Dangerous Goods List in chapter 3.2 of the Code. Each portable tank special provision is identified by an alphanumeric designation (such as TP1). A listing of the portable tank special provisions is provided in 2.7.~~

Portable tank special provisions are assigned to specific dangerous goods in column 14 of the Dangerous Goods List in 3.2.1 of the Code. Each portable tank special provision is identified by an alphanumeric designation (such as TP1). Full details of the T-instructions and the portable tank special provisions can be found in Chapter 4.2 of the IMDG Code.

## 2.2 Portable tank instructions

~~2.2.1 Portable tank instructions apply to dangerous goods of classes 1 to 9. Portable tank instructions provide specific information relevant to portable tanks provisions applicable to specific substances. These provisions shall be met in addition to the general provisions of section 3.~~

~~2.2.2 For substances of classes 3 to 9, the portable tank instructions indicate the applicable minimum test pressure, the minimum shell thickness (in mild steel), bottom opening provisions and pressure relief provisions.~~

~~2.2.3 Non-refrigerated liquefied gases are assigned to portable tank instruction T50 of this circular which provides the maximum allowable working pressures, bottom opening provisions, pressure relief provisions and maximum filling density for non-refrigerated liquefied gases permitted for transport in portable tanks or road tank vehicles.~~

~~2.2.4 Refrigerated liquefied gases are assigned to portable tank instruction T75.~~

### **2.2.53 Determination of the appropriate portable tank instructions for liquids and solids**

When a specific portable tank instruction is specified in the Dangerous Goods List of the Code, additional portable tanks which possess higher test pressures, greater shell thickness, more stringent bottom opening and pressure relief device arrangements may be used. A table is provided at 4.2.5.2.5 of the Code. This specifies the alternative T-instructions which may be applied in selecting a suitable IMO or UN portable tank. The following guidelines apply to ~~determining the appropriate portable tanks or road tank vehicles, which may be used for transport of particular substances:~~

**~~Portable tank instruction specified~~ *Portable tank instructions also permitted***

T1	T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T2	T4, T5, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T3	T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T4	T5, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T5	T10, T14, T19, T20, T22
T6	T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T7	T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T8	T9, T10, T13, T14, T19, T20, T21, T22
T9	T10, T13, T14, T19, T20, T21, T22
T10	T14, T19, T20, T22
T11	T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T12	T14, T16, T18, T19, T20, T22
T13	T14, T19, T20, T21, T22
T14	T19, T20, T22
T15	T16, T17, T18, T19, T20, T21, T22
T16	T18, T19, T20, T22
T17	T18, T19, T20, T21, T22
T18	T19, T20, T22
T19	T20, T22
T20	T22
T21	T22
T22	None
T23	None

#### Example 1:

An offeror would like to offer UN 1294 Toluene for transport in a portable tank. The shipper has access to an IMO Type 1 portable tank (or road tank vehicle) which has the design characteristics of a T11 portable tank. May this tank be used to transport the dangerous good in question? In column 13 of the Dangerous Goods List UN 1294 is assigned T4. Consulting the table in 4.2.5.2.5, IMO Type 1 or UN portable tanks and road tank vehicles which correspond to T5, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, and T22 may be used. So yes the offeror's IMO Type 1 portable tank with T11 characteristics may be used.

#### Example 2:

An offeror would like to offer UN 1422 Potassium Sodium Alloys, Liquid in an IMO portable tank (or road tank vehicle) which has the design characteristics of a T11. May this tank be used to transport the dangerous good in question? In column 13 of the Dangerous Goods List UN 1422 is assigned T9. Consulting the table in 4.2.5.2.5, IMO or UN portable tanks and road tank vehicles with correspond to T10, T13, T14, T19, T20, T21, and T22 may be used. Accordingly the offeror's IMO portable tank (or road tank vehicle) with T11 characteristics may not be used.

## 2.2.6 Portable tank instructions

TI- T22 PORTABLE TANK INSTRUCTIONS TI- T22				
These portable tank instructions apply to liquid and solid substances of classes 1 and 3 to 9. The general provisions of section 3 shall be met.				
Portable tank instruction	Minimum test pressure (bar)	Minimum shell thickness (in mm - mild steel) (see 3.5)	Pressure relief provisions (see 3.9)	Bottom opening provisions (see 3.7)
T1	1.5	See 3.5.2	see 3.9.1	See 3.7.2
T2	1.5	See 3.5.2	see 3.9.1	See 3.7.3
T3	2.65	See 3.5.2	see 3.9.1	See 3.7.2
T4	2.65	See 3.5.2	see 3.9.1	See 3.7.3
T5	2.65	See 3.5.2	See 3.9.3	Not allowed
T6	4	See 3.5.2	see 3.9.1	See 3.7.2
T7	4	See 3.5.2	see 3.9.1	See 3.7.3
T8	4	See 3.5.2	see 3.9.1	Not allowed
T9	4	6 mm	see 3.9.1	Not allowed
T10	4	6mm	See 3.9.3	Not allowed
T11	6	See 3.5.2	see 3.9.1	See 3.7.3
T12	6	See 3.5.2	See 3.9.3	See 3.7.3
T13	6	6mm	see 3.9.1	Not allowed
T14	6	6mm	See 3.9.3	Not allowed
T15	10	See 3.5.2	see 3.9.1	See 3.7.3
T16	10	See 3.5.2	See 3.9.3	See 3.7.3
T17	10	6mm	see 3.9.1	See 3.7.3
T18	10	6 mm	See 3.9.3	See 3.7.3
T19	10	6 mm	See 3.9.3	Not allowed
T20	10	8 mm	See 3.9.3	Not allowed
T21	10	10 mm	see 3.9.1	Not allowed
T22	10	10 mm	See 3.9.3	Not allowed

T50	PORTABLE TANK INSTRUCTION	T50
This portable tank instruction applies to non-refrigerated liquefied gases. The general provisions of		

UN No.	Non-refrigerated — liquefied gases	Max. allowable working pressure (bar) Small; — Bare; liquid level Sunshield; Insulated	Openings below level	Pressure relief provisions (see 3.42)	Maximum filling density (kg/l)
1005	Ammonia, anhydrous	29.0 25.7 22.0 19.7	Allowed	See 3.42.3	0.53
1009	Bromotrifluoromethane (Refrigerant gas R 13B1)	38.0 34.0 30.0 27.5	Allowed	Normal	1.13
1010	Butadienes, stabilized	7.5 7.0 7.0 7.0	Allowed	Normal	0.55
1011	Butane	7.0 7.0 7.0 7.0	Allowed	Normal	0.51
1012	Butylene	8.0 7.0 7.0 7.0	Allowed	Normal	0.53
1017	Chlorine	19.0 17.0 15.0 13.5	Not Allowed	See 3.42.3	1.25
1018	Chlorodifluoromethane (Refrigerant gas R 22)	26.0 24.0 21.0 19.0	Allowed	Normal	1.03
1020	Chloropentafluoroethane (Refrigerant gas R 115)	23.0 20.0 18.0 16.0	Allowed	Normal	1.06
1021	1-Chloro-1,2,2,2-tetrafluoroethane (Refrigerant gas R 124)	10.3 9.8 7.9 7.0	Allowed	Normal	1.20
1027	Cyclopropane	18.0 16.0 14.5 13.0	Allowed	Normal	0.53

<b>T50</b>	<b>PORTABLE TANK INSTRUCTION</b>	<b>T50</b>
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**This portable tank instruction applies to non refrigerated liquefied gases. The general provisions of**

<b>UN No.</b>	<b>Non-refrigerated liquefied gases</b>	<b>Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated</b>	<b>Openings below liquid level</b>	<b>Pressure relief provisions (see 3.42)</b>	<b>Maximum filling density (kg/l)</b>
1028	Dichlorodifluoromethane (Refrigerant gas R 12)	16.0 15.0 13.0 11.5	Allowed	Normal	1.15
1029	Dichlorofluoromethane (Refrigerant gas R 21)	7.0 7.0 7.0 7.0	Allowed	Normal	1.23
1030	1,1-Difluoroethane (Refrigerant gas R 152a)	16.0 14.0 12.4 11.0	Allowed	Normal	0.79
1032	Dimethylamine, anhydrous	7.0 7.0 7.0 7.0	Allowed	Normal	0.59
1033	Dimethyl ether	15.5 13.8 12.0 10.6	Allowed	Normal	0.58
1036	Ethylamine	7.0 7.0 7.0 7.0	Allowed	Normal	0.61
1037	Ethyl chloride	7.0 7.0 7.0 7.0	Allowed	Normal	0.80
1040	Ethylene oxide with nitrogen up to a total pressure of 1 MPa (10 bar) at 50°C	10.0	Not Allowed	See 3.42.3	0.78
1041	Ethylene oxide and carbon dioxide mixture with more than 2% but not more than 87%	See MAWP definition in 3.38.6	Allowed	Normal	See 4.2.2.7
1055	Isobutylene	8.1 7.0 7.0 7.0	Allowed	Normal	0.52

T50 <b>PORTABLE TANK INSTRUCTION</b> T50					
<del>This portable tank instruction applies to non-refrigerated liquefied gases. The general provisions of</del>					
UN No.	Non-refrigerated liquefied gases	Max. allowable working pressure (bar) Small; Bare; liquid level Sunshield; Insulated	Openings below level	Pressure relief provisions (see 3.42)	Maximum filling density (kg/l)
1060	Methylacetylene and propadiene mixture, stabilized	28.0 24.5 22.0 20.0	Allowed	Normal	0.43
1061	Methylamine, anhydrous	10.8 9.6 7.8 7.0	Allowed	Normal	0.58
1062	Methyl bromide with not more than 2% chloropicrin	7.0 7.0 7.0 7.0	Not Allowed	See 3.42.3	1.51
1063	Methyl chloride (Refrigerant gas R40)	14.5 12.7 11.3 10.0	Allowed	Normal	0.81
1064	Methyl mercaptan	7.0 7.0 7.0 7.0	Not Allowed	See 3.42.3	0.78
1067	Dinitrogen tetroxide	7.0 7.0 7.0 7.0	Not Allowed	See 3.42.3	1.30
1075	Petroleum gas, liquefied	See MAWP definition in 3.38.6	Allowed	Normal	See 4.2.2.7
1077	Propylene	28.0 24.5 22.0 20.0	Allowed	Normal	0.43
1078	Refrigerant gas, N.O.S.	See MAWP definition in 3.38.6	Allowed	Normal	See 4.2.2.7

1079	Sulphur dioxide	11.6 10.3 8.5 7.6	Not Allowed	See 3.42.3	1.23
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T50 PORTABLE TANK INSTRUCTION T50					
This portable tank instruction applies to non-refrigerated liquefied gases. The general provisions of					
UN No.	Non-refrigerated liquefied gases	Max. allowable working pressure (bar) Small; Bare; liquid level Sunshield; Insulated	Openings below level	Pressure relief provisions (see 3.42)	Maximum filling density (kg/l)
1082	Trifluorochloroethylene, stabilized (Refrigerant gas R 1113)	17.0 15.0 13.1 11.6	Not Allowed	See 3.42.3	1.13
1083	Trimethylamine, anhydrous	7.0 7.0 7.0 7.0	Allowed	Normal	0.56
1085	Vinyl bromide, stabilized	7.0 7.0 7.0 7.0	Allowed	Normal	1.37
1086	Vinyl chloride, stabilized	10.6 9.3 8.0 7.0	Allowed	Normal	0.81
1087	Vinyl methyl ether, stabilized	7.0 7.0 7.0 7.0	Allowed	Normal	0.67
1581	Chloropicrin and methyl bromide mixture with more than 2% chloropicrin	7.0 7.0 7.0 7.0	Not Allowed	See 3.42.3	1.51
1582	Chloropicrin and methyl chloride mixture	19.2 16.9 15.1 13.1	Not Allowed	See 3.42.3	0.81
1858	Hexafluoropropylene (Refrigerant gas R 1216)	19.2 16.9 15.1 13.1	Allowed	Normal	1.11



1912	Methyl chloride and methylene chloride mixture	15.2 13.0 11.6 10.1	Allowed	Normal	0.81
1958	1,2-Dichloro-1,1,2,2-tetrafluoroethane (Refrigerant gas R 114)	7.0 7.0 7.0 7.0	Allowed	Normal	1.30

T50 PORTABLE TANK INSTRUCTION T50					
This portable tank instruction applies to non-refrigerated liquefied gases. The general provisions of					
UN No.	Non-refrigerated liquefied gases	Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated	Openings below liquid level	Pressure relief provisions (see 3.42)	Maximum filling density (kg/l)
1965	Hydrocarbon gas, mixture liquefied, N.O.S.	See MAWP definition in 3.38.6	Allowed	Normal	See 4.2.2.7
1969	Isobutane	8.5 7.5 7.0 7.0	Allowed	Normal	0.49
1973	Chlorodifluoromethane and chloropentafluoroethane mixture with fixed boiling point, with approximately 49% chlorodifluoromethane (Refrigerant gas R 502)	28.3 25.3 22.8 20.3	Allowed	Normal	1.05
1974	Chlorodifluorobromomethane (Refrigerant gas R 12B1)	7.4 7.0 7.0 7.0	Allowed	Normal	1.61
1976	Octafluorocyclobutane (Refrigerant gas RC 318)	8.8 7.8 7.0 7.0	Allowed	Normal	1.34
1978	Propane	22.5 20.4 18.0 16.5	Allowed	Normal	0.42
1983	1-Chloro-2,2,2-trifluoroethane (Refrigerant gas R 133a)	7.0 7.0 7.0 7.0	Allowed	Normal	1.18

2035	1,1,1-Trifluoroethane (Refrigerant gas R 143a)	31.0 27.5 24.2 21.8	Allowed	Normal	0.76
2424	Octafluoropropane (Refrigerant gas R 218)	23.1 20.8 18.6 16.6	Allowed	Normal	1.07
2517	1-Chloro-1,1-difluoroethane (Refrigerant gas R 142b)	8.9 7.8 7.0 7.0	Allowed	Normal	0.99

T50 PORTABLE TANK INSTRUCTION T50					
This portable tank instruction applies to non-refrigerated liquefied gases. The general provisions of					
UN No.	Non-refrigerated liquefied gases	Max. allowable working pressure (bar) Small; Bare; liquid Sunshield; Insulated	Openings below level	Pressure relief provisions (see 3.42)	Maximum filling density (kg/l)
2602	Dichlorodifluoromethane and difluoroethane azeotropic mixture with approximately 74% dichlorodifluoromethane	20.0 18.0 16.0 14.5	Allowed	Normal	1.01
3057	Trifluoroacetyl chloride	14.6 12.9 11.3 9.9	Not allowed	See 3.42.3	1.17
3070	Ethylene oxide and dichlorodifluoromethane mixture, with not more than 12.5% ethylene oxide	14.0 12.0 11.0 9.0	Allowed	See 3.42.3	1.09
3153	Perfluoro(methyl vinyl ether)	14.3 13.4 11.2 10.2	Allowed	Normal	1.14
3159	1,1,1,2-Tetrafluoroethane (Refrigerant gas R 134a)	17.7 15.7 13.8 12.1	Allowed	Normal	1.04
3161	Liquefied flammable, N.O.S.	See MAWP definition in 3.38.6	Allowed	Normal	See 4.2.2.7

3163	Liquefied gas, N.O.S.	See MAWP definition in 3.38.6	Allowed	Normal	See 4.2.2.7
3220	Pentafluoroethane (Refrigerant gas R 125)	34.4 30.8 27.5 24.5	Allowed	Normal	0.95
3252	Difluoromethane (Refrigerant gas R 32)	43.0 39.0 34.4 30.5	Allowed	Normal	0.78
3296	Heptafluoropropane (Refrigerant gas R 227)	16.0 14.0 12.5 11.0	Allowed	Normal	1.20

T50 PORTABLE TANK INSTRUCTION T50					
This portable tank instruction applies to non-refrigerated liquefied gases. The general provisions of					
UN No.	Non-refrigerated liquefied gases	Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated	Openings below liquid level	Pressure relief provisions (see 3.42)	Maximum filling density (kg/l)
3297	Ethylene oxide and chlorotetrafluoroethane mixture, with not more than 0.8% ethylene oxide	8.1 7.0 7.0 7.0	Allowed	Normal	1.16
3298	Ethylene oxide and pentafluoroethane mixture, with not more than 7.9% ethylene oxide	25.9 23.4 20.9 18.6	Allowed	Normal	1.02
3299	Ethylene oxide and tetrafluoroethane mixture, with not more than 5.6% ethylene oxide	16.7 14.7 12.9 11.2	Allowed	Normal	1.03
3318	Ammonia solution, relative density less than 0.880 at 15°C in water, with more than 50% ammonia	See MAWP definition in 3.38.6	Allowed	See 3.42.3	See 4.2.2.7
3337	Refrigerant gas R 404A	31.6 28.3 25.3 22.5	Allowed	Normal	0.84

3338	Refrigerant gas R 407A	31.3 28.1 25.1 22.4	Allowed	Normal	0.95
3339	Refrigerant gas R 407B	33.0 29.6 26.5 23.6	Allowed	Normal	0.95
3340	Refrigerant gas R 407C	9.9 26.8 23.9 21.3	Allowed	Normal	0.95

T75	PORTABLE TANK INSTRUCTION	T75
This portable tank instruction applies to refrigerated liquefied gases. The general provisions of 4.2.3 and section 3 shall be met		

#### 2.7.4 Portable tank special provisions (TPs)

2.4.1 Portable tank special provisions are assigned to certain substances in column 14 in the Dangerous Goods List of the Code to indicate provisions which are in addition to ~~or in place of or in lieu of~~ those provided by the portable tank instruction or the provisions in section 3.T-instruction. Portable tank special provisions are identified by an alpha-numeric designation beginning with the letters "TP" (tank provision)), and are assigned to specific substances in Columns 12 and 14 of the Dangerous Goods List in Chapter 3.2 of the Code. The following is a list of the portable tank special provisions: Their meaning is ascertained from 4.2.5.3 of the Code.

