



Papers of Potential Interest to DGTA members have the paper number in the upper right highlighted with a comment.

In this compilation, working papers are listed first, followed by INF papers.

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 1 of the provisional agenda

**Adoption of the agenda****Provisional agenda for the sixty-third session****Addendum****List of documents****1. Adoption of the agenda**

ST/SG/AC.10/C.3/125

Provisional agenda for the sixty-third session

ST/SG/AC.10/C.3/125/Add.1

List of documents and annotations

**Background documents**

ST/SG/AC.10/1/Rev.23

Recommendations on the Transport of Dangerous Goods,  
Model Regulations, twenty-third revised edition

ST/SG/AC.10/11/Rev.8

Recommendations on the Transport of Dangerous Goods,  
Manual of Tests and Criteria, eighth revised edition

ST/SG/AC.10/30/Rev.10

Globally Harmonized System of Classification and  
Labelling of Chemicals (GHS), tenth revised edition

ST/SG/AC.10/C.3/124 and Add.1

Report of the Sub-Committee of Experts on the Transport  
of Dangerous Goods on its sixty-second session

ST/SG/AC.10/C.4/88

Report of the Sub-Committee of Experts on the Globally  
Harmonized System of Classification and Labelling of  
Chemicals on its forty-fourth session

ST/SG/AC.10/50 and Adds.1 to 3

Report of the Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals on its eleventh session

## 2. Explosives and related matters

### (a) Review of test series 6

At the time of writing no document has been submitted under this agenda sub-item.

### (b) Improvement of test series 8

At the time of writing no document has been submitted under this agenda sub-item.

### (c) Review of tests in parts I, II and III of the Manual of Tests and Criteria

At the time of writing no document has been submitted under this agenda sub-item.

### (d) “UN” standard detonators

At the time of writing no document has been submitted under this agenda sub-item.

### (e) Energetic samples

At the time of writing no document has been submitted under this agenda sub-item.

### (f) Review of packaging and transport requirements for ammonium nitrate emulsions

At the time of writing no document has been submitted under this agenda sub-item

### (g) Electrification and alternative fuels and how they will affect transport of explosives

At the time of writing no document has been submitted under this agenda sub-item

### (h) Miscellaneous

ST/SG/AC.10/C.3/2023/47 (SAAMI)	Including an acceptable level of risk in classification criteria
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ST/SG/AC.10/C.3/2023/51 (Spain)	Net explosive weight
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## 3. Listing, classification and packing

ST/SG/AC.10/C.3/2023/32 (WLPGA)	Present and future products in the LPG industry - proposal for a new UN number
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ST/SG/AC.10/C.3/2023/33 (Germany)	Adequate UN entry for 2,4-Dichlorophenol with a possible solution for all chlorophenols
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ST/SG/AC.10/C.3/2023/35 (Germany)	Classification of articles
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ST/SG/AC.10/C.3/2023/36 (Cefic)	Organic peroxides: new formulations to be listed in 2.5.3.2.4 and packing instruction IBC520
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ST/SG/AC.10/C.3/2023/37 (Germany)	Amendment of the packing group for UN 2862 VANADIUM PENTOXIDE, non-fused form
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ST/SG/AC.10/C.3/2023/38 (Germany)	Refrigerating machines and heat pumps
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ST/SG/AC.10/C.3/2023/39 (Germany)	Proposal to add class 8 as subsidiary hazard to UN 1040, UN 1041 and UN 3300
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ST/SG/AC.10/C.3/2023/40 (Germany)	Transport of liquid organic hydrogen carrier - new special provision to UN 3082
ST/SG/AC.10/C.3/2023/42 (Sweden)	Classification of UN 1727 AMMONIUM HYDROGENDIFLUORIDE, SOLID
ST/SG/AC.10/C.3/2023/48 (COSTHA, DGTA, FAO)	Infectious substance transport
ST/SG/AC.10/C.3/2023/49 (COSTHA)	Introduction of new entries for 1,4-benzoquinone dioxime

#### 4. Electric storage systems

##### (a) Testing of lithium batteries

At the time of writing no document has been submitted under this agenda sub-item.

##### (b) Hazard-based system for classification of lithium batteries

At the time of writing no document has been submitted under this agenda sub-item.

##### (c) Transport provisions

ST/SG/AC.10/C.3/2023/53 (China)	Transport provisions for hybrid batteries with both lithium ion and sodium ion cells
ST/SG/AC.10/C.3/2023/54 (China)	Transport of articles containing lithium batteries and other dangerous goods

##### (d) Damaged or defective lithium batteries

At the time of writing no document has been submitted under this agenda sub-item.