TP1 ~~- The degree of filling prescribed in 4.2.1.9.2 of the Code shall not be exceeded.~~

TP2 ~~- The degree of filling prescribed in 4.2.1.9.3 of the Code shall not be exceeded.~~

TP3 ~~- For substances transported above 50°C, the degree of filling prescribed in 4.2.1.9.5.1 of the Code shall not be exceeded.~~

TP4 ~~- The degree of filling shall not exceed 90% or, alternatively, any other value approved by the competent authority (see 4.2.1.15.2 of the Code).~~

TP5 ~~- The degree of filling prescribed in 4.2.3.6 of the Code shall not be exceeded.~~

TP6 ~~- To prevent the tank bursting in any event, including fire engulfment, it shall be provided with pressure relief devices which are adequate in relation to the capacity of the tank and to the nature of the substance transported. The device shall also be compatible with the substance.~~

TP7 ~~- Air shall be eliminated from the vapour space by nitrogen or other means.~~

TP8 ~~- The test pressure for the portable tank may be reduced to 1.5 bar when the flashpoint of the substances transported is greater than 0°C.~~

TP9 ~~- A substance under this description shall only be transported in a portable tank under an approval granted by the competent authority.~~

~~TP10 – A lead lining, not less than 5 mm thick, which shall be tested annually, or another suitable lining material approved by the competent authority is required.~~

~~TP11 – Reserved.~~

~~TP12 – This substance is highly corrosive to steel.~~

~~TP13 – Self-contained breathing apparatus shall be provided when this substance is transported.~~

~~TP14 – Reserved.~~

~~TP15 – Reserved.~~

~~TP16 – The tank shall be fitted with a special device to prevent under pressure and excess pressure during normal transport conditions. This device shall be approved by the competent authority. Pressure relief provisions are as indicated in 3.9.3 to prevent crystallization of the product in the pressure relief valve.~~

~~TP17 – Only inorganic non-combustible materials shall be used for thermal insulation of the tank.~~

~~TP18 – Temperature shall be maintained between 18°C and 40°C. Portable tanks containing solidified methacrylic acid shall not be reheated during transport.~~

~~TP19 – The calculated shell thickness shall be increased by 3 mm. Shell thickness shall be verified ultrasonically at intervals midway between periodic hydraulic tests.~~

~~TP20 – This substance shall only be transported in insulated tanks under a nitrogen blanket.~~

~~TP21 – The shell thickness shall be not less than 8mm. Tanks shall be hydraulically tested and internally inspected at intervals not exceeding 2.5 years.~~

~~TP22 – Lubricant for joints or other devices shall be oxygen-compatible.~~

~~TP23 – Transport permitted under special conditions prescribed by the competent authorities.~~

~~TP24 – The portable tank may be fitted with a device located, under maximum filling conditions, in the vapour space of the shell to prevent the build-up of excess pressure due to the slow decomposition of the substance transported. This device shall also prevent an unacceptable amount of leakage of liquid in the case of overturning or entry of foreign matter into the tank. This device shall be approved by the competent authority or its authorized body.~~

~~TP25 – Sulphur trioxide 99.95% pure and above may be transported in tanks without an inhibitor provided that it is maintained at a temperature equal to or above 32.5°C.~~

~~TP26 – When transported under heated conditions, the heating device shall be fitted outside the shell. For UN 3176, this provision only applies when the substance reacts dangerously with water.~~

~~TP27 – A portable tank having a minimum test pressure of 4 bar may be used if it is shown that a test pressure of 4 bar or less is acceptable according to the test pressure definition in 3.2.7.~~

~~TP28 – A portable tank having a minimum test pressure of 2.65 bar may be used if it is shown that a test pressure of 2.65 bar or less is acceptable according to the test pressure definition in 3.2.7.~~

~~TP29 – A portable tank having a minimum test pressure of 1.5 bar may be used if it is shown that a test pressure of 1.5 bar or less is acceptable according to the test pressure definition in 3.2.7.~~

~~TP30 – This substance shall be transported in insulated tanks.~~

~~TP31 – This substance shall be transported in tanks in solid state.~~

**Example:**

~~Portable tank special provision TP31 is assigned to Potassium Sodium Alloys, Liquid, UN 1422. Consulting TP31 in 4.2.5.3 you are told that these substances must be transported in the solid state. The portable tanks will have to be held at the place of filling until all liquid has solidified.~~

## **2.5 Indicating conformance with Portable Tank Instruction on IMO portable tanks.**

2.5.1 Each IMO portable tank should be marked, either on the portable tank itself or on a metal plate firmly secured to the portable tank, with an indication of the portable tank instruction for which it meets the minimum test pressure, minimum shell thickness, pressure relief requirements and bottom opening requirements as shown in 4.2.5.2.6 of the IMDG Code. The markings should conform to the provisions of 4.2.0.3. The existing IMO marking required by IMDG Code at date of manufacture should continue to be displayed. This marking is not an indication that the portable tank meets design and construction criteria for any particular UN portable tank, but merely an indication that the tank complies with the requirements given in 4.2.5.2.6 of the IMDG Code for the applicable portable tank instruction marked on the portable tank.

2.5.2 In accordance with 4.2.0.3 of the IMDG Code IMO portable tanks not currently marked with the portable tank instruction must be marked by the portable tank owner/operator at the occasion of the next periodic inspection and test.

## **2.6 Use of IMO type 4, 6 and 8 tanks on short international voyages**

~~2.6.1 IMO type 4, 6 and 8 tanks may be used according to the provisions of section 3. This provision should only be used for short international voyages. should be constructed and approved on or after 01.01.2002 and used according to the provisions of chapter 6.8 of the IMDG Code. Between 01.01.2001 and 31.12.2001 IMO road tank vehicles may have been approved according to the provisions of Amendment 29-98 or Amendment 30-00 of the Code.~~ This guidance applies to IMO type portable tanks and road tank vehicles on short international voyages approved prior to the entry into force of amendment 30-00 of the IMDG Code.

~~2.86.2~~ IMO type 4 tanks should be attached to the chassis when transported on board ships. Lifting operations for the purposes of loading on to ships and unloading from ships should not take place.

## **Section 3 - Provisions for the design, construction, inspection and testing of IMO type portable tanks and road tank vehicles**

### **3. Introduction**

The provisions for the design, construction, inspection and testing of IMO portable tanks and road tank vehicles from section 13 of amendment 29-98 of the IMDG Code are reproduced below. The only text not reproduced from amendment 29-98 are the appendices, which list in chart format substances suitable for transport in portable tanks or road tank vehicles. **These appendices were not reproduced because users are now required to consult the dangerous goods list to determine the appropriate portable tank and instruction and special provisions.**

It is imperative that users of IMO portable tanks consult and comply with the most current edition of the IMDG Code in regards to periodic inspection and test requirements (found throughout chapter 6.7, general provisions for use (chapter 4.2), as well as definitions for certain terms (e.g. short international voyage). The reproduced text from Amendment 29-98 is intended for reference purposes to ensure design and construction requirements are available to users of this circular that require such information.

### **13.1 GENERAL REQUIREMENTS FOR PORTABLE TANKS AND ROAD TANK VEHICLES FOR DANGEROUS SUBSTANCES OTHER THAN CLASS 2**

#### **13.1.1 Preamble**

13.1.1.1 The requirements of this subsection apply to portable tanks and road tank vehicles intended for the transport of dangerous substances, except for those of class 2, by sea. In addition to these requirements, or unless otherwise specified, the applicable requirements of the International Convention for Safe Containers (CSC) 1972, as amended, should be fulfilled by any tank which meets the definition of a "container" within the terms of that Convention. The International Convention for Safe Containers does not apply to offshore tank-containers that are handled in open seas. The design and testing of offshore tank-containers should take into account the dynamic lifting and impact forces that may occur when a tank is handled in open seas in adverse weather and sea conditions. The requirements for such tanks should be determined by the approving competent authority (see also MSC/Circ. 613 in the annex at the end of this section). Such containers should be based on MSC/Circ.860 Guidelines for the approval of offshore containers handled in open seas.

13.1.1.2 Attention is drawn to the fact that no requirements have been included in respect of any additional fire-fighting equipment which may be necessary on ships transporting these tanks.

13.1.1.3 In order to take into account progress in science and technology, the use of alternative arrangements may be considered where these offer at least equivalent safety in use in respect of compatibility with the properties of the substances transported and equivalent or superior resistance to impact, loading and fire.

13.1.1.4 The appendix to this subsection comprises the list of dangerous substances showing the particular requirements which modify or supplement these general requirements for each particular substance. The appendix will need updating from time to time in the light of technical progress and to include new substances.

13.1.1.4.1 In general, where a substance has not been allocated a UN Number, it should be carried under the most suitable N.O.S. entry. However, the competent

authority of the country of origin may issue interim approvals for shipment of substances not listed in the appendix to this subsection to which individual UN Numbers have already been assigned. The approval should accompany the shipment concerned and contain at a minimum the information normally provided in the list of substances and the conditions under which the particular substance should be carried. The approval should contain a note to the effect that this competent authority has undertaken action to include this substance in the appendix to subsection 13.1.

13.1.1.4.2 Solid dangerous substances which do not appear on the list in the appendix to this section but which may be transported in portable tanks in accordance with paragraphs 13.1.28.2.1 and 13.1.28.2.3 are not subject to approval by the competent authority of the country of origin as provided for in paragraph 13.1.1.4.1 in general. However, in the particular case provided for in paragraph 13.1.28.2.3, it is necessary to obtain competent authority approval but it is not necessary for that approval to contain a note to the effect that the competent authority has undertaken action to include this substance in the appendix to subsection 13.1.

13.1.1.5 These requirements do not apply to rail tank-wagons (except for materials of Class 7), non-metallic tanks, tanks intended for the transport of liquids having a capacity of 450 litres or less and tanks for substances of Class 2.

### 13.1.2 Definitions

13.1.2.1 For the purposes of these requirements:

13.1.2.2 *Portable tank* means a tank having a capacity of more than 450 litres whose shell is fitted with items of service equipment and structural equipment necessary for the transport of dangerous substances whose vapour pressure is not more than 3 bar (absolute) at a temperature of 50°C. It is a tank that has stabilizing members external to the shell and is not permanently secured on board the ship. Its contents should not be loaded or discharged while the tank remains on board. It should be capable of being loaded and discharged without the need of removal of its structural equipment and be capable of being lifted on and off the ship when loaded.

NOTES: 1 Portable tanks being in conformity with the requirements of this section are not considered to be intermediate bulk containers (IBCs).

2 IBCs being in conformity with the requirements of section 26 of this General Introduction are not considered to be portable tanks.

13.1.2.3 *Shell* means the tank proper, including openings and their closures, but does not include service equipment (see 13.1.2.4).

13.1.2.4 *Service equipment* of a shell means filling and discharge, venting, safety, heating and heat-insulating devices and measuring instruments.

13.1.2.5 *Structural equipment* means the reinforcing, fastening, protective or stabilizing members of the shell.



13.1.2.6      *Maximum allowable working pressure* means a pressure that is not less than the higher of the following two pressures, measured at the top of the tank while in operating position:

.1          the highest effective pressure allowed in the shell during filling or discharge; or

.2          the maximum effective gauge pressure to which tanks for liquids should be designed, which is the sum of the following partial pressures minus 1 bar:

.2.1      the vapour pressure (in bar) at 65°C; and

.2.2      the partial pressure (in bar) of air or other gases in the ullage space being determined by a maximum ullage temperature of 65°C and a liquid expansion due to the increase of the bulk mean temperature of  $t_f$ - $t_i$  ( $t_f$ =filling temperature, usually 15°C;  $t_i$ =50°C; the maximum mean bulk temperature).

13.1.2.7      *Test pressure* means the maximum gauge pressure at the top of a tank during a hydraulic test.

13.1.2.8      *Design pressure* means the pressure used, according to a recognized pressure vessel code, as mentioned in 13.1.3.11 for the design of every element of the tank.

The design pressure should never be less than the highest of the following three pressures:

.1          the working pressure as given in 13.1.2.6.1; or

.2          the sum of the pressure as given in 13.1.2.6.2 and the dynamic head pressure, determined on the basis of the dynamic forces due to inertia specified in 13.1.4.1 minus 1.0 bar; such a dynamic head pressure should never be taken to be less than 0.35 bar; or

.3          the required test pressure divided by 1.5.

13.1.2.9      *Discharge pressure* means the highest pressure actually built up in the shell when it is being discharged by pressure.

13.1.2.10     *Leakage test* means a test which consists of subjecting the shell to an effective internal pressure equivalent to the maximum allowable working pressure, but not less than 0.2 bar (gauge).

13.1.2.11     *Total mass* means the mass of the shell, its service equipment and structural equipment, and the heaviest load authorized to be transported.

13.1.2.12     *Start-to-discharge pressure* means the value of increasing static pressure below which no bubbling occurs when a pressure-relief valve is tested by means of air under water seal at the outlet.

13.1.2.13     *Type 1 portable tank* means a portable tank fitted with pressure-relief devices, having a maximum allowable working pressure of 1.75 bar or above.

13.1.2.14 Type 2 portable tank means a portable tank fitted with pressure-relief devices, having a maximum allowable working pressure equal to or above 1.0 bar but below 1.75 bar, intended for the transport of certain dangerous liquids of low hazard.

13.1.2.15 Type 4 tank is a road tank vehicle with a permanently attached tank or a tank attached to a chassis, with at least four twist locks that take account of ISO standards \*, having a capacity of more than 450 litres and fitted with pressure-relief devices. Such a road tank should comply with the requirements of the competent authority. It need not comply fully with the relevant requirements for type 1 or 2 portable tanks. Special requirements for type 4 tanks are given in 13.1.24.5. Type 4 tanks should only be used on short international voyages.

\* ISO International Standard 1161-1984.

13.1.2.16 Road tank vehicle is a vehicle fitted with a tank complying with the relevant requirements for type 1 or 2 portable tanks or is a type 4 tank, intended for the transport of dangerous liquids by both road and sea modes of transport, the tank of which is permanently or rigidly attached to the vehicle during all normal operations of loading, discharging and transport and is neither filled nor discharged on board and is driven on board on its own wheels.

13.1.2.17 Short international voyage means an international voyage in the course of which a ship is not more than 200 miles from a port or place in which the passengers and crew could be placed in safety. Neither the distance between the last port of call in the country in which the voyage begins and the final port of destination nor the return voyage shall exceed 600 miles. The final port of destination is the last port of call in the scheduled voyage at which the ship commences its return voyage to the country in which the voyage began.

13.1.2.18 Long international voyage means an international voyage that is not a short international voyage.

13.1.2.19 No bottom openings means that the shell of the tank is not pierced below the liquid level in the tank. When existing openings are blanked off, this should be by means of suitable blank flanges welded to the shell internally and externally.

13.1.2.20 For the purposes of this subsection, tank means a portable tank or a road tank vehicle.

### **13.1.3 General requirements for the design, construction and operation of tanks**

13.1.3.1 Shells should be manufactured of ductile metallic materials suitable for shaping. For welded shells only a material whose weldability has been fully demonstrated should be used. Welds should be skilfully made and afford complete safety. Tank materials should be suitable for the marine environment.

13.1.3.2 Tanks, fittings and pipework should be manufactured of material which is either:

.1 substantially immune to attack by the substance being transported; or

- .2 properly passivated or neutralized by chemical reaction with that substance; or
- .3 lined with other corrosion-resistant material directly bonded to the material of the shell or attached by equivalent means.
- 13.1.3.3 Gaskets, where used, should be made of materials not subject to attack by the contents of the tank.
- 13.1.3.4 If lining is applied, the lining of the tank and its fittings and pipings should be continuous, and should extend around the face of any flanges. Where external fittings are welded to the tank, the lining should be continuous through the fittings and around the face of external flanges.
- 13.1.3.5 Lining material should be substantially immune to attack by the substance transported, homogeneous, non-porous, and should have thermal-expansion and elasticity characteristics that are compatible with the material of the shell and pipings.
- 13.1.3.6 Care should be taken to avoid damage by galvanic action due to the juxtaposition of dissimilar metals.
- 13.1.3.7 The materials of the tank, including any devices, gaskets and accessories, should not adversely affect the contents of the tank.
- 13.1.3.8 Tanks should be designed and manufactured with supports to provide a secure base during transport and with suitable lifting and tie-down attachments. Road tank vehicles should be fitted with tie-down attachments and secured on board in such a way that the suspension is not left in free play. \*
- 13.1.3.9 Tanks intended for the transport of flammable liquids having a flashpoint of not more than 61°C c.c. should be capable of being electrically earthed, e.g. should have installed a grounding stud or other suitable device with a minimum cross-sectional area of 0.5 cm<sup>2</sup>. Measures should be taken to prevent a dangerous electrostatic discharge, for instance, in lined tanks or in tanks with plastic components which are not electrically conductive. The aim of these measures is to assure electrical continuity.
- 13.1.3.10 Shells, their attachments and their service and structural equipment should be designed to withstand, without loss of contents, at least the internal pressure due to the contents and the static and dynamic stresses in normal handling and transport. For tanks that are intended for use as offshore tank-containers, the dynamic stresses imposed by handling in open seas should be taken into account.
- 13.1.3.11 Tanks should be designed, manufactured and tested in accordance with a recognized pressure vessel code, taking into account the design pressure as defined in 13.1.2.8.
- 13.1.3.12 Tanks should be of a design capable of being stress-analysed mathematically or experimentally by resistance strain gauges, or by any other acceptable method.

13.1.3.13 Tanks should be designed and manufactured to withstand a test pressure equal to at least 1.5 times the maximum allowable working pressure. However, the test pressure should never be lower than 1.5 bar. Specific requirements are laid down for various substances authorized to be carried in tanks in the appendix to this subsection. Attention is also drawn to the minimum shell thickness requirements, specified in 13.1.5.1 to 13.1.5.8.

13.1.3.14 Tanks without vacuum-relief valves should be designed to withstand an external pressure at least 0.4 bar above the internal pressure. Tanks equipped with vacuum-relief valves should be designed to withstand an external overpressure of 0.21 bar or greater and should have their vacuum-relief valve set to relieve at minus (-) 0.21 bar, except that a greater negative setting may be utilized provided the external design pressure is not exceeded. All vacuum-relief valves used on tanks for the transport of liquids with flashpoints below 61°C (c.c.) should be equipped with a flame trap.

\* Attention is drawn to the Guidelines for Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships (resolution A.581(14)) (see the Supplement to this Code).

13.1.3.15 Tanks intended to contain certain dangerous substances should be provided with additional protection, which may take the form of additional thickness of the shell or a higher test pressure, the additional thickness or higher test pressure being determined in the light of the dangers inherent in the substances concerned. The requirements for each substance are given in the list in the appendix to this subsection.

#### **13.1.4 Design criteria**

13.1.4.1 Tanks and their fastenings should, under the maximum permissible load, be capable of absorbing the following dynamic forces:

.1 in the direction of travel: twice the total mass;

.2 horizontally at right angles to the direction of travel: the total mass (where the direction of travel is not clearly determined, the maximum permissible load should be equal to twice the total mass);

.3 vertically upwards: the total mass; and

.4 vertically downwards: twice the total mass (total loading including the effect of gravity).

13.1.4.2 Under each of these loads, the safety factors to be observed for the primary combined stress should be as follows:

.1 for metals having a clearly defined yield point, a safety factor of 1.5 in relation to the determined yield stress; or

.2 for metals with no clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed 0.2% (1.0% for austenitic steels) proof stress.

Note: The above loads do not give rise to an increase in the pressure in the vapour space.

13.1.4.3 At the test pressure the membrane stress in the shell should conform to the material-dependent limitations prescribed below:

- .1 for metals and alloys exhibiting a clearly defined yield point or characterized by a guaranteed conventional yield stress  $R_e$  (generally 0.2% proof stress; for austenitic steels 1.0% proof stress), the membrane stress should not exceed  $0.75R_e$  or  $0.50R_m$ , whichever is lower.
- .2 In the case of steel, the elongation at fracture, in per cent, should not be less than 10,000, where  $R_m$  is in  $N/mm^2$ , with an absolute minimum of 20% based on a standard gauge length of 50 mm. In the case of aluminium, the elongation at fracture, in per cent, should not be less than 10,000, where  $R_m$  is in  $N/mm^2$ , with an absolute minimum of 12%.

13.1.4.4 The specimens used to determine the elongation at fracture should be taken transversely to the direction of rolling and be so secured that:

$$\underline{L_0 = 5d}$$

or

$$\underline{L_0 = 5.65 \sqrt{A}}$$

where :

$L_0$  = gauge length of the specimen before the test;

$d$  = diameter; and

$A$  = cross-sectional area of the test specimen.

### **13.1.5 Minimum shell thickness**

13.1.5.1 The minimum shell thickness referred to in this subsection may be used only if design criteria calculations do not indicate that a greater thickness is required.

13.1.5.2 The cylindrical portions and ends of tanks should have a thickness of not less than that determined by the following formula \*:

$$\underline{e = \frac{C}{\sqrt[3]{(R_m \times A)}}}$$

where:

$e$  = minimum required thickness of the metal to be used, in mm;

$R_m$  = guaranteed minimum tensile strength of the metal to be used, in  $N/mm^2$ ;

$A$  = guaranteed minimum elongation (as a percentage) of the metal to be used on fracture under tensile stress; see 13.1.4.3;

$C$  = 107 (equivalent to 5 mm mild steel) for tanks intended for the transport of powdery or granular solid substances and for tanks of not more than 1.80 m in diameter intended for the transport of liquids

or

C = 128 (equivalent to 6 mm mild steel) for tanks of more than 1.80 m in diameter.

\*The constant C is derived from the following formula:  $e \times \sqrt[3]{(Rm \times A)} = e_o \times \sqrt[3]{(Rm_o \times A_o)}$ , where the sub-index 'o' refers to mild steel and the part of the equation without sub-index 'o' refers to the metal used. The relationship with mild steel as employed by this Code is attached to the constant C, where  $C = e_o \times \sqrt[3]{(Rm_o \times A_o)}$ .

13.1.5.3 Where additional thickness of the shell is required for certain dangerous substances, this thickness is given in mm mild steel in column 9 of the appendix to 13.1.

For calculation purposes the required constant C to be taken is given in the table below:

<u>Where column 9 specifies:</u>	<u>C to be used for calculation is:</u>
<u>6 mm</u>	<u>128</u>
<u>8 mm</u>	<u>171</u>
<u>10 mm</u>	<u>213</u>
<u>12 mm</u>	<u>256</u>

13.1.5.4 Except as provided in 13.1.5.5, the cylindrical portions and ends of all tanks should have a thickness of at least 3 mm regardless of the material of construction. For type 4 tanks the requirements of 13.1.24.5 may be applied.

13.1.5.5 Where additional protection of the tanks against damage is provided, the competent authority may, for a tank having a test pressure below 2.65 bar (i.e. type 2 portable tank), authorize a reduction in the minimum thickness in proportion to the protection provided.

For such protected tanks the thickness should not be less than that determined in accordance with 13.1.5.2, where:

C= 64 (equivalent to 3 mm mild steel) for tanks of not more than 1.80 m in diameter; and

C= 85 (equivalent to 4 mm mild steel) for tanks of more than 1.80 m in diameter.

13.1.5.6 The additional protection referred to in 13.1.5.5 may be provided by overall external structure protection such as a suitable "sandwich" construction with the outer shielding secured to the shell, double-wall construction or the shell supported in a complete framework with longitudinal and transverse structural members.

13.1.5.7 There should be no sudden change in plate thickness at the attachment of the head to the cylindrical portion of the shell, and after forming the head the plate thickness at the knuckle should not be less than the minimum thickness required by this subsection.

13.1.5.8 In no case should the wall thickness of any portion of the shell be less than that prescribed in this subsection.

## 13.1.6 Service equipment

- 13.1.6.1 Service equipment (valves, fittings, safety devices, gauging devices and the like) should be so arranged as to be protected against the risk of being wrenched off or damaged during transport and handling. If the connection between the frame and the shell allows relative movement as between the sub-assemblies, the equipment should be so fastened as to permit such movement without risk of damage to working parts. Equipment protection should offer a degree of safety comparable to that of the shell. For offshore tank-containers, where positioning of service equipment and the design and strength of protection for such equipment is concerned, the increased danger of impact damage when handling such tanks in open seas should be taken into account.
- 13.1.6.2 All shell openings other than openings for pressure-relief devices and inspection openings should be provided with manually operated stop valves situated as near to the shell as is practicable.
- 13.1.6.3 A tank or each of its components should be provided with an opening large enough to enable the tank or compartment to be inspected.
- 13.1.6.4 Whenever possible, external fittings should be grouped together.
- 13.1.6.5 All tank connections should be clearly marked to indicate the function of each.
- 13.1.6.6 Stop valves with screwed spindles should close by clockwise rotation. Each valve should be designed and constructed for a rated pressure not less than the maximum allowable working pressure of the tank at the temperatures expected to be encountered.
- 13.1.6.7 All piping should be of suitable material. Welded pipe joints should be used wherever possible. Where copper tubing is permitted, joints should be brazed or have an equally strong metal union. The melting point of brazing material should be no lower than 525°C. Such joints should, in any event, be such as not to decrease the strength of the tubing, as may happen by cutting of threads. Ductile metals should be used in the construction of valves or accessories. The bursting strength of all piping and pipe fittings should be at least four times the strength at the maximum allowable working pressure of the tank and at least four times the strength at the pressure to which it may be subjected in service by the action of a pump or other device (except pressure-relief valves) the action of which may subject portions of the piping to pressures greater than the tank maximum allowable working pressure. Suitable provisions should be made in every case to prevent damage to piping due to thermal expansion and contraction, jarring and vibration.
- 13.1.7 Bottom openings**
- 13.1.7.1 Certain substances listed in the appendix to this subsection should not be transported in tanks with bottom openings (bottom-discharge tanks). As an exception, for type 4 tanks, existing openings and hand inspection holes may be closed by bolted flanges mounted both internally and externally, fitted with product-compatible gaskets. Such arrangement should be approved by the competent authority.
- 13.1.7.2 Except as may otherwise be provided in the case of tanks intended for the transport of certain crystallisable, highly viscous or extremely hazardous

substances, every bottom-discharge tank should be equipped with two serially mounted and mutually independent shutoff devices as follows:

.1 an internal stop valve; that is a stop valve within the tank or within a welded flange or its companion flange, or within a coupling which is an integral part of the tank, such that:

.1.1 the control devices are so designed as to prevent any unintended opening through impact or other inadvertent act;

.1.2 the valve may be operable from above or below; and

.1.3 if possible, the setting of the valve (open or closed) can be verified from the ground.

.2 At the end of each discharge pipe:

.2.1 a sluice valve; or

.2.2 a bolted blank flange; or

.2.3 a suitable screw cap or other liquid-tight closure.

13.1.7.3 For certain substances, as indicated by a "B" in column 8 of the appendix to this subsection, bottom-discharge tanks should be equipped with three serially mounted and mutually independent shutoff devices as follows:

.1 an internal stop valve as provided in 13.1.7.2 except that it should be possible to close the valve from an accessible position of the tank that is remote from the valve itself;

.2 an external valve; and

.3 at the end of the discharge pipe:

.3.1 a bolted blank flange; or

.3.2 a suitable screw cap or other liquid-tight closure.

13.1.7.4 The internal shutoff device should continue to be effective in the event of damage to the external control device.

13.1.7.5 In order to avoid any loss of contents in the event of damage to external discharge fittings, e.g. pipe sockets, lateral shutoff devices, the internal stop valve and its seating should be protected against the danger of being wrenched off by external stresses or should be so designed as to resist them. The filling and discharge devices, including flanges or threaded plugs and protective caps, if any, should be capable of being secured against any unintended opening.

### **13.1.8 Safety relief**

13.1.8.1 All tanks should be closed and fitted with a pressure-relief device. All pressure-relief devices should be to the satisfaction of the competent authority.

### **13.1.9 Pressure-relief devices**



- 13.1.9.1 Every tank of 1,900 litres or more, or every independent compartment of a tank of similar capacity, should be provided with one or more pressure-relief valves of the spring-loaded type and may in addition have a frangible disc or fusible element in parallel with the spring-loaded valves, except when precluded by the list in the appendix to this subsection as designated by ``NF" in column 7.
- 13.1.9.2 Pressure-relief devices should be designed to prevent the entry of foreign matter, the leakage of liquid and the development of any dangerous excess pressure.
- 13.1.9.3 Tanks intended for the transport of certain *corrosive and* highly toxic substances which are designated ``NF" in column 7 of the list in the appendix to this subsection should have a pressure-relief arrangement approved by the competent authority. The arrangement should comprise a spring-loaded pressure-relief valve preceded by a frangible disc except that a tank in dedicated service may be fitted with an approved relief system offering an equivalent hermetic seal. The space between the frangible disc and the valve should be provided with a pressure gauge or suitable tell-tale indicator. This arrangement permits the detection of disc rupture, pinholing or leakage which could cause a malfunction of the spring-loaded valve. The frangible disc in this instance should rupture at a nominal pressure that is 10% above the start-to-discharge pressure of the valve.
- 13.1.9.4 Every tank with a capacity of less than 1,900 litres should be fitted with a pressure-relief device which may be a frangible disc. If no spring-loaded pressure-relief valve is used, the frangible disc should be set to rupture at a nominal pressure equal to the test pressure.
- 13.1.9.5 If the tank is fitted with arrangements for air-pressure or inert-gas pressure discharge, the inlet line should be provided with a suitable pressure-relief device set to operate at a pressure not higher than the maximum allowable working pressure of the tank. A stop valve should be provided at the entry to the tank.
- 13.1.10 **Setting of pressure-relief devices**
- 13.1.10.1 It should be noted that the devices should operate only in conditions of excessive rise in temperature, as the tank will not during transport be subject to undue fluctuations of pressure due to operating procedures (see, however, 13.1.13.2).
- 13.1.10.2 The required pressure-relief valve should be set to start to discharge at a nominal pressure of five sixths of the test pressure in the case of tanks having a test pressure up to and including 4.5 bar and 110% of two thirds of the test pressure in the case of tanks having a test pressure of more than 4.5 bar. The valve should, after discharge, close at a pressure not lower than 10% below the pressure at which discharge starts, and should remain closed at all lower pressures provided that this requirement not be so construed as to prevent the use of vacuum-relief or combination pressure-relief and vacuum-relief valves.
- 13.1.11 **Fusible elements**

13.1.11.1 Fusible elements, if allowed in the appendix to this subsection, should function at a temperature between 110°C and 149°C provided that the developed pressure in the tank at the fusing temperature of the element does not exceed the test pressure of the tank. They should be placed at the top of the tank in the vapour space and in no case should they be shielded from external heat.

**13.1.12 Frangible discs**

13.1.12.1 Except as provided in 13.1.9.3, frangible discs, if used, should rupture at a nominal pressure equal to the test pressure. Particular attention should be given to the requirements of 13.1.6.1 if frangible discs are used.

**13.1.13 Capacity of relief devices**

13.1.13.1 The spring-loaded relief valve required by 13.1.9.1 should have a minimum diameter of 31.75 mm. Vacuum-relief valves, if used, should have a minimum through area of 2.84 cm<sup>2</sup>.

13.1.13.2 The combined delivery capacity of the relief devices in condition of complete engulfment of the tank in fire should be sufficient to limit the pressure in the tank to 20% above the start-to-discharge pressure of the relief device. Emergency pressure-relief devices may be used to achieve the full relief capacity prescribed. Emergency pressure-relief devices may be of the spring-loaded, frangible or fusible type.

To determine the total certified capacity of the relief devices, which may be regarded as being the sum of the individual capacities of the several devices, the following formula may be used:

$$Q = 12.4 \frac{FA^{0.82}}{LC} \sqrt{\frac{ZT}{M}}$$

where:

the accumulating condition is 20% above the start-to-discharge pressure of the relief device;

Q is the minimum required rate of discharge in cubic metres of air per second at standard conditions: 1 bar and 0°C (273 K);

F is a coefficient with the following value:

.1 for uninsulated tanks F = 1

.2 for insulated tanks F = U(649 - t)/13.6 but in no case is less than 0.25

where:

U = thermal conductance of the insulation, in kW/(m<sup>2</sup>K), at 38°C

t = actual temperature of the substance at loading (°C); if this temperature is unknown, let t = 15°C;

The value of F given in .2 above may be taken provided that:

the insulation is jacketed with a material having a melting point not less than 649°C; and

the insulation system will remain effective at all temperatures up to 649°C;

A is the total external surface area of tank in square metres;

Z is the gas compressibility factor in the accumulating condition (if this factor is unknown, let Z equal 1.0);

T is the absolute temperature in Kelvin (°C+273) above the pressure-relief devices and in the accumulating condition;

L is the latent heat of vaporization of the liquid, in kJ/kg, in the accumulating

$$k = \frac{c_p}{c_v}$$

condition;

(1)

M is the molecular mass of the discharged gas;

C is the constant which is derived from equation (2) as a function of the ratio k of specific heats:

where:

C<sub>p</sub> is the specific heat at constant pressure and  
C<sub>v</sub> is the specific heat at constant volume;

When k. >1 In this case C may be taken from the table at the top of the next page  
"VALUES FOR THE CONSTANT C WHEN k >1".

$$C = \sqrt{k \left( \frac{2}{k+1} \right)^{\frac{k+1}{k-1}}}$$

When k = 1 or k is unknown:

$$C = \frac{1}{\sqrt{e}} = 0.607$$

where e is the mathematical constant 2.7183

VALUES FOR THE CONSTANT C WHEN k >1

<u>k</u>	<u>C</u>	<u>k</u>	<u>C</u>	<u>k</u>	<u>C</u>
1.00	0.607	1.26	0.660	1.52	0.704
1.02	0.611	1.28	0.664	1.54	0.707
1.04	0.615	1.30	0.667	1.56	0.710
1.06	0.620	1.32	0.671	1.58	0.713
1.08	0.624	1.34	0.674	1.60	0.716
1.10	0.628	1.36	0.678	1.62	0.719
1.12	0.633	1.38	0.681	1.64	0.722
1.14	0.637	1.40	0.685	1.66	0.725
1.16	0.641	1.42	0.688	1.68	0.728
1.18	0.645	1.44	0.691	1.70	0.731
1.20	0.649	1.46	0.695	2.00	0.770
1.22	0.652	1.48	0.698	2.20	0.793
1.24	0.656	1.50	0.701		

13.1.13.3 Alternatively to using the formula above, tanks designed for the transport of liquids may have their relief devices sized in accordance with the following table. This table assumes an insulation value of  $F = 1$  and should be adjusted accordingly if the tank is insulated. Other values used in determining this table are:

$$M = 86.7 \quad T = 394 \text{ K} \quad L = 334.94 \text{ kJ/kg} \quad C = 0.607 \quad Z = 1$$

MINIMUM EMERGENCY VENT CAPACITY Q IN CUBIC METRES OF AIR  
PER SECOND AT 1 BAR AND 0°C (273 K)

<u>A</u>	<u>Q</u>	<u>A</u>	<u>Q</u>
<u>Exposed area</u> <u>(square metres)</u>	<u>(Cubic metres of</u> <u>air per second)</u>	<u>Exposed area</u> <u>(square metres)</u>	<u>(Cubic metres of</u> <u>air per second)</u>
2	0.230	37.5	2.539
3	0.320	40	2.677
4	0.405	42.5	2.814
5	0.487	45	2.949
6	0.565	47.5	3.082
7	0.641	50	3.215
8	0.715	52.5	3.346
9	0.788	55	3.476
10	0.859	57.5	3.605
12	0.998	60	3.733
14	1.132	62.5	3.860
16	1.263	65	3.987
18	1.391	67.5	4.112
20	1.517	70	4.236
22.5	1.670	75	4.483
25	1.821	80	4.726
27.5	1.969	85	4.967
30	2.115	90	5.206
32.5	2.258	95	5.442
35	2.400	100	5.676

13.1.14 **Marking of pressure-relief devices**

13.1.14.1 Every pressure-relief device should be plainly and permanently marked with the pressure or temperature at which it is set to discharge and the rated free-air delivery of the device. Where practicable, the following particulars should also be shown:

- .1 the manufacturer's name and the relevant catalogue number; and
- .2 allowable tolerances at start-to-discharge pressure (frangible disc) and allowable temperature tolerances (fusible elements).

#### **13.1.15 Connections to pressure-relief devices**

13.1.15.1 Connections to pressure-relief devices should be of sufficient size to enable the required discharge to pass unrestricted to the safety device. No stop valve should be installed between the shell and the pressure-relief devices except where duplicate devices are provided for maintenance or other reasons and the stop valves serving the devices actually in use are locked open or the stop valves are interlocked so that at least one of the devices is always in use. Vents from the pressure-relief devices, where used, should deliver the relieved vapour or liquid to the atmosphere in conditions of minimum back-pressure on the relieving device.

#### **13.1.16 Siting of pressure-relief devices**

13.1.16.1 Pressure-relief device inlets should be sited on top of the tank in a position as near the longitudinal and transverse centre of the tank as possible. All pressure-relief device inlets should be situated in the vapour space of the tank and the devices so arranged as to ensure that the escaping vapour is discharged unrestrictedly and in such a manner that it cannot impinge upon the shell. Protective devices which deflect the flow of vapour are permissible provided the required relief-device capacity is not reduced.

13.1.16.2 Arrangements should be made to prevent access to the devices by unauthorized persons and to protect the devices from damage caused by the tank overturning.

#### **13.1.17 Gauging devices**

13.1.17.1 Glass level-gauges, or gauges made of other easily destructible material, which are in direct communication with the contents of the tank should not be used.

#### **13.1.18 Tank support, frameworks, lifting and tie-down attachments\***

13.1.18.1 Tanks should be designed and manufactured with a support structure to provide a secure base during transport. Skids, frameworks, cradles or other similar devices are acceptable. The loadings specified in 13.1.4.1 should also be considered in this aspect of design.

13.1.18.2 The design of tank mountings (e.g. cradles and frameworks) and tank lifting and tie-down attachments should not cause undue concentration of stress in any portion of the tank. Permanent lifting and tie-down attachments should be fitted to all tanks. They should preferably be fitted to the tank supports. Otherwise, these attachments should be secured to reinforcing plates located on the shell at the points of support.

13.1.18.3 In the design of supports and frameworks, due regard should be paid to the effects of environmental corrosion, and in calculations for all structural members not constructed of corrosion-resistant materials a minimum corrosion allowance, determined by the competent authority, should be provided.

13.1.18.4 Tank frameworks intended to be lifted or secured by their corner castings should be subjected to internationally accepted tests, such as those set forth in the CSC Convention. The use of such frameworks within an integrated system is generally encouraged. In addition, for road tank vehicles, tie-down attachments should be located on the tank support or vehicle structure in such a manner that the springing system is not left in free play. Offshore tank-containers should be subjected to tests that take into account the dynamic lifting and impact forces that may occur when a tank is handled on open seas.

\*See also IMO Assembly resolution A.581(14) of 20 November 1985, Guidelines for Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships (see the Supplement to this Code).

13.1.18.5 \* Fork-lift pockets of tanks should be capable of being closed off. The means of closing fork-lift pockets should be a permanent part of the framework or permanently attached to the framework.

13.1.18.5.1 Single-compartment tanks with a nominal length of less than 3.65 m (12 feet) need not comply with 13.1.18.5 provided that:

.1 the tank shell and all fittings are well protected from being hit by the fork's blades; and

.2 the distance between the centres of the fork-lift pockets is at least 1/2 of the maximum length of the portable tank unit.

13.1.18.6 Tanks should be carried only on vehicles whose fastenings are capable, in conditions of maximum permissible loading of the tanks, of absorbing the forces specified in 13.1.4.1.

#### 13.1.18 **Approval, testing and marking of tanks**

13.1.19.1 The competent approval authority or a body authorized by that authority should issue, in respect of every new design of a tank, a certificate attesting that the tank and its attachments surveyed by that authority or that body are suitable for the purpose for which they are intended and meet the construction and equipment requirements of this subsection and, where appropriate, the special requirements for the substances in the appendix to this subsection. The prototype test results and an approval number should be specified in a test report. If the tanks are manufactured without change in structural design, this approval should be deemed to be design approval. The approval number should consist of the distinguishing sign or mark of the State in whose territory the approval was granted and a registration number.

13.1.19.2 Design approval should be given in respect of at least one tank of each design and each size, it being, however, understood that a set of tests made on a tank of one size may serve for the approval of smaller tanks made of a material of the same kind and thickness by the same fabrication technique and with identical supports and equivalent closures and other appurtenances.

\* Existing tanks should comply with this requirement from 1 January 1996.