##### (e) Sodium ion batteries

ST/SG/AC.10/C.3/2023/43 (Spain)	Inclusion in 5.2.1.9.1 of a reference to special provision 400
ST/SG/AC.10/C.3/2023/56 (ICAO)	Proposed amendments to special provision 400 and classification criteria for lithium and sodium ion batteries

##### (f) Miscellaneous

ST/SG/AC.10/C.3/2023/23 (IATA)	Classification provisions for lithium batteries and sodium ion batteries
ST/SG/AC.10/C.3/2023/24 (IATA)	Exception for equipment containing both lithium batteries and lithium button cells

#### 5. Transport of gases

##### (a) Global recognition of UN and non-UN pressure receptacles

At the time of writing no document has been submitted under this agenda sub-item.

##### (b) Limited quantities for division 2.2

At the time of writing no document has been submitted under this agenda sub-item.

**(c) Miscellaneous**

ST/SG/AC.10/C.3/2023/34 (Germany) Consequential amendments in the context of the pV-product of salvage pressure receptacles and document ST/SG/AC.10/C.3/2023/1

ST/SG/AC.10/C.3/2023/46 (ISO) Updated ISO standards for class 2

**6. Miscellaneous proposals for amendments to the Model Regulations on the Transport of Dangerous Goods****(a) Marking and labelling**

ST/SG/AC.10/C.3/2023/52 (China) Amendments to the location of lithium battery or sodium ion battery mark

**(b) Packagings, including the use of recycled plastics material**

ST/SG/AC.10/C.3/2023/31 (Spain) Revision of standard ISO 535:2014

**(c) Portable tanks**

ST/SG/AC.10/C.3/2023/41 (Poland) Modification of the definitions of "FRP tank" and "FRP shell" in 6.9.2.1 of the Model Regulations

ST/SG/AC.10/C.3/2023/45 (Russian Federation on behalf of the informal working group on FRP service equipment) New sub-chapter 6.9.3 "Requirements for design, construction, inspection and testing of fibre reinforced plastic (FRP) service equipment for portable tanks"

**(d) Other miscellaneous proposals**

ST/SG/AC.10/C.3/2023/44 (Spain) Mass and weight

ST/SG/AC.10/C.3/2023/50 (Spain) Stacking test

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

ST/SG/AC.10/C.3/2023/57 (Secretariat) Follow up to the amendments proposed by the Ad hoc Working Group on the Harmonization of RID/ADR/ADN with the United Nations Recommendations on the Transport of Dangerous Goods

**8. Cooperation with the International Atomic Energy Agency**

At the time of writing no document has been submitted under this agenda item.

## **9. Guiding principles for the Model Regulations**

At the time of writing no document has been submitted under this agenda item.

## **10. Issues relating to the Globally Harmonized System of Classification and Labelling of Chemicals:**

### **(a) Testing of oxidizing substances**

At the time of writing no document has been submitted under this agenda sub-item.

### **(b) Simultaneous classification in physical hazards and possible combination of hazards**

At the time of writing no document has been submitted under this agenda sub-item.

### **(c) Miscellaneous**

ST/SG/AC.10/C.3/2023/55 (China)

Proposal to add hazard communication for substances or mixtures evolving flammable vapours in annex 4 of the Globally Harmonized System “Guidance on the preparation of Safety Data Sheets (SDS)”

## **11. Unified interpretations of the Model Regulations**

At the time of writing no document has been submitted under this agenda item.

## **12. Implementation of the Model Regulations**

At the time of writing no document has been submitted under this agenda item.

## **13. Dangerous goods safety training and capacity building**

At the time of writing no document has been submitted under this agenda item.

## **14. United Nations 2030 Agenda for Sustainable Development**

At the time of writing no document has been submitted under this agenda item.

## **15. Opportunities to enhance operational efficiency and inclusiveness**

At the time of writing no document has been submitted under this agenda item.

## **16. Other business**

At the time of writing no document has been submitted under this agenda item.

## **17. Adoption of the report**

In accordance with the established practice, the Sub-Committee may wish to adopt the report on its sixty-third session and its annexes based on a draft prepared by the secretariat.



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

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

#### Sixty-third session

Geneva, 27 November - 6 December 2023

Item 1 of the provisional agenda

#### Adoption of the agenda

### Provisional agenda for the sixty-third session<sup>\*</sup>, <sup>\*\*</sup>, <sup>\*\*\*</sup>

To be held as at the Palais des Nations, Geneva  
starting at 10 a.m. on Monday, 27 November 2023

1. Adoption of the agenda.
2. Explosives and related matters:
  - (a) Review of test series 6;
  - (b) Improvement of test series 8;
  - (c) Review of tests in parts I, II and III of the Manual of Tests and Criteria;
  - (d) “UN” standard detonators;
  - (e) Energetic samples;
  - (f) Review of packaging and transport requirements for ammonium nitrate emulsions;
  - (g) Electrification and alternative fuels and how they will affect transport of explosives);
  - (h) Miscellaneous.
3. Listing, classification and packing.