13.1.19.3 The shell and items of equipment of each tank should be inspected and tested, either together or separately, first before being put into service (initial inspection and test) and thereafter at no more than five-year intervals (periodic inspection and test). The initial inspection and test should include a check of the design characteristics, an internal and external examination and a hydraulic pressure test. If the shell and equipment have been pressure-tested separately, they should together be subjected after assembly to a leakage test. The periodic inspections and tests should include an internal and external examination and, as a general rule, a pressure test.

- .1 Sheathing, thermal insulation and the like should be removed only to the extent required for reliable appraisal of the tank's condition. The initial and periodic pressure tests should be carried out, by the competent authority or a body authorized by that authority, at the test pressure indicated on the data plate of the tank, except in cases where periodic tests at lower test pressures are authorized.
- .2 The tank should be inspected for corroded areas, dents or other conditions which indicate weakness that might render the tank unsafe in transport and, while under pressure, for leakage. If any evidence of such unsafe condition is discovered, the tank should not be placed in or returned to service until it has been repaired and the test, repeated, has been passed.

13.1.19.4 Before tanks are put into service, and thereafter at intervals midway between the five-yearly inspection and tests specified in 13.1.19.3, the following tests and inspections should be performed:

- .1 a leakage test, where required;
- .2 a test of satisfactory operation of all service equipment; and
- .3 an internal and external inspection of the tanks and their fittings with due regard to the substances transported.

13.1.19.5 The 2.5 year (midway) inspection and test may be carried out within 3 months before or after the specified date. The date of the 2.5 year inspection should be durably marked on, or as near as possible to, the metal identification plate required in 13.1.20.1. When marking is not done on the plate, the characters should be at least 32 mm in height and of a contrasting colour to the tank.

13.1.19.6 The 2.5 year internal inspections may be waived or substituted for by other test methods by the competent authority in the case of tanks intended for dedicated transport. A portable tank may not be filled and offered for transport after the date of expiry of the last 5 year or 2.5 year periodic inspection and test as required by 13.1.19.3 and 13.1.19.4 / 13.115.3 and 13.115.4 / 13.213.3 and 13.213.4. However, a portable tank filled prior to the date of expiry of the last periodic inspection and test may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, a portable tank may be transported after the date of expiry of the last periodic test and inspection:

- .1 After emptying but before cleaning, for purposes of performing the next required test and inspection prior to refilling; and
- .2 Unless otherwise approved by the competent authority, for a

period not to exceed six months beyond the date of expiry of the last periodic test and inspection, in order to allow the return of dangerous goods for proper disposal or recycling. Reference to this authorization should be entered in the dangerous goods shipping document.

13.1.19.7 When the tank is damaged, it should be so repaired as to comply with these recommendations.

13.1.19.8 In all cases where cutting, burning or welding operations on the shell of the tank have been effected, that work should be to the approval of the competent authority and a hydrostatic test to at least the original test pressure should be carried out.

13.1.19.9 The certificate and the test report required under 13.1.19.1 and the certificate showing the results of the initial hydrostatic test for each tank issued by the competent authority or its approved inspecting agency should be retained by the authority or agency and the owners during the time the tank is in service. As a minimum, the certificate issued under 13.1.19.1 should provide the information required in 13.1.20.1.

#### **13.1.20 Marking**

13.1.20.1 Every tank should be fitted with a corrosion-resistant metal plate permanently attached in a place readily accessible for inspection. At least the following particulars should be marked on the plate in characters at least 3 mm in height by stamping, engraving, embossing or any similar method. If, for reasons of tank arrangements, the plate cannot be permanently attached to the shell, the shell should be marked with at least those particulars required by a recognized pressure vessel code in a manner prescribed by that code.

The plate should be kept free of paint to ensure that the markings will be legible at all times.

Country of manufacture .....

<u>IMO tank</u>	<u>Approval</u>	<u>Approval</u>
<u>type no .....</u>	<u>country .....</u>	<u>number .....</u>

Manufacturer's name or mark .....

Registration number .....

Year of manufacture .....

Test pressure .....(bar)/(MPa)\*

Maximum allowable working pressure .....(bar)/(MPa)\*

Water capacity at 20°C .....(litres)

(The water capacity should be established to within 1% by practical test rather than by calculation.)

Maximum gross mass .....(kg)

Original hydrostatic test date and witness identification .....

Code to which tank is designed .....



Metallurgic design temperature (only if above +50°C or below -20°C)  
.....

Maximum allowable working pressure for coils (where coils used)  
.....( bar)/(MPa)\*

Tank material .....

Equivalent thickness in mild steel ..... (mm)

Lining material (if any) .....

Capacity of each compartment (in compartmented tanks) .....litres

Month, year and test pressure of most recent periodic test:

..... month ..... year ..... (bar)/(MPa)\*

Stamp of expert who carried out most recent test.....

\* The unit used should be marked.

13.1.20.2 Special-purpose tanks should be marked on the identification plate to indicate the substance they are permitted to transport.

13.1.20.3 If a tank is designed and approved for handling in open seas, the words OFFSHORE CONTAINER should be marked on the identification plate.

13.1.20.4 Marking and placarding of tanks containing dangerous goods should be carried out in accordance with the requirements of sections 7 and 8.

### 13.1.21 Transport requirements

13.1.21.1 The shells and service equipment of tanks should be manufactured so as to withstand impact or overturning or, alternatively, they should, during transport, be adequately protected against lateral and longitudinal impact and against overturning.

Examples of protection of shells against collision:

.1 protection against lateral impact may consist, for example, of longitudinal bars protecting the shell on both sides at the level of the median line;

.2 protection of tanks against overturning may consist, for example, of reinforcement rings or bars fixed across the frame;

.3 protection against rear impact may consist of a bumper or frame;  
or

.4 external fittings should be designed or protected so as to preclude the release of contents upon impact or overturning of the tank upon the fittings.

13.1.21.2 Certain substances are chemically unstable. They are to be accepted for transport only if the necessary steps have been taken to prevent their dangerous decomposition, transformation or polymerization during transport.

To this end, care should in particular be taken to ensure that tanks do not contain any substances liable to promote these reactions.

### 13.1.22 Filling ratios

13.1.22.1 Tanks should be filled to the extent provided for in 13.1.22.2 to 13.1.22.6.

13.1.22.2 The degree of filling for general use is determined by the formula:

$$\text{Degree of filling} = \frac{97}{1 + \alpha (t_r - t_f)}$$

13.1.22.3 Tanks to be filled with liquids of class 6.1 or 8 (packaging group I or II) or with liquids with an absolute vapour pressure in excess of 1.75 bar (175 kPa) at 65°C, or with liquids identified as being harmful to the marine environment, should be filled in accordance with the following formula:

$$\text{Degree of filling} = \frac{95}{1 + \alpha (t_r - t_f)}$$

13.1.22.4 For certain dangerous substances a lower degree of filling may be required.

13.1.22.5 In these formulae alpha is the mean coefficient of cubical expansion of the liquid between the temperature of the liquid during filling (tf) and the maximum mean bulk temperature (tr) (both in °C) and is calculated by the formula:

$$\alpha = \frac{d_{15} - d_{50}}{35 d_{50}}$$

in which  $d_{15}$  and  $d_{50}$  are the density of the liquid at 15°C and 50°C, respectively.

The maximum mean bulk temperature (tr) should be taken as 50°C except that, for journeys in temperate climatic conditions or extreme climatic conditions, the competent authority may agree to a lower or to a higher temperature, as appropriate.

13.1.22.6 The requirements of 13.1.22.2 and 13.1.22.3 do not apply to tanks whose contents are transported at elevated temperatures. For transport at elevated temperatures, the formula for the degree of filling given in 13.1.27.4 should be used.

13.1.22.7 Tanks should not be offered for transport:

- .1 with a degree of filling, for liquids having a viscosity of less than 2,680 centistokes at 20°C, of more than 20% but less than 80%, unless the shell of the tank is divided by partitions or surge plates into sections of not more than 7,500 litres capacity;
- .2 with residue of lading adhering to the outside of the tank or service equipment;
- .3 if leaking or damaged to such an extent that the integrity of the tank or its lifting or securing arrangements may be affected; and

.4 unless the service equipment has been examined and found to be in good working order.

13.1.22.8 Empty tanks not cleaned and not gas-free should comply with the same requirements as tanks filled with the previous substance.

**13.1.23 Handling requirements**

13.1.23.1 Fork-lift pockets of tanks should be closed off when the tank is filled. This provision does not apply to tanks which, according to 13.1.18.5.1, need not be provided with means for closing off the fork-lift pockets.

**13.1.24 Road tank vehicles**

13.1.24.1 A road tank vehicle for long international voyages should be fitted with a tank complying with the requirements for type 1 or 2 portable tanks and should comply with the relative requirements for tank supports, frameworks, lifting and tie-down attachments in 13.1.18.1 to 13.1.18.4, and in addition comply with the requirements in 13.1.24.3 and 13.1.24.4.

13.1.24.2 A road tank vehicle for short international voyages should either:

.1 comply with the requirements of 13.1.24.1; or

.2 be constructed as a type 4 tank, as defined in 13.1.2.15, complying with the requirements of 13.1.24.3, 13.1.24.4 and 13.1.24.5.

13.1.24.3 The tank supports and tie-down arrangements \* of road tank vehicles should be included in the visual external inspection provided for in 13.1.19.4.

\* See also IMO Assembly resolution A.581(14) of 20 November 1985, Guidelines for Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships (see the Supplement to this Code).

13.1.24.4 The vehicle of a road tank vehicle should be tested and inspected in accordance with the road transport requirements of the competent authority of the country in which the vehicle is operated.

**13.1.24.5 Type 4 tanks**

13.1.24.5.1 Type 4 tanks should only be authorized for short international voyages. They should comply with the requirements of 13.1.3, 13.1.4, 13.1.5 and 13.1.18 or, if they do not comply fully with these requirements, they should be certified by the competent authority for road transport of the substances to be transported by road and should at least comply with the following minimum requirements:

.1 they should have been subjected during construction to a minimum hydraulic test pressure equal to that specified in column 6 of the list of substances in the appendix to this subsection;

.2 the thickness of cylindrical portions and ends in mild steel should be:

.2.1 not more than 2 mm thinner than the thickness specified in column 9 of the above-mentioned list of substances;

- .2.2 subject to an absolute minimum thickness of 4 mm of mild steel; and
- .2.3 for other materials, subject to an absolute minimum thickness of 3 mm;
- .3 the maximum effective gauge pressure developed by the substances to be transported should not exceed the maximum allowable working pressure of the tank; and
- .4 the primary combined stresses in supports, tie-down attachments\* and tank structures in way of them due to static forces and to dynamic forces as defined in 13.1.4.1 should not exceed 0.8 Re, where Re is explained in 13.1.4.3. The said stresses may be calculated or measured.

\* See also IMO Assembly resolution A.581(14) of 20 November 1985, Guidelines for Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships (see the Supplement to this Code).

- 13.1.24.5.2 The materials of construction of type 4 tanks, if they do not comply with the requirements of 13.1.3.1 to 13.1.3.7, should at least comply with the requirements of the competent authority for the transport by road of the substances to be transported by road.
- 13.1.24.5.3 Tank supports on permanently attached type 4 tanks, if they do not comply with the requirements of 13.1.18, should at least comply with the requirements of the competent authority for the transport by road of the substances to be transported by road.
- 13.1.24.5.4 Type 4 tanks should, as a minimum, be tested and inspected in accordance with the requirements of the competent authority for the transport by road of the substances to be transported by road.
- 13.1.24.5.5 The protection of valves and accessories of type 4 tanks should at least comply with the requirements of the competent authority for the transport by road of the substances to be transported by road.
- 13.1.24.5.6 The joints in shells of type 4 tanks should at least be made by fusion welding and comply with the requirements of the competent authority for the transport by road of the substances to be transported by road.
- 13.1.24.5.7 Type 4 tanks should at least be provided with manholes or other openings in the tank which comply with the requirements of the competent authority for the transport by road of the substances to be transported by road.
- 13.1.24.5.8 Tank nozzles and external fittings on type 4 tanks should at least comply with the requirements of the competent authority for the transport by road of the substances to be transported by road, except that, irrespective of road requirements, tanks with bottom openings should not be used for substances for which bottom openings would not be permitted for transport by sea in other types of tanks, unless exempted in accordance with 13.1.7.1.
- 13.1.24.5.9 All type 4 tanks should be closed tanks and, if they do not comply with the requirements of 13.1.8 to 13.1.16, they should at least be fitted with pressure-relief devices of the type required in the list of substances in the appendix to

this subsection. The devices should be acceptable to the competent authority for the transport by road of the substances to be transported. The start-to-discharge pressure of such devices should in no case be less than the maximum allowable working pressure, nor greater than 25% above that pressure.

13.1.24.5.10 Type 4 tanks should be attached to the chassis when transported on board ship. Type 4 tanks which are not permanently attached to the chassis should be marked "IMO 4" in letters at least 32 mm high.

#### 13.1.25      **Stowage**

13.1.25.1      A list of liquid substances suitable for transport in tanks is given in the appendix to this subsection. Where necessary, this list also contains additional constructional requirements or operational provisions.

13.1.25.2      Tanks should be stowed in accordance with the requirements of the individual schedules, subsection 12.5 and section 14 of this General Introduction.

13.1.25.3      Where stowage is permitted "on deck or under deck", a tank containing a marine pollutant should be preferably stowed under deck except when a weather deck provides equivalent protection.

13.1.25.4      Where stowage is permitted "on deck only", preference should be given to the stowage of a tank containing a marine pollutant on well-protected decks or to stowage inboard in sheltered areas of exposed decks.

13.1.25.5      Portable tanks should not be overstored unless they are designed for that purpose and transported in specially designed ships, or unless they are specially protected to the satisfaction of the competent authority.

#### 13.1.26      **Segregation**

13.1.26.1      Tanks containing dangerous substances should be segregated in accordance with the requirements of section 15 of this General Introduction.

#### 13.1.27      **Special requirements relating to tanks for the transport of dangerous substances at elevated temperatures in liquid, molten or resolidified form**

13.1.27.1      The following general requirements relate particularly to tanks for the transport of dangerous substances at elevated temperatures in either liquid or molten form and of molten dangerous substances in resolidified form. Reference should also be made to the appendix to this subsection, setting out special requirements for individual substances.

13.1.27.2      The design of the tank, the choice of materials, insulation, fittings and service equipment should take into account the highest temperature reached during filling, discharge and transport and should be compatible with the substances to be transported.

13.1.27.3      The highest temperature reached during filling, discharge and transport, if it is in excess of 65°C, should be used when calculating the maximum allowable

working pressure as defined in 13.1.2.6. The minimum test pressure should never be less than the pressure indicated in the appendix to this subsection.

- 13.1.27.4 Tanks for the transport of substances at elevated temperatures should be filled at the outset such that the tank is not more than 95% full at any time during transport, unless otherwise indicated for individual substances. The degree of filling for elevated temperature use is determined by the formula:

$$\text{Degree of filling} = \frac{95}{1 + \alpha (t_r - t_f)}$$

where:

$t_r$  is the maximum mean bulk temperature during transport.

$t_f$  is the mean bulk temperature during filling.

$\alpha$  is the mean coefficient of cubical expansion of the substance between  $t_f$  and  $t_r$  and is calculated by the formula:

$$\alpha = \frac{d(t_r) - d(t_f)}{(t_r - t_f) \times d(t_f)}$$

in which  $d(t_r)$  and  $d(t_f)$  are the densities of the substance at the maximum transport temperature and the filling temperature respectively.

- 13.1.27.5 When tanks are used for the transport of liquids at a temperature above the flashpoint, they should be capable of being electrically earthed, e.g. they should have installed a grounding stud or other suitable device with a minimum cross-sectional area of 0.5 cm<sup>2</sup>. Measures should be taken to prevent a dangerous electrostatic discharge, for instance, in lined tanks or in tanks with plastic components which are not electrically conductive. The aim of these measures is to assure electrical continuity.

- 13.1.27.6 The temperature of the outer surface of the shell or of the thermal insulation should not exceed 70°C during transport.

- 13.1.27.7 An additional hazard during transport can be expected from flammable vapours emanating from contaminated insulation by spillage of the product during loading or unloading.

- 13.1.27.8 An elevated temperature mark should be displayed on the tank to indicate that it contains a substance at an elevated temperature. Substances transported at elevated temperatures may also pose additional hazards, such as explosion, fire, toxicity or corrosivity. These additional hazards may be listed in the individual schedules for these substances. In addition, the maximum temperature of the substance expected to be reached during transport should be durably marked on both sides of the tank or insulation jacket, immediately adjacent to the elevated temperature mark, in characters 100 mm high.

#### **13.1.27.9 Heating systems**

13.1.27.9.1 The heating system should not allow a substance to reach a temperature at which the pressure in the tank exceeds its design pressure or causes other hazards (e.g. thermal decomposition or increased corrosivity).

13.1.27.9.2 For some substances the heating system should be fitted outside the inner shell. However, a pipe used for discharging the substance may be equipped with a heating jacket. These substances are marked in column 10 with ``(u)'`.

#### **13.1.27.9.3 Protection against explosion**

.1 In no case should the temperature at the surface of the heating element for internal heating equipment or the temperature at the tank shell for external heating equipment exceed 80% of the autoignition temperature of the substance carried. Power for internal heating elements should not be available unless the heating elements are completely submerged.

.2 If the electrical heating system is installed inside the tank, an earth leakage circuit breaker should be installed with a releasing current of < 100 mA.

.3 Electrical switch cabinets mounted to tanks should not have a direct connection to the tank interior and should provide protection of at least the equivalent of type IP 56 according to IEC 144 or IEC 529.

13.1.27.9.4 The heating system should be subject to inspection and tests, including pressure tests on heating coils or ducts as appropriate, together with the other equipment mentioned in 13.1.19.

13.1.27.10 Bottom openings should be in accordance with 13.1.7. However, all shutoff devices may be external.

#### **13.1.27.11 Stowage and segregation**

13.1.27.11.1 Portable tanks transported at elevated temperatures should be stowed and segregated in accordance with 13.1.25 and 13.1.26.

#### **13.1.28 Special requirements relating to tanks for the transport of solid dangerous substances (e.g. powdery or granulated materials)**

13.1.28.1 Tanks used for the transport of solid dangerous substances capable of flow should comply at least with the requirements for IMO type 2 or type 4 tanks. However, the required service equipment may be in accordance with 13.1.28.4.2 and 13.1.28.4.3.

13.1.28.2 The solid dangerous substances which may be transported in portable tanks are:

.1 solid dangerous substances for which transport in portable tanks is indicated in the individual schedules for these substances, or

.2 solid dangerous substances for which transport in portable tanks is authorized by the competent authority, or

.3 solid dangerous substances which are suitable for transport in metallic IBCs (see section 26 of this General Introduction). However, competent authority approval should be obtained where special requirement ``7" or ``12" applies for a particular substance, as mentioned in appendix 2 to section 26 of this General Introduction.

13.1.28.3 A number of solid materials (see 24.1.6 of this General introduction) present no significant hazard when transported in packaged form. These materials are not covered by individual schedules in this Code and, unless otherwise specified \*, there are no special requirements when transported in portable tanks.

\* No ``special requirements" are currently specified.

13.1.28.4 Special requirements for tanks dedicated to the transport of solid substances which do not liquefy during transport

.1 The periodic hydraulic pressure tests for tanks used only in the dedicated transport of solid dangerous substances other than toxic or corrosive substances may be replaced by a suitable pressure test at 1.5 times the maximum allowable working pressure, subject to competent authority approval.

.2 Every bottom-discharge tank should be equipped with at least two serially mounted and mutually independent shutoff devices. An internal stop valve is not required.

.3 The design of the tank and the choice of materials, fittings and service equipment should be suitable for, and compatible with, the substances to be transported.

13.1.30 **Special requirements relating to tanks for the transport of flammable liquids (class 3)**

13.1.30.1 The following general requirements relate particularly to tanks intended for the transport of flammable liquids (class 3). Reference should also be made to the appendix to this subsection, setting out special requirements for individual substances of this class.

13.1.30.2 All tanks intended for the transport of flammable liquids should be closed tanks and be fitted with pressure-relief devices in accordance with 13.1.9 to 13.1.16.

13.1.30.3 In the case of liquids having a vapour pressure of more than 1.75 bar (absolute) at 50°C and a coefficient of cubical expansion of more than 150 x 10(-5) the degree of filling for tanks should not exceed 90%.

13.1.40 **Special requirements relating to tanks for the transport of flammable solids, substances liable to spontaneous combustion and substances which, in contact with water, emit flammable gases (class 4)**

13.1.40.1 Reference should be made to the appendix to this subsection, setting out the special requirements for individual substances of this class. No requirements have been included for the majority of class 4.1 solids, since they can be transported quite safely in containers other than tanks.



**13.1.50      Special requirements relating to tanks for the transport of oxidizing substances (class 5.1)**

13.1.50.1      Reference should be made to the appendix to this subsection, setting out special requirements for individual substances to this class.

**13.1.55      Special requirements relating to tanks for the transport of organic peroxides (class 5.2)**

13.1.55.1      Each organic peroxide should have been tested, and a report submitted to the competent authority of the country of origin for approval and notification thereof should be sent to the competent authority of the country of destination. The notification should contain relevant transport information and the report, with test results. The tests undertaken should include those necessary:

- to prove the compatibility of all materials normally in contact with the substance during transport; and
- to provide data to enable the design of the pressure and emergency relief devices, taking into account the design characteristics of the tank.

Any special requirements necessary for the safe transport of the substance should be clearly described in the report.

13.1.55.2      The following requirements apply to tanks intended for the transport of organic peroxides (type F) with a Self-Accelerating Decomposition Temperature (SADT) of 55°C or more. In case of conflict, these requirements prevail over 13.1 to 13.1.26. Emergencies to be taken into account are the self-accelerating decomposition of the organic peroxide and the fire engulfment as described in 13.1.55.8.

13.1.55.3      Formulations of organic peroxides transported in portable tanks with an SADT less than 55°C have to be subjected to the temperature control requirements given in section 21 of this General Introduction. The additional requirements for transport in tanks of organic peroxides with an SADT less than 55°C should be specified by the competent authority of the country of origin and notification thereof should be sent to the competent authority of the country of destination.

13.1.55.4      Tanks should be designed for a test pressure of at least 0.4 MPa (4 bar).

13.1.55.5      Tanks should be fitted with temperature-sensing devices.

13.1.55.6      Tanks should be fitted with pressure-relief devices and emergency relief devices. Vacuum-relief devices may also be used. Pressure-relief devices should operate at pressures determined according to both the properties of the organic peroxide and the construction characteristics of the tank. Fusible elements are not allowed in the shell of the tank.

13.1.55.7      The pressure-relief devices should consist of spring-loaded valves fitted to prevent significant build-up within the tank of the decomposition products and vapours released at a temperature of 50°C. The capacity and start-to-

discharge pressure of the relief valves should be based on the results of the tests specified in 13.1.55.1. The start-to-discharge pressure should, however, in no case be such that liquid would escape from the valve or valves if the tank is overturned.

- 13.1.55.8 The emergency relief devices may be of the spring-loaded or frangible types designed to vent all the decomposition products and vapours evolved during a period of not less than one hour of complete fire engulfment as calculated by the following equations:

$$q = 70961 F A^{0.82}$$

where:

$q$  = heat absorption [W]

$A$  = wetted area [m<sup>2</sup>]

$F$  = insulation factor [-];

$F$  = 1 for non-insulated vessels, or

$$F = \frac{U (923 - T_{po})}{47032} \text{ for insulated vessels}$$

where:

$K$  = heat conductivity of insulation layer [Wm<sup>-1</sup>K<sup>-1</sup>]

$L$  = thickness of insulation layer [m]

$U = K/L$  = heat transfer coefficient of the insulation [Wm<sup>-2</sup>K<sup>-1</sup>]

$T_{po}$  = temperature of peroxide at relieving conditions [K]

The start-to-discharge pressure of the emergency relief device(s) should be higher than that specified in 13.1.55.7 and based on the results of the tests referred to in 13.1.55.1. The emergency relief devices should be dimensioned in such a way that the maximum pressure in the tank never exceeds the test pressure of the tank.

*Note: An example of a method to determine the size of emergency relief devices is given in Appendix 5 of the United Nations Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria.*

- 13.1.55.9 For insulated tanks the capacity and setting of emergency relief device or devices should be determined assuming a loss of insulation of 1% of the surface area.

- 13.1.55.10 Vacuum-relief devices and spring-loaded valves should be provided with flame arresters. Due attention should be paid to the reduction of the relief capacity caused by the flame arrester.

- 13.1.55.11 Service equipment such as valves and external piping should be so arranged that no organic peroxide remains in them after filling of the tank.

13.1.55.12 Tanks may be either insulated or protected by a sun shield. If the SADT of the organic peroxide in the tank is 55°C or less, or the tank is constructed of aluminium, the tank should be completely insulated. The outer surface should be finished in white or bright metal.

13.1.55.13 The degree of filling should not exceed 90% at 15°C.

**13.1.60 Special requirements relating to tanks for the transport of toxic substances (class 6.1)**

13.1.60.1 Reference should be made to the appendix to this subsection setting out the special requirements for individual substances of this class.

**13.1.70 Special requirements relating to tanks for the transport of radioactive materials (class 7)**

13.1.70.1 With the approval of the competent authority of the country of origin, tanks may be used for the transport of radioactive materials listed in section 12 of the introduction to class 7 under the provisions of schedules 1, 5, 6, 9, 10 and 11, except uranium hexafluoride

13.1.70.2 In addition to the requirements of this section, the provisions of the appropriate class 7 schedule should be applied.

13.1.70.3 The degree of filling for tanks should not exceed 90% or, alternatively, any other value approved by the competent authority.

13.1.70.4 Tanks used for the transport of radioactive material should not be used for the transport of other goods.

**13.1.80 Special requirements relating to tanks for the transport of corrosive substances (class 8)**

13.1.80.1 The following general requirements relate particularly to tanks for the transport of corrosive substances (class 8).

13.1.80.2 The pressure-relief devices of tanks used for the transport of class 8 substances should be inspected at intervals not exceeding one year.

13.1.80.3 Reference should be made to the appendix to this subsection, setting out special requirements for individual substances of this class.

**13.1.90 Special requirements relating to tanks for the transport of marine pollutants included in class 9**

13.1.90.1 A tank used for the transport of an ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., MARINE POLLUTANT, UN No. 3082, should be at least a type 2 tank as defined in 13.1.2.14.

**13.101 Preamble**

13.101.1 The requirements of this subsection apply to portable tanks (type 5 tanks) and road tank vehicles (type 6 tanks) intended for the transport of non-refrigerated liquefied gases of class 2. In addition to these requirements and unless otherwise specified, the applicable requirements of the International Convention for Safe Containers (CSC), 1972, as amended, should be fulfilled

by any portable tank which meets the definition of a "container" within the terms of that Convention. The International Convention for Safe Containers does not apply to offshore tank-containers that are handled in open seas. The design and testing of offshore tank-containers should take into account the dynamic lifting and impact forces that may occur when a tank is handled in open seas in adverse weather and sea conditions. The requirements for such tanks should be determined by the approving competent authority (see MSC/Circ. 613 in the annex at the end of this section). Such requirements should be based on MSC/Circ.860 Guidelines for the approval of offshore containers handled in open seas.

13.101.2 In order to take into account progress in science and technology, the use of alternative arrangements may be considered where these offer at least equivalent safety in use in respect of compatibility with the properties of the substances transported and equivalent or superior resistance to impact, loading and fire.

13.101.3 The requirements of this subsection are presented in two parts. The first contains general requirements applicable to portable tanks and road tank vehicles intended for the transport of non-refrigerated liquefied gases of class 2. The second contains the appendix \* with a table showing the particular requirements which modify or supplement the general requirements of this subsection for each particular gas.

\* The appendix will need updating from time to time in the light of technical progress and to include new substances.

13.101.3.1 In general, where a substance has not been allocated a UN Number, it should be carried under the most suitable N.O.S. entry. However, the competent authority of the country of origin may issue interim approvals for shipment of gases not listed in the appendix to this subsection to which individual UN Numbers have already been assigned. The approval should accompany the shipment concerned and contain at a minimum the information normally provided in the list portable tank instruction T50 for non-refrigerated liquefied gases and the conditions under which the particular gases should be carried. The approval should contain a note to the effect that this competent authority has undertaken action to include this gas in the appendix to subsection 13.100

13.101.4 Construction, equipment, testing, marking and operation of portable tanks and road tank vehicles should be subject to acceptance by the competent authority of the country in which they are approved.

13.101.5 The requirements of this subsection do not apply to rail tank-wagons, non-metallic tanks or tanks having a capacity of 1,000 litres 450 litres or less.

13.101.6 IMO type 5 tanks certified prior to the implementation of these revised requirements and constructed in accordance with the requirements in force at the time prior to the entry into force of Amendment 29-98 may be permitted for use with competent authority approval. The approval should refer to this paragraph.

## 13.102 Definitions

- 13.102.1      For the purposes of these requirements:
- 13.102.2      For the purposes of this subsection, *tank* means a portable tank or the carrying tank of a road tank vehicle the shell of which is fitted with items of service equipment and structural equipment necessary for the transport of gases. A tank should be capable of being transported, loaded and discharged without the need of removal of its structural equipment.
- 13.102.3      *Shell* means the pressure vessel proper, including openings and their closures.
- 13.102.4      *Service equipment* of a shell means filling and discharge, venting, safety, heating and heat-insulating devices and measuring instruments.
- 13.102.5      *Structural equipment* means the reinforcing, fastening, protective and stabilizing members external to the shell and for a road tank vehicle includes fastenings to running gear or chassis.
- 13.102.6      *Maximum allowable working pressure (MAWP)* means the maximum gauge pressure permissible at the top of the tank in its operating position. It may be no less than the vapour pressure at the design reference temperature less one bar of any product which can be loaded and carried, and any pressure which might be used during loading or unloading. In no case should the MAWP be less than 7 bar.
- 13.102.7      *Test pressure* means the highest pressure which arises in the shell during the hydraulic pressure test.
- 13.102.8      *Discharge pressure* means the highest pressure actually built up in the shell when it is being discharged by pressure.
- 13.102.9      *Leakage test* is the test which submits the shell, complete with those items of service equipment necessary for filling, discharge, safety and measuring, to an effective internal pressure equivalent to the MAWP. The procedure to be adopted should be approved by the competent authority.
- 13.102.10     *Total mass* means the mass of the portable tank or road tank vehicle with the heaviest load authorized for transport.
- 13.102.11     *Design reference temperature* means the temperature at which the vapour pressure of the tank contents is determined for the purpose of calculating the MAWP.

The design reference temperature should be less than the critical temperature of the gas to be transported to ensure that the gas at all times is liquefied.

For portable tanks the temperature to be taken is as follows :

- .1 for a tank with a diameter of 1.5 metres or less: 65°C;
- .2 for a tank with a diameter of more than 1.5 metres:
  - .2.1 without insulation or sun shield: 60°C;
  - .2.2 with sun shield: 55°C; and
  - .2.3 with insulation: 50°C. \*

For a road tank vehicle the temperature to be taken is to be agreed by the competent authorities.

\* This reference temperature is envisaged but dependent on the quality of the insulation system.

13.102.12    *Mild steel* means a steel with a guaranteed minimum tensile strength of 360 N/mm<sup>2</sup> and a guaranteed minimum percentage elongation of 27.

13.102.13    *Filling ratio* means the average mass of gas in kg per litre of tank capacity (kg/l).

13.102.14    *Type 5 tank* means a portable tank as defined in 13.102.2 fitted with pressure-relief devices. It should be capable of being lifted when full and its contents should not be loaded or discharged whilst the tank remains on board ship.

13.102.15    *Type 6 tank* means a road tank vehicle and includes a semi-trailer with a permanently attached tank as defined in 13.102.2 fitted with pressure-relief devices. It should be fitted with permanent attachments such that it can be secured on board ship; however, its contents should not be loaded or discharged whilst the vehicle remains on board.

A road tank vehicle should be carried only on short international voyages.

13.102.16    *Short international voyage* means an international voyage in the course of which a ship is not more than 200 miles from a port or place in which the passengers and crew could be placed in safety.

Neither the distance between the last port of call in the country in which the voyage begins and the final port of destination nor the return voyage shall exceed 600 miles. The final port of destination is the last port of call in the scheduled voyage at which the ship commences its return voyage to the country in which the voyage began.

13.102.17    *Long international voyage* means an international voyage that is not a short international voyage.

13.102.18    *Competent authorities* means, in respect of those requirements solely applicable to road tank vehicles, the authority concerned with approval for transport by sea and also the authority concerned with approval for international transport by road. Where the latter authority does not exist, the relevant national authority should be substituted.

**13.103    General requirements for the construction and operation of tanks for non-refrigerated liquefied gases**

13.103.1    Shells should be made of steel suitable for shaping. For welded shells only a material whose weldability has been fully demonstrated should be used. If the manufacture-procedure or the materials make it necessary, the tanks should be heat-treated with a suitable heat treatment both after welding operations and after forming. Welds should be skilfully made and afford complete safety. Tank materials should be suitable for the external environment in which they may be carried, e.g. the marine environment. The use of aluminium as a material of construction should be specifically authorized for use in the marine mode in the

appendix. In those cases where aluminium is authorized, it should be insulated to prevent significant loss of physical properties when it is subjected to a heat load of 2.60 gcal/cm<sup>2</sup>.s for a period of 30 minutes. The insulation system should remain effective at all temperatures of up to 650°C and should be jacketed with a material with a melting point of not less than 650°C. The insulation system should be approved by the competent authority. Steel should be resistant to brittle fracture and to fissuring corrosion under stress. For portable tanks the temperature range to be taken into account should be between -30°C and the design reference temperature unless more stringent conditions are specified by the competent authority. For road tank vehicles the temperature range is to be agreed by the competent authorities.

- 13.103.2 Tanks, fittings and pipework should be constructed of material which is either:
- .1 substantially immune to attack by the gas transported; or
- .2 properly passivated or neutralized by chemical reaction with that gas.
- 13.103.3 Gaskets, where used, should be made of materials not subject to attack by the contents of the tank.
- 13.103.4 Care should be taken to avoid damage by galvanic action due to the juxtaposition of dissimilar metals.
- 13.103.5 The tanks, including any devices, appendages, coverings or fittings that can be expected to come into contact with the contents, should be constructed of materials that cannot be damaged by or enter into dangerous reactions with the contents.
- 13.103.6 Portable tanks should be designed and fabricated with supports to provide a secure base during transport and with suitable lifting and tie-down attachments.
- Road tanks vehicles should be fitted with tie-down attachments and secured on board in such a way that the suspension is not left in free play. \*
- \* Attention is drawn to the Guidelines for Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships (resolution A.581(14)) (see the Supplement to this Code).
- 13.103.7 Shells, their attachments and their service and structural equipment should be designed to withstand, without loss of contents, at least the internal pressure due to the contents, plus the most severe combination of the static and dynamic stresses in normal handling and transport. For tanks that are intended for use as offshore tank-containers the dynamic stresses imposed by handling in open seas should be taken into account.
- 13.103.8 Tanks should be manufactured to a technical code recognized by the competent authority. Shells should be designed, manufactured and tested in accordance with a recognized pressure vessel code, taking into account corrosion, mass of contents, MAWP and, if applicable, the effect of superimposed stresses due to dynamic forces in accordance with 13.103.10.
- 13.103.9 Tanks should be designed to withstand an external pressure of at least 0.4 bar gauge above the internal pressure without permanent deformation.

When the tank is to be subjected to a significant vacuum before loading or during discharge, it should be designed to withstand an external pressure of at least 0.9 bar gauge and should be proven to that pressure.

13.103.10 The minimum dynamic loads to be withstood should be based on:

- .1 in the direction of travel: twice the total mass;
- .2 horizontally at right angles to the direction of travel: the total mass (where the direction of travel is not clearly determined, the maximum permissible load should be equal to twice the total mass);
- .3 vertically upwards: the total mass; and
- .4 vertically downwards: twice the total mass (total loading, including the effect of gravity).

The said loads should be considered separately.

13.103.11 Where portable tanks are transported on vehicles, the fastenings of tank and vehicle should be capable of absorbing the forces specified in 13.103.10.

13.103.12 Tanks intended to contain certain gases, listed in the appendix, should be provided with additional protection, which may take the form of additional thickness of the shell or a higher test pressure, the additional thickness or higher test pressure being determined in the light of the dangers inherent in the substances concerned; or of a protective device approved by the competent authority.

13.103.13 Thermal insulation systems should satisfy the following requirements:

- .1 If the shells of tanks intended for the transport of gases are equipped with thermal insulation, such insulation should either:
  - .1.1 consist of a shield covering not less than the upper third but not more than the upper half of the tank's surface and separated from the shell by an air space about 4 cm across; or
  - .1.2 consist of a complete cladding of adequate thickness of insulating materials protected so as to prevent the ingress of moisture and damage under normal transport conditions.

If the protected covering is so closed as to be gastight, a device should be provided to prevent any dangerous pressure from developing in the insulation layer in the event of inadequate gastightness of the shell or of its items of equipment.

- .2 The thermal insulation should be so designed as not to hinder access to the fittings and discharge devices.

13.104 **Cross-sectional design**

13.104.1 Tanks should be of a circular cross-section.



13.104.2 Tanks should be designed and constructed to withstand a test pressure equal to at least 1.3 times the MAWP.

Specific requirements are laid down for various gases in the appendix portable tank instruction T50 in the IMDG Code provisions as modified by the applicable TPs which are in addition to or in place of those provided by the T-instruction.

Attention is also drawn to the minimum shell thickness requirements specified in 13.105.1 to 13.105.2.

13.104.3 Having regard to the risk of brittle fracture, the maximum and minimum filling and tank working temperatures should be taken into account when choosing materials and determining wall thickness. Material properties should be to the satisfaction of the competent authority.

13.104.4 At the test pressure the primary membrane stress in the shell should conform to the material-dependent limitations prescribed below:

.1 for metals and alloys exhibiting a clearly defined yield point or characterized by a guaranteed conventional yield stress  $R_e$  (generally 0.2% residual elongation; for austenitic steels, 1% residual elongation), the stress should not exceed  $0.75R_e$  or  $0.50R_m$ , whichever is lower;

.2 the elongation at fracture of steel, in per cent, should not be less than 10,000, with an absolute minimum of 20%  $R_m$ ;

the elongation at fracture of aluminium, in per cent, should not be less than 10,000, with an absolute minimum of 12%;  $6R_m$

.3  $R_m$  is the guaranteed minimum tensile strength, given in N/mm<sup>2</sup>; and

.4 when fine-grain steel is used for road tank vehicles, the minimum elongation at fracture of material used is to be agreed between the competent authorities but should not be less than 16%.

13.104.5 It should be noted that the specimens used to determine the elongation at fracture should be taken transversely to the direction of rolling and be so secured that:

$$\underline{L_o = 5d,}$$

or

$$\underline{L_o = 5.65 \sqrt{A}}$$

where :

$L_o$  = gauge length of the specimen before the test;

$d$  = diameter; and

A = cross-sectional area of the test specimen.