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<sup>\*</sup> Annotations to the agenda will be circulated as document ST/SG/AC.10/C.3/125/Add.1. The deadline for submission of documents is 1 September 2023.

<sup>\*\*</sup> The documentation for the session will be made available at:  
<https://unece.org/info/Transport/Dangerous-Goods/events/376526>. This will be a paperless meeting. Printed documents will not be available in the meeting room.

<sup>\*\*\*</sup> Participation will only be possible for registered delegates. All participants wishing to attend the session shall register in INDICO at the following address: <https://indico.un.org/event/1001152/>. Delegates attending in-person should, upon arrival at the Palais des Nations, obtain an identification badge at the UNOG Security and Safety Section, located at the Pregny Gate (14, Avenue de la Paix). In case of difficulty, please contact the secretariat by telephone (ext. 75028). For a map of the Palais des Nations and other useful information, see the website: <https://unece.org/practical-information-delegates>.



4. Electric storage systems:
  - (a) Testing of lithium batteries;
  - (b) Hazard-based system for classification of lithium batteries;
  - (c) Transport provisions;
  - (d) Damaged or defective lithium batteries;
  - (e) Sodium-ion batteries;
  - (f) Miscellaneous.
5. Transport of gases:
  - (a) Global recognition of UN and non-United Nations pressure receptacles;
  - (b) Limited quantities for division 2.2;
  - (c) Miscellaneous.
6. Miscellaneous proposals for amendments to the Model Regulations on the Transport of Dangerous Goods:
  - (a) Marking and labelling;
  - (b) Packagings, including the use of recycled plastics material;
  - (c) Portable tanks;
  - (d) Other miscellaneous proposals.
7. Global harmonization of transport of dangerous goods regulations with the Model Regulations.
8. Cooperation with the International Atomic Energy Agency.
9. Guiding principles for the Model Regulations.
10. Issues relating to the Globally Harmonized System<sup>1</sup>:
  - (a) Testing of oxidizing substances;
  - (b) Simultaneous classification in physical hazards and possible combination of hazards;
  - (c) Miscellaneous.
11. Unified interpretations of the Model Regulations.
12. Implementation of the Model Regulations.
13. Dangerous goods safety training and capacity building.
14. United Nations 2030 Agenda for Sustainable Development.
15. Opportunities to enhance operational efficiency and inclusiveness.
16. Other business.
17. Adoption of the report.

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<sup>1</sup> Participants in the work of the Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals who are not normally involved in the work of the TDG Sub-Committee are invited to participate in the work of the TDG Sub-Committee when the Sub-Committee is acting as GHS focal point for physical hazards (see also ST/SG/AC.10/C.4/2, para. 43 (b)).



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

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

#### Sixty-second session

Geneva, 3-7 July

Item 4 (f) of the provisional agenda

Electric storage systems: miscellaneous

## Classification provisions for lithium batteries and sodium ion batteries

Transmitted by the International Air Transport Association (IATA)\*

### I. Introduction

1. Paragraphs 2.9.4 and 2.9.5 in the *Model Regulations* describe the requirements that apply to the classification of lithium cells and batteries and sodium ion cells and batteries, respectively, for the cells or batteries to be transported.
2. Included in the wording of paragraphs 2.9.4 and 2.9.5 is a statement on the UN numbers to which the cells or batteries shall be assigned. For paragraph 2.9.4 this is “UN Nos. 3090, 3091, 3480 or 3481 as appropriate”. For paragraph 2.9.5, it is “UN Nos. 3551 or 3552 as appropriate”.
3. However, there are references in special provisions 310, 363, 388 and 389 that lithium cells or batteries or sodium ion cells or batteries shall meet the provisions of 2.9.4 or 2.9.5, as applicable, where the cells or batteries are in articles, engines, machines or vehicles that are not assigned to one of the UN numbers stated in the opening paragraph of 2.9.4 or 2.9.5.
4. The reference in these special provisions to paragraph(s) 2.9.4 and/or 2.9.5, which are assigned to UN numbers other than UN Nos. 3090, 3091, 3480 or 3481 creates a conflict with some consignors challenging the requirements set out in subparagraphs 2.9.4 (a) to (g) as not applying to articles, engines or vehicles as the applicable UN numbers are not referenced in paragraph 2.9.4 or 2.9.5.

### II. Proposal

5. The Sub-Committee is invited to amend the wording of paragraphs 2.9.4 and 2.9.5 to remove the reference to specific UN numbers.