### **13.105 Minimum shell thickness**

13.105.1 The cylindrical portions and ends of all tanks should have a thickness not less than that determined by the following formula: \*

$$e = \frac{C}{\sqrt[3]{(R_m \times A)}}.$$

where:

e = minimum required thickness of the metal to be used, in mm;

R<sub>m</sub> = guaranteed minimum tensile strength of the metal to be used, in N/mm<sup>2</sup>;

A = guaranteed minimum elongation (as a percentage) of the metal to be used on fracture under tensile stress; see 13.104.4;

C = 107 (equivalent to 5 mm mild steel) for tanks of not more than 1.80 m in diameter; and

C = 128 (equivalent to 6 mm mild steel) for tanks of more than 1.80 m in diameter.

\*The constant C is derived from the following formula:  $e \times \sqrt[3]{(R_m \times A)} = e_o \times \sqrt[3]{(R_{m_o} \times A_o)}$ , where the sub-index 'o' refers to mild steel and the part of the equation without sub-index 'o' refers to the metal used. The relationship with mild steel as employed by this Code is attached to the constant C, where  $C = e_o \times \sqrt[3]{(R_{m_o} \times A_o)}$ .

13.105.2 The cylindrical portions and ends of all tanks should have a thickness of at least 4 mm regardless of the materials of construction.

13.105.3 There should be no sudden change in plate thickness at the attachment of the head to the cylindrical portion of the shell, and after forming the head the plate thickness at the knuckle should not be less than the minimum thickness required by this subsection.

13.105.4 In no case should the wall thickness of any portion of the shell be less than that prescribed in this subsection.

### **13.106 Service equipment**

13.106.1 Service equipment (valves, fittings, safety devices, gauging devices and the like) should be arranged so as to be protected against the risk of being wrenched off or damaged during transport and handling. If the connection between any tank and framework or any tank and running gear or chassis allows relative movement as between the sub-assemblies, the equipment should be so fastened as to permit such movement without risk of damage to working parts. Equipment protection should offer a degree of safety comparable to that of the tank shell. For offshore tank-containers, where positioning of service equipment and the design and strength of protection for such equipment is concerned, the increased danger of impact damage when handling such tanks in open seas should be taken into account.

- 13.106.2 All orifices in the shell more than 1.5 mm in diameter except those for safety valves, inspection openings or closed bleed holes should be provided with three mutually independent shutoff devices in series, the first being an internal stop valve, flow-restricting valve or equivalent device, the second being an external stop valve and the third being a blank flange or equivalent device.
- 13.106.2.1 A flow-restricting valve should be so fitted that its seating is inside the shell or inside a welded flange or if fitted externally its mountings should be designed so that in the event of impact its effectiveness should be maintained.
- 13.106.2.2 Flow-restricting valves should be selected and fitted so as to close automatically when the rated flow specified by the manufacturer is reached. Connections and accessories leading to or from such a valve should have the capacity for a flow greater than the rated flow of the flow-restricting valve.
- 13.106.3 For filling and discharge openings the first shutoff device should be an internal stop valve and the second should be a stop valve placed in an accessible position on each discharge or filling pipe.
- 13.106.4 For filling and discharge openings of tanks intended for the transport of flammable or toxic gases, the internal stop valve should be an instant-closing safety device which closes automatically in the event of unintended movement of the tank or fire engulfment. It should also be possible to operate this device by remote control.
- 13.106.5 The shells of tanks may be equipped, in addition to filling, discharge and gas pressure equalizing orifices, with openings in which gauges, thermometers and manometers can be fitted. Connections for such instruments must be made by suitably welded nozzles or pockets and not be screwed connections through the shell.
- 13.106.6 A tank should be provided with an opening large enough for the tank to be inspected internally.
- 13.106.7 For portable tanks, external fittings should be grouped together.
- 13.106.8 All tank connections should be clearly marked to indicate the function of each.
- 13.106.9 Stop valves with screwed spindles should close by clockwise rotation.
- 13.106.10 All piping should be of suitable material. Welded pipe joints should be used. Non-malleable metals should not be used in the construction of valves or accessories. The bursting strength of all piping and pipe fittings should be at least four times the strength at the MAWP of the tank and at least four times the strength at the pressure to which the tank may be subjected in service by the action of a pump or other device (except pressure-relief valves), the action of which may subject portions of the piping to pressures greater than the tank MAWP. Suitable provisions should be made in every case to prevent damage to piping due to thermal expansion and contraction, jarring and vibration.

13.106.11 Tanks intended for the transport of flammable gases should be capable of being electrically earthed.

**13.107 Bottom openings**

13.107.1 For certain gases listed in the appendix, shell openings in portable tanks below the liquid level are not allowed for any purpose. Openings in the shell of a road tank vehicle should be subject to the agreement of the competent authorities.

**13.108 Pressure-relief devices**

13.108.1 Tanks should be provided with one or more spring-loaded pressure-relief devices of a type that will resist dynamic forces, including surge. Frangible discs not in series with a spring-loaded pressure-relief device are not permitted.

For portable tanks the devices should open at a pressure not less than 1.0 times the MAWP and be fully open at a pressure of 1.1 times the MAWP.

For road tank vehicles the devices should open at a pressure not less than 1.0 times the MAWP and be fully open at a pressure not exceeding the test pressure.

The devices should, after discharge, close at a pressure not lower than 10% below the pressure at which discharge starts and should remain closed at all lower pressures.

13.108.2 Pressure-relief devices should be designed to prevent the entry of foreign matter, the leakage of gas and the development of any dangerous excess pressure.

13.108.3 Tanks for the transport of certain gases listed in the appendix should have a pressure-relief device approved by the competent authority. The pressure-relief device arrangement should comprise a spring-loaded pressure-relief valve preceded by a frangible disc, except that a tank in dedicated service may be fitted with an approved relief system offering an equivalent hermetic seal. The space between the frangible disc and the valve should be provided with a pressure gauge or a suitable tell-tale indicator. This arrangement permits the detection of disc rupture, pinholing or leakage which could cause a malfunction of the device. The frangible disc, in this instance, should rupture at the start-to-discharge pressure of the relief valve.

13.108.4 It should be noted that the safety device should operate only in conditions of excessive rise in temperature, as the tank will not, during transport, be subject to undue fluctuations of pressure due to operating procedures (see, however, 13.109.1).

**13.109 Capacity of pressure-relief devices**

13.109.1 For portable tanks the combined delivery capacity of the devices should be such that, in the event of total fire engulfment, the pressure (including accumulation) inside the shell does not exceed 1.1 times the MAWP.

Spring-loaded pressure-relief devices should be used to achieve the full relief capacity prescribed.

13.109.1.1 To determine the total required capacity of the devices, which may be regarded as being the sum of the individual capacities of the several devices, the following formula \* may be used:

$$Q = 12.4 \frac{FA^{0.82}}{LC} \sqrt{\frac{ZT}{M}}$$

where:

the accumulating condition is 20% above the start-to-discharge pressure of the relief device;

Q is the minimum required rate of discharge in cubic metres of air per second at standard conditions: 1 bar and 0°C (273 K);

F is a coefficient with the following value:

.1 for uninsulated tanks F = 1

.2 for insulated tanks F = U(649 - t)/13.6 but in no case is less than 0.25

where:

U = thermal conductance of the insulation, in kW/(m<sup>2</sup>K), at 38°C

t = actual temperature of the substance at loading (°C); if this temperature is unknown, let t = 15°C;

The value of F given in .2 above may be taken provided that:

the insulation is jacketed with a material having a melting point not less than 649°C; and

the insulation system will remain effective at all temperatures up to 649°C;

A is the total external surface area of tank in square metres;

Z is the gas compressibility factor in the accumulating condition (if this factor is unknown, let Z equal 1.0);

T is the absolute temperature in Kelvin (°C+273) above the pressure-relief devices and in the accumulating condition;

\* This formula applies only to liquefied gases which have critical temperatures well above the temperature at the accumulating condition. For gases which have critical temperatures near or below the temperature at the accumulating condition, the calculation of the pressure-relief device delivery capacity should consider further thermodynamic properties of the gas.

L is the latent heat of vaporization of the liquid, in kJ/kg, in the accumulating condition;

M is the molecular mass of the discharged gas;

C is the constant which is derived from equation (2) as a function of the ratio k of specific heats:

$$k = \frac{c_p}{c_v} \quad (1)$$

$$C = \sqrt{k \left( \frac{2}{k+1} \right)^{\frac{k+1}{k-1}}}$$

when  $k > 1$   
In this case C may be taken  
from the table below.

when  $k = 1$  or  $k$  is unknown  
(both 2)

$$C = \frac{1}{\sqrt{e}} = 0.607$$

where

e is the mathematical constant 2.7183

#### VALUES FOR THE CONSTANT C WHEN $k > 1$

<u>k</u>	<u>C</u>	<u>k</u>	<u>C</u>	<u>k</u>	<u>C</u>
1.00	0.607	1.26	0.660	1.52	0.704
1.02	0.611	1.28	0.664	1.54	0.707
1.04	0.615	1.30	0.667	1.56	0.710
1.06	0.620	1.32	0.671	1.58	0.713
1.08	0.624	1.34	0.674	1.60	0.716
1.10	0.628	1.36	0.678	1.62	0.719
1.12	0.633	1.38	0.681	1.64	0.722
1.14	0.637	1.40	0.685	1.66	0.725
1.16	0.641	1.42	0.688	1.68	0.728
1.18	0.645	1.44	0.691	1.70	0.731
1.20	0.649	1.46	0.695	2.00	0.770
1.22	0.652	1.48	0.698	2.20	0.793
1.24	0.656	1.50	0.701		

13.109.2 For road tank vehicles the delivery capacity of the pressure-relief devices should be subject to the agreement of the competent authorities.

#### 13.110 Marking of pressure-relief devices

13.110.1 Every pressure-relief device of a portable tank should be plainly and permanently marked with the pressure at which it is set to discharge and the rated free-air delivery of the device at 15°C and one bar. Capacity

marked on devices should be as rated at a pressure not greater than 110% of the set pressure.

#### **13.111 Connections to pressure-relief devices**

13.111.1 Connections to pressure-relief devices should be of sufficient size to enable the required discharge to pass unrestricted to the device. No stop valve should be installed between the tank shell and the pressure-relief devices except where duplicate equivalent devices are provided for maintenance and the stop valves serving the devices actually in use are locked open or the stop valves are interlocked so that at least one of the duplicate devices is always in use. Vents from the pressure-relief devices, where used, should deliver the relieved vapour or liquid to the atmosphere in conditions of minimum back-pressure on the device.

#### **13.112 Siting of pressure-relief devices**

13.112.1 Pressure-relief device inlets should be sited on top of any portable tank in a position as near the longitudinal and transverse centre of the tank as possible.

All pressure-relief device inlets should be situated in the vapour space of the tanks and the devices so arranged as to ensure that the escaping vapour is discharged unrestricted and in such a manner that it cannot impinge upon the tank shell. Protective devices which deflect the flow of vapour are permissible provided the required valve capacity is not reduced.

13.112.2 Arrangements should be made to prevent access to the devices by unauthorized persons and to protect the devices from damage caused by the tank overturning.

#### **13.113 Gauging devices**

13.113.1 Glass level-gauges, or gauges made of other easily destructible material, which are in direct communication with the contents of the tank should not be used.

#### **13.114 Tank support, frameworks, lifting and tie-down attachments \***

\*See also IMO Assembly resolution A.581(14) of 20 November 1985, Guidelines for Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships (see the Supplement to this Code).

13.114.1 Tanks should be designed and fabricated with a support structure to provide a secure base during transport. Skids, frameworks, cradles or other similar devices are acceptable. Cradles or other devices attaching a tank to the chassis or running gear of a road tank vehicle are acceptable.

The loads specified in 13.103.10 should be taken into account in this aspect of design.

13.114.1.1 Under each of these loads for portable tanks, the safety factors to be observed should be as follows:

- .1 for metals having a clearly defined yield point, a safety factor of 1.5 in relation to the determined yield stress; or
- .2 for metals with no clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed 0.2% proof stress.
- 13.114.2 For road tank vehicles, the stress levels due to each load should not exceed those permitted in 13.104.4.1.
- 13.114.3 If the landing legs of a road tank vehicle are to be used as support structure, the loads specified in 13.103.10 should be taken into account in their design and method of attachment. Any bending stress induced in the shell as a result of this manner of support should also be included in the design calculations.
- 13.114.4 The combined stresses caused by tank mountings (e.g. cradles, frameworks, etc.) and tank lifting and tie-down attachments should not cause excessive stress in any portion of the tank shell.
- 13.114.4.1 Permanent lifting and permanent tie-down attachments should be fitted to all portable tanks. Permanent tie-down attachments should be fitted to all road tank vehicles. Lifting and tie-down attachments should preferably be fitted to the tank support structure but they may be secured to the reinforcing plates located on the shell at the points of support, bearing in mind the provisions of 13.115.7.
- 13.114.5 Securing arrangements (tie-down attachments) should be fitted to the tank support structure and the towing vehicle of a road tank vehicle. Semi-trailers unaccompanied by a towing vehicle should be accepted for shipment only if the trailer supports and the securing arrangements and the position of stowage are agreed with the competent authority.
- 13.114.6 In the design of supports and frameworks, due regard should be paid to the effects of environmental corrosion, and in calculations for all structural members not constructed of corrosion-resistant materials a minimum corrosion allowance, determined by the competent authority, should be provided.
- 13.114.7 Portable tank frameworks intended to be lifted or secured by their corner castings should be subjected to internationally accepted special tests, for example the ISO system. The use of such frameworks within an integrated system is generally encouraged. Offshore tank-containers should be subjected to tests that take into account the dynamic lifting and impact forces that may occur when a tank is handled in open seas.
- 13.114.8 Fork-lift pockets of portable tanks should be capable of being closed off.
- 13.115 **Approval, testing and marking of type 5 tanks**
- 13.115.1 The competent approval authority or a body authorized by that authority should issue, in respect of every new design of a tank, a certificate attesting that the tank and its attachments surveyed by that authority or that body are suitable for the purpose for which they are intended and meet the construction and equipment requirements of this subsection and, where



appropriate, the particular requirements for the gases in the appendix to this subsection. Such certificate should show the gases or group of gases allowed to be transported in the tank. The prototype test results, the gases for whose transport the tank is approved and an approval number should be specified in a test report. If a series of tanks are manufactured without change in structural design, this approval should be deemed to be a design approval. The approval number should consist of the distinguishing sign or mark of the State in whose territory the approval was granted, i.e. the distinguishing sign for use in international traffic, as prescribed by the Convention on Road Traffic, Vienna, 1968, and a registration number.

13.115.2 Design approval should be given in respect of at least one tank of each design and each size, it being, however, understood that a set of tests made on a tank of one size may serve for the approval of smaller tanks made of a material of the same kind and thickness by the same fabrication technique and with identical supports and equivalent closures and other appurtenances.

13.115.3 The shell and items of equipment of each tank should be inspected and tested, either together or separately, first before being put into service (initial inspection and test) and thereafter at not more than five-year intervals (periodic inspection and test).

13.115.3.1 The initial inspection and test should include a check of the design characteristics, and internal and external examination and a hydraulic pressure test. If the shell and equipment have been pressure-tested separately, they should together be subjected after assembly to a leakage test. All welds in the shell should be tested in the initial inspection by radiographic, ultrasonic or another suitable non-destructive method. This does not apply to the metal sheathing of an insulation.

13.115.3.2 The periodic inspections and tests should include an internal and external examination and, as a general rule, a pressure test.

13.115.3.2.1 Sheathing thermal insulation and the like should be removed only to the extent required for reliable appraisal of the tank's condition.

13.115.3.3 The initial and periodic pressure tests should be carried out by an expert approved by the competent authority, at the test pressure indicated on the data plate of the tank except in cases where periodic tests at lower test pressures are authorized.

13.115.3.4 While under pressure, the tank should be inspected for leakage or other conditions which indicate weaknesses that might render the tank unsafe in transport, and if any evidence of such unsafe condition is discovered, the tank should not be placed in or returned to service until it has been repaired and the test, repeated, has been passed.

13.115.4 Before tanks are put into service, and thereafter at intervals midway between the inspections and tests specified in 13.115.3, the following tests and inspections should be performed:

.1 a leakage test, where required;

.2 a test of satisfactory operation of all service equipment; and

.3 an internal and external inspection of the tanks and their fittings with due regard to the gases transported.

13.115.5 The 2.5 year (midway) inspection and test may be carried out within 3 months of the specified date. The date of the 2.5 year inspection should be durably marked on or as near as possible to the metal identification plate required in 13.117.1. When marking is not done on the plate, the characters should be at least 32 mm in height and of a contrasting colour to the tank.

13.115.6 The 2.5 year internal inspections may be waived or substituted by other test methods by the competent authority in the case of tanks intended for the transport of one substance. A portable tank may not be filled and offered for transport after the date of expiry of the last 5 year or 2.5 year periodic inspection and test as required by 13.1.19.3 and 13.1.19.4 / 13.115.3 and 13.115.4 / 13.213.3 and 13.213.4. However, a portable tank filled prior to the date of expiry of the last periodic inspection and test may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, a portable tank may be transported after the date of expiry of the last periodic test and inspection:

.1 After emptying but before cleaning, for purposes of performing the next required test and inspection prior to refilling; and

.2 Unless otherwise approved by the competent authority, for a period not to exceed six months beyond the date of expiry of the last periodic test and inspection, in order to allow the return of dangerous goods for proper disposal or recycling. Reference to this authorization should be entered in the dangerous goods shipping document.

13.115.7 When a tank, other than its shell, is damaged it should not be allowed for use unless it has been repaired, so as to comply with these requirements. When the shell is damaged, it should be repaired and retested in conformity with 13.115.8.

13.115.8 In all cases where cutting, burning or welding operations on the shell of a tank have been effected, that work should be to the approval of the competent authority and a hydrostatic test to at least the original test pressure should be carried out.

#### 13.116 Approval, testing and marking of type 6 tanks

13.116.1 Road tank vehicles are to be authorized for short international voyages only.

13.116.2 For any road tank vehicles intended for transport of a substance listed in the appendix to this subsection, there should be in existence a valid certificate issued by or on behalf of the competent authority for road transport authorizing transport of that substance by road.

13.116.3      The competent authority for sea transport or a body authorized by that authority should issue additionally in respect of a road tank vehicle a certificate attesting compliance with the relevant design, construction and equipment requirements of this subsection and, where appropriate, the special requirements for the gases listed in the appendix to this subsection. The certificate should list the gases allowed to be transported.

13.116.4      A road tank vehicle should be periodically tested and inspected in accordance with the requirements of the competent authority for road transport.

13.116.5      Road tank vehicles should be marked in accordance with 13.117. However, where the marking required by the competent authority for road transport is substantially in agreement with that of 13.117.1, it will be sufficient to endorse the plate attached to the road tank vehicle with "IMO type 6".

13.117      **Marking**

13.117.1      Every tank should be fitted with a corrosion-resistant metal plate permanently attached in a place readily accessible for inspection. At least the following particulars should be marked on the plate in characters at least 3 mm in height by stamping, engraving, embossing or any similar method. If, for reasons of tank arrangements, the plate cannot be permanently attached to the shell, the shell should be marked with at least those particulars required by a recognized pressure vessel code in a manner prescribed by that code.

The plate should be kept free of any paint to ensure that the markings will be legible at all times.

Country of manufacture .....

<u>IMO tank</u>	<u>Approval</u>	<u>Approval</u>
<u>type no. ....</u>	<u>country ....</u>	<u>number ....</u>

Manufacturer's name or mark .....

Registration number .....

Year of manufacture .....

Test pressure .....(bar)/(MPa) gauge\*

Maximum allowable working pressure .....(bar)/(MPa) gauge\*

Water capacity at 20°C .....(litres)

(The water capacity should be established to within 1% by practical test rather than by calculation.)