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\* A/77/6 (Sect. 20), table 20.6





6. Amend the wording of 2.9.4 as follows (new text is underlined, deleted text in ~~strikethrough~~):

**“2.9.4 Lithium batteries**

Cells and batteries, cells and batteries contained in articles, engines, equipment or vehicles, or cells and batteries packed with equipment, containing lithium in any form ~~shall be assigned to UN Nos. 3090, 3091, 3480 or 3481 as appropriate. They~~ may be transported ~~under these entries~~ if they meet the following provisions:

...”

7. Amend the wording of 2.9.5 as follows (new text is underlined, deleted text in ~~strikethrough~~):

**“2.9.5 Sodium ion batteries**

Cells and batteries, cells and batteries contained in articles, engines, equipment or vehicles, or cells and batteries packed with equipment containing sodium ion, which are a rechargeable electrochemical system where the positive and negative electrode are both intercalation or insertion compounds, constructed with no metallic sodium (or sodium alloy) in either electrode and with an organic non aqueous compound as electrolyte, ~~shall be assigned to UN Nos. 3551 or 3552 as appropriate.~~ may be transported if they meet the following provisions:

**NOTE:** *Intercalated sodium exists in an ionic or quasi-atomic form in the lattice of the electrode material.*

~~They may be transported under these entries if they meet the following provisions:~~

...”

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-second session**

Geneva, 3-7 July 2023

Item 4 (f) of the provisional agenda

**Electric storage systems: miscellaneous****Exception for equipment containing both lithium batteries  
and lithium button cells****Transmitted by the International Air Transport Association (IATA)\*\*****I. Introduction**

1. Special provision 188 includes an exception in subparagraph (f) (i) stating that packages containing only button cell batteries installed in equipment (including circuit boards) are not required to bear the lithium or sodium ion battery mark.
2. The exception from the application of the mark on packages for equipment containing only button cells clearly applies to packages containing small devices such as digital watches, calculators and car key fobs where the power source is a single lithium button cell.
3. However, there has also been an informal practice that packages containing laptop computers that have a lithium ion battery for main power and also have a lithium metal button cell that provides power to the complementary metal oxide semiconductor (CMOS) chip need only show “UN 3481” and there does not need to be any reference to the presence of the lithium metal button cell in the equipment by including “UN 3091” on the mark.
4. Recently, the lack of identification of the presence of the lithium metal button cells when classifying laptops was raised by a member of the IATA Dangerous Goods Board. In the discussion, there was general agreement that consignments of laptop computers would only have the packages marked with “UN 3481” on the lithium battery mark. It was though acknowledged that the exception in the regulations did not provide for this and, technically, the lithium battery mark should show both UN 3481 and UN 3091.
5. Given that it is a well-established practice for consignors of laptop computers to apply the lithium battery mark with just “UN 3481” to packages, and the presence of a lithium metal button cell inside the laptop would not materially alter the risk and the need for

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\* A/77/6 (Sect. 20), table 20.6

\*\* This document was scheduled for publication after the standard publication date owing to circumstances beyond the submitter's control.



additional hazard communication, it is proposed to include an exception for the mark where the equipment contains both a button cell and a lithium battery as the primary power source.

## II. Proposal

6. The Sub-Committee is invited to amend the wording of paragraph 5.2.1.9.2 to provide for an exception from the addition of the UN number for button cells where the equipment contains both lithium batteries (ion or metal) and lithium button cells. The change proposed is as follows (new text is underlined):

“5.2.1.9.2 The mark shall indicate the UN number, preceded by the letters "UN" i.e. "UN 3090" for lithium metal cells or batteries, "UN 3480" for lithium ion cells or batteries or "UN 3551" for sodium ion cells or batteries. Where the cells or batteries are contained in, or packed with, equipment, the UN number, preceded by the letters "UN", i.e. "UN 3091", "UN 3481" or "UN 3552" as appropriate shall be indicated. Where a package contains cells or batteries assigned to different UN numbers, all applicable UN numbers shall be indicated on one or more marks. However, where equipment contains cells or batteries and a button cell, there is no requirement for the UN number indicating the button cell to be included on the mark in addition to the UN number(s) for the cells or batteries.”

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

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

#### Sixty-third session

Geneva, 27 November-6 December 2023

Item 6 (b) of the provisional agenda

**Miscellaneous proposals for amendments to the Model Regulations on the Transport of Dangerous Goods:  
Packagings, including the use of recycled plastics material**

## Revision of standard ISO 535:2014

### Transmitted by the expert from Spain

#### Introduction

1. In July 2021, the Subcommittee agreed to amend the version of standard ISO 535 to reference the last version available (ISO 535:2014), following a proposal from Spain (INF.4 of the 58<sup>th</sup> session). The Cobb method is a method of determining water absorptiveness, which is referenced in 6.1.4.12.1, 6.5.5.4.16, 6.5.5.5.3 and 6.6.4.4.1.
2. In 2023 a revised version of the standard was published, namely "ISO 535:2023 Paper and board – Determination of water absorptiveness – Cobb method".
3. The revised version of ISO 535:2023 incorporates several modifications compared to the 2014 version. Most of them do not affect the specifications referenced in 6.1.4.12.1, 6.5.5.4.16, 6.5.5.5.3 and 6.6.4.4.1, such as a better definition of the roller for drying, the inclusion of the test time of 600 s or expressing the range for removing the water in the 1800 s test as  $(1785 \pm 30)$  s instead of "between 1755 and 1815".
4. However, there are other modifications to be considered:
  - (a) Rejection of test pieces: the reasons for rejection of test pieces are better described, as reasons due to the nature of the tested material, such as water leaking from the test area or water penetration through the test pieces, but also due to test performance failures, such as too much or too little cylinder pressure in the Cobb apparatus or wetting of the specimen outside the test area during handling.
  - (b) Drying of corrugated board test pieces: the corrugated board is dried by passing the roller with the axis parallel to the glue lines (as in previous version of the standard, but a figure is included to avoid mistakes.
5. It would be better to refer to the latest version of the standard, and therefore the expert from Spain proposes to amend the corresponding paragraphs to update the version of standard ISO 535, as shown in paragraph 6 below.



## **Proposal**

6. Replace in 6.1.4.12.1, 6.5.5.4.16, 6.5.5.5.3 and 6.6.4.4.1 the reference to “ISO 535:2014” by “ISO 535:2023”.

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**Secretariat**

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 3 of the provisional agenda

**Listing, classification and packing****Present and future products in the LPG industry - proposal  
for a new UN number****Transmitted by the World LPG Association – WLPGA\****Summary*

**Executive summary:** Conventional liquefied petroleum gas (LPG) (primarily propane-butane), for the purpose of lowering the carbon footprint of the product, can be partly replaced in the future by blends of renewable/recycled LPG and dimethyl ether (DME) at any ratio. These blends, according to the current regulations, would be assigned today to UN 3161 Liquefied Gas, Flammable, N.O.S. However, to ease identification of the product by emergency services, it is proposed that a new UN Number is created for “Hydrocarbon and Dimethyl Ether Gas Mixtures, Liquefied”.

This proposal is separate from and not linked to the proposal to introduce a new ‘Special Provision’ to allow up to XX% by mass of DME in gas mixtures assigned to UN 1075 or UN 1965.

**Action to be taken** Create a new UN Number for hydrocarbon and DME blends as “Hydrocarbon Gases UN numbers 1075, 1965, 1011, 1012, 1055, 1969, 1978 and Dimethyl Ether UN 1033, Mixtures, Liquefied”.

**Related document(s):** Document ST/SG/AC.10/C.3/2023/30 from the sixty-second session.

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\* A/77/6 (Sect. 20), table 20.6



## I. Background

1. Document ST/SG/AC.10/C.3/2023/30 of the sixty-second session contained the background information on the way that the LPG industry is changing and adapting to meet its renewable and sustainability goals.
2. During the debate held in the sixty-second session on the above document, a number of points were raised, that have been addressed in this revised proposal.
3. A point raised was why the transport in cylinder bundles and multiple-element gas containers (MEGC's) is permitted in the proposal, as these are not used for LPG. The current entries for LPG (UN 1075 and UN 1965) and for DME (UN 1033) all permit carriage in cylinder bundles and MEGC's, however as these are not commonly used for LPG, this permission has now been deleted.
4. Concern was raised as to why special provision 'v' was included in the new entry in 4.1.4.1 packing instruction P200, Table 2. That only permits a 15-year inspection interval subject to competent authority approval. This has now also been deleted from the revised submission.
5. Concern was raised about the suitability of the materials used with LPG, in DME/LPG blend service. Special provision 'z' in 4.1.4.1 packing instruction P200, Table 2 requires that all materials are compatible with the contents. Special provision 'z' also has the requirements for minimum test pressure and the maximum filling ratio of containers. Hence special provision "z" was maintained.
6. Views were expressed that this new UN number was not necessary, as there was no need to specifically identify this mixture in an emergency, thus duplicating unnecessarily the existing UN number (UN 3161). However, there are already similar duplications in UN numbers, and we believe these were introduced for the sake of clarity.
7. An example is with refrigerant gases, there are 25 separate UN numbers for gases that are classified as 2A, with a 20 HIN (1009, 1018, 1020, 1021, 1022, 1028, 1029, 1958, 1973, 1974, 1976, 1982, 1983, 1984, 2422, 2424, 2599, 2602, 3159, 3220, 3296, 3337, 3338, 3339 and 3340) and 7 UN numbers classified as 2F with a 23 HIN (1030, 1063, 2035, 2453, 2454, 2517 and 3252). The 2A gases could have been assigned to UN 1078 Refrigerant gases, N.O.S. or UN 3163 (liquefied gases N.O.S.) and the 2F gases to UN 3161. However, they have all been assigned to separate UN numbers to avoid confusion and aid identification. It will not be many years before the volume of LPG/DME mixtures transported exceeds the total volume of refrigerant gases that are transported.
8. Another example is that hydrocarbon gases are assigned largely in practice to UN 1075 or UN 1965, although it could be claimed that this is a duplication and overlap with UN 3161.
9. All three UN numbers above have the same HIN (hazard identification number 23). However, some flammable liquefied gases that could be mixed and then classified as UN 3161 have different HIN's. For example, UN 1041 has a 239 HIN (Risk of spontaneous violent reaction), but if that is mixed with another flammable gas it is assigned to UN 3161 with a 23 HIN. The same applies with UN numbers 1060, 1081, 1085, 1086, 1087, 1959 and 2452. UN 2191 has a 26 HIN, again that can be mixed with another liquefied gas and then assigned to UN 3161.
10. WLPGA believes that blends of DME and LPG (Hydrocarbons to UN numbers 1075, 1965, 1011, 1012, 1055, 1969, 1978), will become very common in the transport chain as conventional fossil fuels are replaced, and having a dedicated UN number for these blends will enable rapid identification of the actual product transported, which can only help in the case of an emergency and will improve safety.