Original hydrostatic test date and witness identification .....

Code to which tank is designed .....

Design reference temperature .....(°C)

Metallurgic design temperature (only if below -30°C) .....

Tank material .....

Equivalent thickness in mild steel .....(mm)

Month, year and test pressure of most recent periodic test:

..... month ..... year ..... (bar)/(MPa) gauge\*

\* The unit used should be marked.

13.117.2 The following particulars should be marked either on the tank itself or on a metal plate firmly secured to the tank.

Names of owner and operator .....

Name of gas being carried (and maximum mean bulk temperature if other than 50°C)  
.....

Date of the last inspection .....

Maximum permissible gross mass .....(kg)

Unladen (tare) mass .....(kg)

13.117.3 If a tank is designed and approved for handling in open seas, the words OFFSHORE CONTAINER should be marked on the identification plate.

13.117.4 The contents should be identified as specified in sections 7, 8 and 9 of the General Introduction to this Code.

13.117.5 Unless the name of the gas being transported appears on the metal plate specified in 13.117.2, a copy of the certificate specified in 13.115.1 should be made available upon request of a competent authority and readily provided by the consignor, consignee or agent, as appropriate.

## 13.118 Transport requirements

13.118.1 Tanks should not be offered for transport:

.1 in an ullage condition liable to produce an unacceptable hydraulic force due to surge within the tank;

.2 when leaking;

.3 when damaged to such an extent that the integrity of the tank or its lifting or securing arrangements may be affected; and

.4 unless the service equipment has been examined and found to be in good working order.

13.118.2 Empty tanks not cleaned and not gas-free should comply with the same requirements as tanks filled with the substance previously carried.

13.118.3 During transport, portable tanks should be adequately protected against lateral and longitudinal impact and against overturning. If the shells and the service equipment are so constructed as to withstand impact or overturning they need not be protected in this way.

Examples of protection of shells against collision:

.1 protection against lateral impact may consist, for example, of longitudinal bars protecting the shell on both sides at the level of the median line;

.2 protection of tanks against overturning may consist, for example, of reinforcement rings or bars fixed across the frame;

.3 protection against rear impact may consist of a bumper or frame;

.4 external fittings should be designed or protected so as to preclude the release of contents upon impact or overturning of the tank upon the fittings.

13.118.4 Certain gases are chemically unstable. They are to be accepted for transport only if the necessary steps have been taken to prevent their dangerous decomposition, transformation or polymerization during transport. To this end, care should in particular be taken to ensure that tanks do not contain any substances liable to promote these reactions.

#### 13.119 Filling

13.119.1 The maximum mass of liquefied gas per litre of tank capacity (kg/l) should not exceed the density of liquefied gas at 50°C multiplied by 0.95. Furthermore, the tank should not be liquid-full at 60°C.

13.119.2 During filling, the temperature of the liquefied gas should fall within the limits of the metallurgic design temperature.

13.119.3 Tanks should not be filled above their maximum permissible gross mass.

#### 13.120 Stowage and segregation

13.120.1 Tanks should be stowed in accordance with the requirements of the individual schedules and section 14 of this General Introduction.

13.120.2 If a tank is to be shipped containing a non-refrigerated liquefied gas for which the individual schedule shows one or more secondary labels, due consideration should be given to all properties of that gas and stowage should be arranged accordingly.

13.120.3 Portable tanks should not be overstowed unless they are designed for that purpose and transported in specially designed ships, or unless they are specially protected to the satisfaction of the competent authority.

13.120.4      Tanks containing non-refrigerated liquefied gases should be segregated in accordance with the requirements of section 15 of this General Introduction.

13.200      **GENERAL REQUIREMENTS FOR PORTABLE TANKS AND ROAD TANK VEHICLES FOR REFRIGERATED LIQUEFIED GASES OF CLASS 2**

13.201      **Preamble**

13.201.1      The requirements of this subsection apply to portable tanks (type 7 tanks) and road tank vehicles (type 8 tanks) intended for the transport of refrigerated liquefied gases of class 2. In addition to the requirements of this subsection and unless otherwise specified, the applicable requirements of the International Convention for Safe Containers (CSC), 1972, as amended, should be fulfilled by any portable tank which meets the definition of a "container" within the terms of that Convention. The International Convention for Safe Containers does not apply to offshore tank-containers that are handled in open seas. The design and testing of offshore tank-containers should take into account the dynamic lifting and impact forces that may occur when a tank is handled in open seas in adverse weather and sea conditions. The requirements for such tanks should be determined by the approving competent authority (see also MSC/Circ. 613 in the annex at the end of this section). Such requirements should be based on MSC/Circ.860 Guidelines for the approval of offshore containers handled in open seas.

13.201.2      In order to take into account progress in science and technology, the use of alternative arrangements which offer at least equivalent safety in use in respect of compatibility with the properties of the substances transported and equivalent or superior resistance to impact, loading and fire may be considered by the national competent authority.

13.201.3      Existing tanks and their service equipment not conforming strictly to the requirements set forth, but having acceptable alternatives, may be considered by the competent authority for approval. In the approval it should be clearly stated that the basis for the issue of the certificate is this paragraph. In the certificate the entry should read: "Approved in accordance with 13.201.3 of the IMDG Code".

13.201.4      The appendix \* to this subsection comprises the list of dangerous substances and also indicates any special requirements which modify or supplement these general requirements for each particular substance.

\* The appendix will need updating from time to time in the light of technical progress and to include new substances.

13.201.5      Construction, equipment, testing, marking and operation of portable tanks and road tank vehicles should be subject to acceptance by the competent authority of the country in which they are approved.

13.201.6      These requirements do not apply to rail tank-wagons, non-metallic tanks or tanks having a capacity of 1,000 litres or less.

13.202      **Definitions**

- 13.202.1      For the purposes of these requirements:
- 13.202.2      Type 7 tank means a thermally insulated portable tank fitted with items of service and structural equipment necessary for the transport of refrigerated liquefied gases. The portable tank should be capable of being transported, loaded and discharged without the need of removal of its structural equipment, and should be capable of being lifted when full. It should not be permanently secured on board the ship. Its contents should not be loaded or discharged while the portable tank remains on board.
- 13.202.2.1      Type 8 tank means a road tank vehicle and includes a semi-trailer with a permanently attached thermally insulated tank fitted with items of service equipment and structural equipment necessary for the transport of refrigerated liquefied gases. It should be fitted with permanent attachments such that it can be secured on board ship. However, its contents should not be loaded or discharged whilst the vehicle remains on board. A road tank vehicle should only be carried on short international voyages.
- 13.202.3      Tank means a construction which normally consists of:
- .1      a jacket and one or more inner shells where the space between the shell or shells and the jacket incorporates thermal insulation and is exhausted of air (vacuum insulation); or
- .2      a jacket and an inner shell with an intermediate layer of solid thermally insulating material (e.g. solid foam); or
- .3      an outer shell with an inner layer of solid thermally insulating material.
- 13.202.4      Shell means a pressure vessel proper, including openings and their closures.
- 13.202.5      Service equipment of a tank means filling and discharge, venting, safety, thermal-insulating devices and measuring instruments.
- 13.202.6      Structural equipment means the reinforcing, fastening, protective and stabilizing members external to a tank and includes, for a road tank vehicle, fastenings to running gear or chassis.
- 13.202.7      Maximum allowable working pressure (MAWP) means the maximum effective gauge pressure permissible at the top of the shell of a loaded tank in its operating position.
- 13.202.8      Test pressure means the maximum gauge pressure which arises in the shell during the pressure test.
- 13.202.9      Leakage test means a test which consists of subjecting the shell, complete with its service equipment, to an effective internal pressure equivalent to the MAWP. The procedure to be adopted should be approved by the competent authority.
- 13.202.10      Total mass means the mass of the portable tank or road tank vehicle with the heaviest load authorized for transport.

- 13.202.11      *Holding time* means the time that will elapse from the moment the liquid starts boiling at atmospheric pressure up to the moment the pressure of the tank contents reaches the MAWP under equilibrium conditions.
- 13.202.12      *Minimum design temperature* means the lowest contents temperature at which the tank can be used.
- 13.202.13      *Short international voyage* means an international voyage in the course of which a ship is not more than 200 miles from a port or place in which the passengers and crew could be placed in safety. Neither the distance between the last port of call in the country in which the voyage begins and the final port of destination nor the return voyage shall exceed 600 miles. The final port of destination is the last port of call in the scheduled voyage at which the ship commences its return voyage to the country in which the voyage began.
- 13.202.14      *Long international voyage* means an international voyage that is not a short international voyage.
- 13.202.15      *Competent authorities* means, in respect of those requirements solely applicable to road tank vehicles, the authority concerned with approval for transport by sea and also the authority concerned with approval for international transport by road. Where the latter does not exist, the relevant national authority should be substituted.
- 13.203            **General requirements for the design, construction and operation of tanks for refrigerated liquefied gases**
- 13.203.1        Shells should be made of steel, aluminium or aluminium alloys, suitable for shaping and of adequate ductility and toughness at the minimum design temperature, having regard to the risk of brittle fracture. Only materials whose weldability has been fully demonstrated should be used. Welds should be skillfully made and afford complete safety and, if the manufacturing procedure of the material so requires, the shell should be suitably heat-treated to guarantee adequate toughness in the weld and in the heat-affected zones.
- 13.203.1.1      Jackets should be made of steel. Jackets of aluminium may be used for road tank vehicles with the approval of the competent authority. Any part of a portable tank, including fittings and pipe-work, that is exposed to the environment should be compatible with the marine environment.
- 13.203.2        Any part of a tank, including fittings and pipe-work, which can be expected normally to come into contact with the substance transported should be compatible with that substance.
- 13.203.3        Care should be taken to avoid damage by galvanic action due to the juxtaposition of dissimilar metals.
- 13.203.4        The thermal insulation should include complete covering of the shell or shells externally or internally with effective insulating materials. External insulation should be protected (see 13.202.3.2) so as to prevent the ingress of moisture and other damage under normal transport conditions, either by a jacket or other suitable cladding.



- 13.203.5      If the jacket is so closed as to be gastight, a device should be provided to prevent any dangerous pressure from developing in the insulation space in the event of inadequate gastightness of the shell or of its items of equipment.
- 13.203.6      Tanks intended for the transport of refrigerated liquefied gases having a boiling point below -182°C at atmospheric pressure should not include material in the thermal insulation which may react with oxygen in a dangerous manner. Compact means of attachment between a shell and jacket may contain plastics materials, provided their material properties at their service temperature are proved to be sufficient.
- 13.203.7      Insulating materials should not deteriorate unduly in service.
- 13.203.8      A holding time should be calculated at the design stage and take into account:
- .1      effectiveness of the insulation system provided;  
          .2      MAWP;  
          .3      degree of filling;  
          .4      assumed ambient temperature of 50°C;  
          .5      physical properties of the individual substance to be transported.
- 13.203.9      The jacket of a vacuum-insulated double-wall tank should have either an external design pressure of at least 100 kPa (1 bar) gauge pressure calculated in accordance with a recognized code, or a calculated collapsing pressure of at least 200 kPa (2 bar) gauge pressure. Internal and external reinforcement devices may be included in calculating the ability of the jacket to resist the external pressure.
- 13.203.10     Portable tanks should be designed and manufactured with supports to provide a secure base during transport and with suitable lifting and tie-down attachments. Road tank vehicles should be fitted with tie-down attachments and secured on board in such a way that the suspension is not left in free play. \*
- \* Attention is drawn to the Guidelines for the Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships (Resolution A.581(14)) (see the Supplement to this Code).
- 13.203.11     Shells of portable tanks, their attachments and their service and structural equipment should be constructed to withstand, without loss of contents, at least the internal pressure and thermal loads due to the contents, taking into account the most severe combination of the static and dynamic loads under normal handling and transport conditions. For tanks that are intended for use as offshore tank-containers, the dynamic stresses imposed by handling in open seas should be taken into account.
- 13.203.12     Portable tanks and their fastenings should be capable of withstanding separately applied forces, based on:
- .1      twice the total mass acting in the direction of travel of the tank simultaneous with the weight of the tank;

- .2 the total mass acting horizontally at right angles to the direction of travel of the tank (where the direction of travel is not clearly determined, the total mass should be used) simultaneous with the weight of the tank;
- .3 the total mass acting vertically upwards;
- .4 twice the total mass acting vertically downwards.
- 13.203.13 Under each of these loads, for portable tanks, the safety factors to be observed should be:
- .1 for metals having a clearly defined yield point, a safety factor of 1.5 in relation to the determined yield stress; or
- .2 for metals with no clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed 0.2% proof stress (1.0% proof stress for austenitic steels).
- 13.203.14 The tank of a road tank vehicle and its fastenings should be capable of withstanding such separately applied static and dynamic loads as may be agreed between the competent authorities. Under the condition of each load, the stress level should not exceed that permitted in 13.203.19.1.
- 13.203.15 Shells should be designed and manufactured to withstand a test pressure equal to at least 1.3 times the MAWP.
- 13.203.16 For shells with vacuum insulation, the test pressure should not be less than 1.3 times the sum of the MAWP and 100 kPa (1 bar).
- 13.203.17 In no case should the test pressure be less than 300 kPa (3 bar) gauge pressure.
- 13.203.18 Attention is also drawn to the minimum shell thickness requirements specified in 13.204.2 and 13.204.3.
- 13.203.19 At the test pressure, the primary membrane stress in the shell should conform to the material-dependent limitations prescribed below:
- .1 for metals and alloys exhibiting a clearly defined yield point or characterized by a guaranteed conventional yield stress  $R_e$  (generally 0.2% proof stress; for austenitic steels 1.0% proof stress), the membrane stress should not exceed  $0.75R_e$  or  $0.50R_m$ , whichever is lower, where  $R_m$  in  $N/mm^2$  is the guaranteed minimum tensile strength;
- .2 in the case of steel, the elongation at fracture, in per cent, should not be less than 10,000 ,
- $R_m$
- where  $R_m$  is in  $N/mm^2$ , with an absolute minimum of 17%. In the case of aluminium, the elongation at fracture, in per cent, should not be less than 10,000, where  $R_m$  is in  $N/mm^2$ , with an absolute minimum of 12%.
- $6R_m$
- 13.203.20 The specimens used to determine the elongation at fracture should be taken transversely to the direction of rolling and be so secured that:

$$\underline{L_o = 5d,}$$

or

$$\underline{L_o = 5.65 \sqrt{A}}$$

where :

L<sub>o</sub> = gauge length of the specimen before the test;

d = diameter; and

A = cross-sectional area of the test specimen.

13.203.21 Shells should be of a circular cross-section.

13.203.22 Tanks should be manufactured to a technical code recognized by the competent authority. Shells should be designed, manufactured and tested in accordance with a recognized pressure vessel code, taking into account corrosion, mass of contents, MAWP and the effect of superimposed stresses due to dynamic forces in accordance with 13.203.12.

13.204 Minimum shell thickness

13.204.1 The shells should have a thickness of not less than that determined by the following formula: \*

$$\underline{e = \frac{C}{\sqrt[3]{(R_m \times A)}}.}$$

where:

e = minimum required thickness of the metal to be used, in mm;

R<sub>m</sub> = guaranteed minimum tensile strength of the metal to be used, in N/mm<sup>2</sup>;

A = guaranteed minimum elongation (as a percentage) of the metal to be used on fracture under tensile stress; see 13.203.15;

C = 107 (equivalent to 5 mm mild steel) for tanks of not more than 1.80 m in diameter

C = 128 (equivalent to 6 mm mild steel) for tanks of more than 1.80 m in diameter.

C = 64 for shells of vacuum-insulated tanks of not more than 1.80 m in diameter; and

C = 85 for shells of vacuum-insulated tanks of more than 1.80 m in diameter.

\*The constant C is derived from the following formula:  $e \times \sqrt[3]{(R_m \times A)} = e_o \times \sqrt[3]{(R_{m_o} \times A_o)}$ , where the sub-index 'o' refers to mild steel and the part of the equation without sub-index

'o' refers to the metal used. The relationship with mild steel as employed by this Code is attached to the constant C, where  $C = e_o \times \sqrt[3]{(Rm_o \times A_o)}$ .

13.204.2 Portable tanks should have a shell thickness of at least 3 mm regardless of the material of construction. Road tank vehicles may have a lesser thickness, subject to the agreement of the competent authorities.

13.204.3 There should be no sudden change in plate thickness at the attachment of the head to the cylindrical portion of the shell, and, after forming the head, the plate thickness at the knuckle should be not less than that determined by a recognized pressure vessel code or as required by 13.204.1 to 13.204.2, as applicable.

### 13.205 Service equipment

13.205.1 Service equipment (valves, fittings, safety devices, gauging devices and the like) should be so arranged as to be protected against the risk of being wrenched off or damaged during handling and transport. If the connection between a frame and a tank, a jacket and a shell, or a tank and a chassis or running gear allows relative movement, the equipment should be fastened so as to permit such movement without risk of damage to working parts. Equipment protection should offer a degree of safety comparable to that of the tank shell. For offshore tank-containers, where positioning of service equipment and the design and strength of protection for such equipment is concerned, the increased danger of impact damage when handling such tanks in open seas should be taken into account.

13.205.2 Each filling opening and each discharge opening in tanks used for the transport of flammable gases should be fitted with three independent shutoff devices in series, the first being a stop valve situated as close as possible to the jacket, the second being a stop valve and the third being a blank flange or equivalent device. Each filling opening and each discharge opening in tanks used for the transport of non-flammable gases should be provided with at least two independent shutoff devices in series, the first being a stop valve situated as close as possible to the outer jacket and the second being a blank flange or equivalent device.

13.205.3 For sections of piping which can be closed at both ends and where liquid product can be trapped, a method of automatic pressure relief, to prevent excess pressure, should be provided.

13.205.4 Vacuum-insulated tanks need not have an opening for inspection.

13.205.5 External fittings should preferably be grouped together.

13.205.6 All tank connections should be clearly marked to indicate the function of each.

13.205.7 Stop valves with screwed spindles should close by clockwise rotation.

13.205.8 All piping should be of a suitable material. Where tanks are subject to the fire engulfment requirement of 13.207.3, only steel piping and welded joints should be used between the shell and the connection to the first closure of any outlet. The method of attaching the closure to this connection should

be to the satisfaction of the competent authority. Elsewhere pipe-joints should be welded wherever necessary.

13.205.9 Joints of copper tubing should be brazed or have an equally strong metal union. These joints should, in any event, not be such as to decrease the strength of the tubing as may happen by cutting of threads.

The melting point of brazing materials should be no lower than 525°C.

13.205.10 Only metals which are ductile at the lowest operating temperatures should be used in the construction of valves and accessories.

13.205.11 The bursting strength of all piping and pipe fittings should be at least four times the strength at the MAWP of the tank and at least four times the strength at the pressure to which it may be subjected in service by the action of a pump or other device (except pressure-relief valves).

13.205.12 Suitable provisions should be made in every case to prevent damage to piping due to thermal expansion and contraction, jarring and vibration.

13.205.13 Tanks for the transport of flammable gases should be capable of being electrically earthed.

#### 13.206 Pressure-relief devices

13.206.1 Every shell should be provided with at least two independent pressure-relief valves of the spring-loaded type except that, in the case of a road tank vehicle used for non-flammable refrigerated gases, one of the valves may be replaced by a frangible disc.

13.206.2 Shells for non-flammable refrigerated liquefied gases may, in addition, have frangible discs in parallel with the spring-loaded valves as specified in 13.207.2 and 13.207.3.

13.206.3 Pressure-relief devices should be designed to prevent:

.1 accumulation of moisture and the entry of foreign matter; and

.2 the leakage of gas and the development of any dangerous excess pressure.