## II. Proposal

11. Add a new entry to the Dangerous Goods List in 3.2.2 as follows:

UN No.	Name and description	Class or Division	Subsidiary Hazard	LC <sub>50</sub> (ml/m <sup>3</sup> )	Cylinders	Tubes	Pressure Drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special packing provisions
XXXX	HYDROCARBON GASES, UN NUMBERS 1075 1965, 1011, 1012, 1055, 1969, OR 1978 , AND DIMETHYL ETHER UN 1033, MIXTURES, LIQUEFIED	2.1			X	X	X			10			z

12. In 4.1.4.1 packing instruction P200, Table 2, add new entry as follows:

UN No.	Non-refrigerated liquefied gases	Max.allowable working pressure (bar) Small: Bare; Sunshield; Insulated: respectively <sup>a</sup>	Openings below liquid level	Pressure-relief requirements <sup>b</sup> (see 6.7.3.7)	Maximum filling ratio
XXXX	Hydrocarbon gases, UN numbers 1075 1965, 1011, 1012, 1055, 1969, or 1978 , and dimethyl ether UN 1033, mixtures, liquefied	See MAWP definition in 6.7.3.1	Allowed	Normal	See 4.2.2.7

13. In 4.2.5.2.6 portable tank instruction T50, add a new entry as follows:

(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
XXXX	HYDROCARBON GASES, UN NUMBERS 1075, 1965, 1011, 1012, 1055, 1969, OR 1978 , AND DIMETHYL ETHER UN1033, MIXTURES, LIQUEFIED	2.1			274, 392	0	E0	P200		T50	

## III. Safety implications

14. No negative safety implications are foreseen from the proposal. Having a dedicated UN number for this product, will enable easy identification by the emergency services without the need of checking the transport documentation and this can only have a positive impact.





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**Committee of Experts on the Transport of Dangerous Goods  
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and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 3 of the provisional agenda

**Listing, classification and packing****Adequate UN entry for 2,4-Dichlorophenol with a possible  
solution for all chlorophenols****Transmitted by the expert from Germany\*****Introduction**

1. The United Nations Model Regulations subsume chlorophenolic substances under UN 2020 or UN 2021 CHLOROPHENOLS, division 6.1 in solid or liquid form with packing group III. The index of the UN Model Regulations and the International Maritime Dangerous Goods (IMDG) code include entries for Dichlorophenol with references to division 6.1 and the UN Numbers 2020, 2021. In addition, the index of the IMDG code also lists 2,4-Dichlorophenol with an assignment to division 6.1 under UN 2020.
2. However, 2,4-dichlorophenol (CAS-No. 120-83-2) has toxic as well as corrosive properties which both have to be considered for classification. In addition, other chlorophenols may as well have divergent or additional hazards, which are not addressed by UN 2020 and UN 2021.
3. The Editorial and Technical Group (E&T 32) at the International Maritime Organization considered document CCC 6/6/12 from Germany, proposing a new allocation of 2,4-Dichlorophenol to UN 2923 in the index of the IMDG Code since that substance does not only have toxic, but also corrosive properties. The discussion showed support and it was decided that Germany should submit an appropriate proposal to the Sub-Committee of Experts on the Transport of Dangerous Goods.
4. At the fifty-eighth session of the Sub-Committee, the expert from Germany submitted document ST/SG/AC.10/C.3/2021/3. It proposed adding new UN entries for chlorophenols not meeting the classification criteria for the class or division of the current UN entries identified in the Dangerous Goods List in Chapter 3.2 and which are therefore currently not transported properly according to their chemical and physical properties.
5. After taking into account the feedback received during and after that session, the expert from Germany submitted informal document INF.9 at the sixty-first session of the