13.206.4 Pressure-relief devices should be approved by the competent authority.

#### 13.207 Capacity and setting of pressure-relief devices

13.207.1 The capacity of each spring-loaded pressure-relief valve should be sufficient to limit the pressure to 110% of the MAWP due to normal pressure rise. These valves should be set to start to discharge at the nominal pressure equal to the MAWP and should, after discharge, close at a pressure not lower than 90% of the MAWP and remain closed at all lower pressures.

13.207.2 In the case of loss of vacuum of a vacuum-insulated tank, or loss of 20% of the insulation of a tank insulated with solid materials, the combined capacity

of all valves installed should be sufficient to limit the pressure to 110% of the MAWP. For helium, this capacity may be achieved by the use of frangible discs in combination with the required safety relief valves. These discs should rupture at a nominal pressure equal to the test pressure.

13.207.3 For portable tanks, the requirements of 13.207.2 should be considered together with complete engulfment in fire, under which circumstances the combined capacity of all pressure-relief devices installed should be sufficient to limit the pressure to the test pressure. Frangible discs, if used, should rupture at a nominal pressure equal to the test pressure.

13.207.4 With respect to complete fire engulfment, the competent authority should examine the heat input to the tank in the fire exposure condition. Having established the heat input, the required capacity of the relief devices should be calculated in accordance with a well-established technical code.

13.207.5 For a road tank vehicle, where a frangible disc is used for the purposes of 13.206.1, it should rupture at a nominal pressure equal to the test pressure.

### **13.208 Markings on pressure-relief devices**

13.208.1 Every pressure-relief device of a portable tank should be plainly and permanently marked with the pressure at which it is set to discharge and the rated free-air delivery of the device at 15°C and one bar. Capacity marked on devices should be as rated at a pressure not greater than 110% of the set pressure.

### **13.209 Connections to pressure-relief devices**

13.209.1 Connections to pressure-relief devices should be of sufficient size to enable the required discharge to pass unrestricted to the safety devices. No stop valve should be installed between the shell and the pressure-relief devices except where additional devices are provided for maintenance or other reasons and the stop valves serving the devices actually in use are locked open or the stop valves are interlocked so that the requirements of 13.207 are always fulfilled. Vents from the pressure-relief devices, where used, should deliver the relieved vapour or liquid to the atmosphere in conditions of minimum back-pressure on the relieving device.

### **13.210 Siting of pressure-relief devices**

13.210.1 All pressure-relief device inlets should be situated in the vapour space of the shells and the devices so arranged as to ensure that the escaping vapour is discharged unrestrictedly and in such a manner that it cannot impinge upon the portable tank. Protective devices which deflect the flow of vapour are permissible, provided the required capacity is not reduced.

13.210.2 Arrangements should be made to prevent access to the devices by unauthorized persons and to protect the devices from damage caused by the tank overturning.

### **13.211 Gauging devices**

13.211.1      Glass level-gauges, or gauges made of other easily destructible material, which are in direct communication with the contents of the shell should not be used.

13.211.2      A connection for a vacuum gauge should be provided in the jacket of a vacuum-insulated portable tank.

**13.212      Tank support framework, lifting and tie-down attachments \***

\* See also IMO Assembly resolution A.581(14) of 20 November 1985, Guidelines for Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships (see the Supplement to this Code).

13.212.1      Tanks should be designed and manufactured with a support structure to provide a secure base during transport. Skids, frameworks, cradles or other similar devices are acceptable. The cradles or other devices attaching a tank to the chassis or running gear of a road tank vehicle are considered acceptable.

13.212.1.1    For portable tanks, the loads specified in 13.203.12 and safety factors in 13.203.13 should be taken into account in this aspect of design, whilst for road tank vehicles the design calculations should include loads and factors agreed as in 13.203.14.

13.212.1.2    If the landing legs of a road tank vehicle are to be used as support structure, the loads agreed as in 13.203.14 should be taken into account in their design and method of attachment. Bending stress induced in the shell as a result of this manner of support should be included in design calculations.

13.212.2      Permanent lifting and permanent tie-down attachments should be fitted to all portable tanks. Permanent tie-down attachments should be fitted to all road tank vehicles. Lifting and tie-down attachments should preferably be fitted to the tank support structure but they may be secured to the reinforcing plates located on the tank at the points of support.

13.212.2.1    Securing arrangements (tie-down attachments) should be fitted to the tank support structure and the towing vehicle of a road tank vehicle. Semi-trailers unaccompanied by a towing vehicle should be accepted for shipment only if the trailer supports and the securing arrangements and the position of stowage are agreed with the competent authority.

13.212.2.2    The combined stresses caused by tank mountings (e.g. cradles, frameworks, etc.) and tank lifting and tie-down attachments should not cause excessive stress in any portion of the tank.

13.212.3      In the design of supports and frameworks, due regard should be paid to the effects of environmental corrosion; in calculations for all structural members not constructed of corrosion-resistant materials, a minimum corrosion allowance determined by the competent authority should be provided.

13.212.4      Portable tank frameworks intended to be lifted or secured by their corner castings should be subjected to internationally accepted special tests, for example the ISO system. The use of such frameworks within an integrated system is generally encouraged. Offshore tank-containers should be subjected to tests that take into account the dynamic lifting and impact forces that may occur when a tank is handled in open seas.

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**13.213      Approval, testing and marking of type 7 tanks**

- 13.213.1**      The competent approval authority or a body authorized by that authority should issue, in respect of every new design of a portable tank, a certificate attesting that the portable tank and its attachments surveyed by that authority or that body are suitable for the purpose for which they are intended and meet the construction and equipment requirements of this subsection and, where appropriate, the special requirements for the gases in the appendix to this subsection the special requirements of the TPs assigned to the substance or substances in 3.2.1 of the IMDG Code. Such a certificate should include the gases or group of gases allowed to be transported in the portable tank. The results of the prototype test, the gases for whose transport the portable tank is approved and an approval number should be specified in a test report. If a series of portable tanks are manufactured without change in structural design, this approval should be deemed to be a design approval. The approval number should consist of the distinguishing sign or mark of the State in whose territory the approval was granted, i.e. the distinguishing sign for use in international traffic, as prescribed by the Convention on Road Traffic, Vienna, 1968, and a registration number.
- 13.213.2**      Design approval should be given in respect of at least one portable tank of each design and each size, it being, however, understood that a set of tests made on a portable tank of one size may serve for the approval of smaller portable tanks made of a material of the same kind and thickness by the same fabrication technique and with equivalent support, closures and other appurtenances.
- 13.213.3**      The shell and items of equipment of each tank should be inspected and tested, either together or separately, before being put into service (initial inspection and test) and thereafter at not more than five-year intervals (periodic inspection and test).
- 13.213.3.1**      The initial inspection and test should include a check of the design characteristics and internal and external examination and a hydraulic pressure test. In special cases, and with the agreement of a competent authority, the hydraulic pressure test may be replaced by a pressure test using another liquid or gas. If the shell and equipment have been pressure-tested separately, they should together be subjected, after assembly, to a leakage test. All welds in the shell should be tested in the initial test by radiographic, ultrasonic or another suitable non-destructive method. This does not apply to the jacket.
- 13.213.3.2**      The periodic inspections and tests should consist of an external examination of the portable tank and a leakage test. In the case of non-vacuum-insulated tanks, the jacket and thermal insulation and the like should be removed only to the extent required for a reliable appraisal of the portable tank's condition. In the case of a vacuum-insulated tank there should be a vacuum reading.
- 13.213.3.3**      The initial and periodic tests should be carried out as required by the competent authority.



- 13.213.3.4 While under pressure, the tank should be inspected for leakage or other conditions which indicate weaknesses that might render the tank unsafe in transport; if any evidence of such unsafe condition is discovered, the portable tank should not be placed in or returned to service until it has been repaired and the test, repeated, has been passed.
- 13.213.4 Before a portable tank is put into service, and thereafter at intervals midway between the inspections and tests provided in 13.213.3, the following tests and inspections should be performed:
- .1 a leakage test, where required;
- .2 a test of satisfactory operation of all service equipment;
- .3 an external inspection of the portable tank and its fittings with due regard to the gases transported; and
- .4 a vacuum reading, where applicable.
- 13.213.5 The 2.5 year (midway) inspection and test may be carried out within 3 months before or after the specified date. The date of the 2.5 year inspection should be durably marked on or as near as possible to the metal identification plate required in 13.215.1. When marking is not done on the plate, the characters should be at least 32 mm in height and of a contrasting colour to the tank. A portable tank may not be filled and offered for transport after the date of expiry of the last 5 year or 2.5 year periodic inspection and test as required by 13.1.19.3 and 13.1.19.4 / 13.115.3 and 13.115.4 / 13.213.3 and 13.213.4. However, a portable tank filled prior to the date of expiry of the last periodic inspection and test may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, a portable tank may be transported after the date of expiry of the last periodic test and inspection:
- .1 After emptying but before cleaning, for purposes of performing the next required test and inspection prior to refilling; and
- .2 Unless otherwise approved by the competent authority, for a period not to exceed Six months beyond the date of expiry of the last periodic test and inspection, in order to allow the return of dangerous goods for proper disposal or recycling. Reference to this authorization should be entered in the dangerous goods shipping document.
- 13.213.6 When a portable tank is damaged it should not be allowed to be used until it has been repaired so as to comply with these requirements. When the shell is damaged, it should be repaired and retested in conformity with 13.213.7.
- 13.213.7 In all cases where cutting, burning or welding operations on the shell of a portable tank have been carried out, that work should be to the satisfaction of the competent authority and a pressure test to at least the original test pressure should be carried out.
- 13.213.8 Certificates showing the results of the test should be issued by the competent authority. All information required in 13.215.1 and 13.215.2 should also be included in this certificate.

## **13.214 Approval, testing and marking of type 8 tanks**

**13.214.1** Road tank vehicles are to be authorized for short international voyages only.

**13.214.2** For any road tank vehicle intended for transport of a substance listed in the appendix to this subsection, there should be in existence a valid certificate issued by or on behalf of the competent authority for road transport authorizing transport of that substance by road.

**13.214.3** The competent authority for sea transport or a body authorized by that authority should issue additionally in respect of a road tank vehicle a certificate attesting compliance with the relevant design, construction and equipment requirements of this subsection and, where appropriate, the special requirements for the gases in the appendix to this subsection. The certificate should list the gases allowed to be transported.

**13.214.4** A road tank vehicle should be tested and inspected in accordance with the requirements of the competent authority for road transport.

**13.214.5** Road tank vehicles should be marked in accordance with 13.215. However, where the marking required by the competent authority for road transport is substantially in agreement with that of 13.215.1, it will be sufficient to endorse the metal plate attached to the road tank vehicle with "IMO type 8"; the reference to holding time may be omitted.

## **13.215 Marking**

**13.215.1** Every tank should be fitted with a corrosion-resistant metal plate permanently attached in a place readily accessible for inspection. At least the following particulars should be marked on the plate in characters at least 3 mm in height by stamping, engraving, embossing or any similar method.

If, for reasons of tank arrangements, the plate cannot be permanently attached to the shell, the shell should be marked with at least those particulars required by a recognized pressure vessel code in a manner prescribed by that code.

The plate should be kept free of any paint to ensure that the markings will be legible at all times.

Country of manufacture .....

<u>IMO tank</u>	<u>Approval</u>	<u>Approval</u>
<u>type no .....</u>	<u>country ....</u>	<u>number ....</u>

Manufacturer's name or mark .....

Registration number .....

Year of manufacture .....

Test pressure .....(bar)/(MPa) gauge\*

Maximum allowable working pressure .....(bar)/(MPa) gauge\*

Water capacity at 20°C of each compartment.....(litres)

(The water capacity should be established to within 1% by practical test rather than by calculation.)

Original pressure test date and witness identification .....

Code to which the shell is designed .....

Minimum design temperature ..... (°C)

Maximum total mass .....(kg)

Unladen (tare) mass .....(kg)

Shell material .....

Month, year and test pressure of most recent periodic test:

..... month ..... year ..... (bar)/(MPa)\* gauge

Stamp of expert who carried out most recent test.....

The names, in full, of the gases for whose transport the tank is approved.....

Either "thermally insulated" or "vacuum-insulated" .....

\* The unit used should be indicated.

13.215.2 The following particulars should be durably marked either on the tank itself or on a metal plate firmly secured to the portable tank.

Name of owner and operator .....

Name of gas being transported (and minimum mean bulk temperature) .....

Date of the last inspection .....

Total mass .....(kg)

Holding time .....(days)

13.215.3 If a tank is designed and approved for handling in open seas, the words OFFSHORE CONTAINER should be marked on the identification plate.

13.215.4 The contents should be identified as specified in sections 7, 8 and 9 of the General Introduction to this Code.

13.215.5 Unless the name of the gas being transported appears on the metal plate specified in 13.215.1, a copy of the certificate specified in 13.213.1 should

be made available if requested by a competent authority and be provided readily by the consignor, consignee or agent, as appropriate.

### **13.216      Transport requirements**

#### **13.216.1      Tanks should not be offered for sea transport:**

.1      in an ullage condition liable to produce an unacceptable hydraulic force due to surge within the shell;

.2      when leaking;

.3      when damaged to such an extent that the integrity of the tank or its lifting or securing arrangements may be affected; and

.4      unless the service equipment has been examined and found to be in good working order.

#### **13.216.2      Empty tanks not cleaned and not gas-free should comply with the same requirements as tanks filled with the substance previously carried.**

#### **13.216.3      During transport, tanks should be adequately protected against lateral and longitudinal impact and against overturning. If the tanks and the service equipment are so constructed as to withstand impact or overturning, they need not be protected in this way.**

Examples of protection of shells against collision:

.1      protection against lateral impact may consist, for example, of longitudinal bars protecting the tank on both sides at the level of the median line;

.2      protection of portable tanks against overturning may consist, for example, of reinforcement rings or bars fixed across the frame;

.3      protection against rear impact may consist of a bumper or frame;

.4      external fittings should be designed or protected so as to preclude the release of contents upon impact or overturning of the tank upon the fittings.

#### **13.216.4      Portable tanks should not normally be offered for sea transport of longer duration than the holding time. Due consideration should also be given to any delays which might be encountered.**

#### **13.216.5      Road tank vehicles should not be offered for carriage by sea in a condition that would lead to venting during the voyage under normal conditions.**

### **13.217      Filling**

#### **13.217.1      In estimating the initial degree of filling, the necessary holding time for the intended voyage, including any delays which might be encountered, has to be taken into consideration. The initial degree of filling of a shell should be such that, if the contents were to be raised to a temperature at which the**

vapour pressure equalled the MAWP, the volume occupied by liquid would not exceed:

.1 for flammable gases, class 2.1, 95%;

.2 for non-flammable non-toxic gases, class 2.2, 98%.

13.217.2 Provided the competent authority is satisfied with the modified tank arrangements, a higher initial degree of filling may be allowed when the intended voyage is considerably shorter than the holding time.

**13.218 Stowage and segregation**

13.218.1 Tanks should be stowed in accordance with the requirements of the individual schedules and section 14 of this General Introduction.

13.218.2 If a tank is to be shipped containing a refrigerated liquefied gas for which the individual schedule shows one or more secondary labels, due consideration should be given to all properties of that gas and stowage should be arranged accordingly.

13.218.3 Portable tanks should not be overstowed unless they are designed for that purpose and transported in specially designed ships, or unless they are specially protected to the satisfaction of the competent authority.

13.218.4 Tanks containing refrigerated liquefied gases should be segregated in accordance with the requirements of section 15 of this General Introduction.

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## ANNEX 4

**DRAFT AMENDMENTS TO THE EMERGENCY RESPONSE PROCEDURES  
FOR SHIPS CARRYING DANGEROUS GOODS (EmS GUIDE)  
(MSC/Circ.1025, as amended by MSC.1/Circ.1025/Add.1,  
MSC.1/Circ.1262, MSC.1/Circ.1360, MSC.1/Circ.1438 and MSC.1/Circ.1476)**

### Index

Amend the entries as indicated below:

- 1 For UN 2668, replace “F-E” with “F-A” and “S-D” with “S-A”
- 2 For UN 2907, replace “F-B” with “F-A”
- 3 For UN 2919, replace “S-S” with “S-S”
- 4 For UN 2978, replace “S-S” with “S-S”
- 5 For UN 3484, replace “S-C” with “S-C”
- 6 The entries for UN 3492 and 3493 are deleted.

Insert the following new entries:

"

UN No.	EmS Fire	EmS Spill
0510	F-B	S-X
3527	F-A	S-G
3528	F-E	S-E
3529	F-D	S-U
3530	F-A	S-F
3531	F-J	S-G
3532	F-J	S-G
3533	F-F	S-K
3534	F-F	S-K

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## **ANNEX 5**

### **DRAFT AMENDMENTS TO MSC.1/CIRC.1442 INSPECTION PROGRAMMES FOR CARGO TRANSPORT UNITS CARRYING DANGEROUS GOODS**

- 1 In paragraph 3 of the cover page, add a new last sentence with the following:

"In cases where the safety of the transport of dangerous goods is compromised as a result of serious or repeated infringements by an enterprise which has its headquarters on the territory of another competent authority, that competent authority should be notified of such infringements in order to investigate and take actions against those responsible."

## **ANNEX 1**

### **GUIDELINES FOR THE IMPLEMENTATION OF THE INSPECTION OF CARGO TRANSPORT UNITS**

#### **2 Targeting methodology and undeclared dangerous goods**

- 2 In paragraph 2.2, a new sub-paragraph .3 is added with the following:

".3 Reporting between competent authorities in cases where the safety of the transport of dangerous goods is compromised as a result of serious or repeated infringements by an enterprise which has its headquarters on the territory of another competent authority is strongly encouraged."

- 3 In paragraph 2.3, after the words "national legislation," insert ", including, but not limited to reporting the non-compliance to the competent authority of the State in which the infringing enterprise has its headquarters,"

#### **Control actions for deficiencies**

##### **General procedures**

- 4 In paragraph 5.11, above the heading "Serious structural deficiencies" a new subparagraph ".4" is added with the following:

".4 Reporting deficiencies to the relevant competent authority in cases where the safety of the transport of dangerous goods is compromised as a result of serious or repeated infringements by an enterprise which has its headquarters on the territory of another competent authority."

and the remaining subparagraph are renumbered accordingly

##### **Serious structural deficiencies**

- 5 In paragraph 5.11, in the new subparagraph ".9", after the words "If a discrepancy involves", insert the words "the non-declaration or misdeclaration of cargo,"



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## ANNEX 6

### DRAFT IMO DANGEROUS GOODS MANIFEST

1 The draft IMO FAL Form 7 has been developed by the Editorial and Technical group of the Sub-Committee for the transports of cargoes and containers at its 23<sup>rd</sup> session

(IMO FAL Form 7)

(As required by SOLAS 74, chapter VII, regulations 4.2 and 7-2.2, MARPOL, Annex III, regulation 4.2 and chapter 5.4, paragraph 5.4.3.1 of the IMDG Code)

										Page Number
1.1 Name of ship			1.2 IMO number				1.3 Call sign			
1.4 Voyage number		2. Flag State of ship			3. Port of loading			4. Port of discharge		
5. Stowage Position.	6. Reference Number	7. Marks & Numbers Container Id. No(s). Vehicle Reg. No(s).	8. UN Number	9. Proper Shipping Name / (Technical Specifications)	10. Class / (Subsidiary Risk(s))	11. Packing Group	12. Additional information / Marine Pollutant / Flash Point / etc.	13. Number and kind of packages	14. Mass (kg) or Volume (L)	15. EmS
16. Shipping Agent										
16.1 Place and date										
Signature of Agent										