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\* A/77/6 (Sect. 20), table 20.6



Sub-Committee. Most experts who took the floor supported the proposal and expressed a preference for Option 3, one delegation also found Option 1 acceptable.

6. In view of the numerous compounds of chlorophenols, the expert from Germany prepared the following updated proposal for the consideration of the Sub-Committee.

7. In addition, this working document is in support of Sustainable Development Goal 3: Good health and well-being of the 2030 Agenda for Sustainable Development by promoting the safe transport of chlorophenols.

## Background

8. Chlorophenols are currently transported under UN 2020 or UN 2021 CHLOROPHENOLS, division 6.1 in solid or liquid form with packing group III:

UN No.	Name and description	Class or division	Subsidiary Hazard	UN packing group	Special Provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instructions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)
2020	CHLOROPHENOLS, SOLID	6.1		III	205	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2021	CHLOROPHENOLS, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1

9. 2,4-Dichlorophenol is expected to be transported under UN 2020 at the present time in all modes of transport.

10. 2,4-Dichlorophenol (CAS-No. 120-83-2) is classified as both, corrosive (Skin Corr. Cat. 1B) and toxic (Acute Tox. Cat. 3, dermal)<sup>1</sup> according to GHS criteria. According to the Model Regulations criteria the toxicological properties of 2,4-dichlorophenol should lead to an assignment to class 8, subsidiary hazard 6.1, packing group II.

11. The majority of the monochlorophenols and dichlorophenols exhibit these toxicological properties and should therefore take a similar classification in class 8, with or without subsidiary hazard 6.1, packing group II according to the Model Regulations criteria (see Annex 1 below).

12. UN 2020 and UN 2021 do not cover the corrosive properties and the required packing group for 2,4-dichlorophenol as well as for other mono- and dichlorophenols from Annex 1. Moreover, the transportation requirements corresponding to the hazards of these substances differ from those regulated within UN 2020 or UN 2021.

13. In general, the proper classification is the responsibility of the consignor (2.0.0.1 of the UN Model Regulations). When classifying and transporting chlorophenols as dangerous goods, possible corrosive properties as well as current toxicological information should be considered. A harmonized classification should be achieved for all modes of transport.

<sup>1</sup> Based on data from Directives on classification, labelling and packaging (CLP) Regulation No. 1272/2008, from the GESTIS database ([www.dguv.de/ifa/stoffdatenbank](http://www.dguv.de/ifa/stoffdatenbank) from the Institute for Occupational Safety and Health of the German Social Accident Insurance) and from the ECHA database ([echa.europa.eu](http://echa.europa.eu) from the European Chemicals Agency).

14. Of the 19 chlorophenols (phenols with only chlorine substituent/s), only pentachlorophenol (CAS-No. 87-86-5) has an individual entry under UN 3155 in the Dangerous Goods list. Like pentachlorophenol, pure chlorophenols, except 2-monochlorophenol, are solid at room temperature.

15. Not all chlorophenols are of equal importance for transport and not all chlorophenols are sufficiently documented in terms of the hazards they pose. In addition to the examples mentioned, there are numerous chlorophenols with other substituents that pose hazards differing from those regulated under UN 2020 or UN 2021 and for which the appropriate UN entry has to be chosen.

16. Chlorophenols are not the only chemical group subsuming substances with different physico-chemical hazards relevant for transport classification. Based on the problems that existed in the case of chlorosilanes (UN 2985-2988), there is already an example for a functioning practice of changing the UN entries for a chemical group in order to appropriately classify and differentiate substances of the same chemical group with different hazards in different combinations.

## Proposal

17. Germany proposes a classification with an appropriate N.O.S. entry for chlorophenols not meeting classification criteria of UN 2020 and UN 2021.

## Option 1

18. Considering that there are no specific entries by name for the various chlorophenols not meeting the classification criteria of the current entries of UN 2020 and UN 2021 (except pentachlorophenol) and the fact that other mono- and dichlorophenols would also be classified as corrosive (see Annex 1) the following amendments are proposed:

19. Amend the Dangerous Goods List in Chapter 3.2 as follows (new text is underlined):

UN No.	Name and description	Class or division	Subsidiary Hazard	UN packing group	Special Provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instructions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)
2020	CHLOROPHENOLS, SOLID	6.1		III	205 <u>XXX</u>	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2021	CHLOROPHENOLS, LIQUID	6.1		III	<u>XXX</u>	5 L	E1	P001 IBC03 LP01		T4	TP1

20. Add a new special provision XXX in Chapter 3.3 of the Model Regulations to read as follows:

“XXX If the chemical or physical properties of a chlorophenol are such that the substance does not meet the classification criteria for the entries UN 2020 or UN 2021 but meets the criteria for any other or additional class or division or a diverging UN packing group, it shall be transported according to the appropriate N.O.S. entry.”

21. The new special provision would allow 2,4-Dichlorophenol to be transported appropriately under UN 2923 CORROSIVE SOLID, TOXIC N.O.S. class 8, subsidiary

hazard 6.1, packing group II in accordance with its chemical properties and the hazards it poses.

### Required supplementary provisions for Option 1

22. Delete Dichlorophenol from the Alphabetical Index of the Model Regulations.
23. Amend the Alphabetical Index of the Model Regulations with 2,4-Dichlorophenol by introducing the following entry:
- “2,4-Dichlorophenol Class: 8 UN No. 2923”

### Option 2

24. In accordance with 2.0.0.2 of the Model Regulations amend the two existing UN entries of UN 2020 and UN 2021 and introduce two new UN numbers for chlorophenols in the Dangerous Goods List in Chapter 3.2 as follows (new text is underlined):

UN No.	Name and description	Class or division	Subsidiary Hazard	UN packing group	Special Provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instructions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)
2020	CHLOROPHENOLS, <u>TOXIC, SOLID, N.O.S</u>	6.1		III	205	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2021	CHLOROPHENOLS, <u>TOXIC, LIQUID, N.O.S</u>	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
<u>XXXX</u>	<u>CHLOROPHENOLS,</u> <u>CORROSIVE, TOXIC,</u> <u>SOLID, N.O.S</u>	<u>8</u>	<u>6.1</u>	<u>II</u>		<u>1 kg</u>	<u>E2</u>	<u>P002</u> <u>IBC08</u>	<u>B2, B4</u>	<u>T3</u>	<u>TP33</u>
<u>XXXY</u>	<u>CHLOROPHENOLS,</u> <u>CORROSIVE, SOLID,</u> <u>N.O.S</u>	<u>8</u>		<u>II</u>		<u>1 kg</u>	<u>E2</u>	<u>P002</u> <u>IBC08</u>	<u>B2, B4</u>	<u>T3</u>	<u>TP33</u>

25. UN XXXX would allow 2,4-Dichlorophenol to be transported appropriately in accordance with its chemical properties and the hazards it poses.

### Required supplementary provisions for Option 2

26. Delete Dichlorophenol from the Alphabetical Index of the Model Regulations.
27. Amend the Alphabetical Index of the Model Regulations with 2,4-Dichlorophenol by introducing the following entry:
- “2,4-Dichlorophenol Class: 8 UN No. XXXX.”

## Annex 1

### Classification of most mono- and dichlorophenols

Name	Cas-No.	Classification according to GHS Criteria*	Classification according to TDG criteria
2-Monochlorophenol	95-57-8	Skin Corr. Cat. 1	Class 8 PG ?
4-Monochlorophenol	106-48-9	Skin Corr. Cat. 1B	Class 8 PG II**
2,4-Dichlorophenol	120-83-2	Skin Corr. Cat. 1B, Acut Tox. Cat. 3 dermal	Class 8 (6.1) PG II
2,5-Dichlorophenol	583-78-8	Skin Corr. Cat. 1B	Class 8 PG II
2,6-Dichlorophenol	87-65-0	Skin Corr. Cat. 1B	Class 8 PG II
3,5-Dichlorophenol	591-35-5	Skin Corr. Cat. 1B, Acut Tox. Cat. 3 dermal	Class 8 (6.1) PG II
3,4-Dichlorophenol	95-77-2	Skin Corr. Cat. 1B, Acute Tox. Cat. 3 inhalative and maybe also dermal	Class 8 (6.1) PG II

\*Based on data from the GESTIS database ([www.dguv.de/ifa/stoffdatenbank](http://www.dguv.de/ifa/stoffdatenbank) from the Institute for Occupational Safety and/or Health of the German Social Accident Insurance) and/or from the ECHA database ([echa.europa.eu](http://echa.europa.eu) from the European Chemicals Agency).

\*\* According to WHO (1989. Chlorophenols other than pentachlorophenol. Environmental Health Criteria 93. Geneva, Switzerland: World Health Organization.) the substance is also classified as Class 6.1 PG III as subsidiary hazard.

## Annex 2

### Data sheet to be submitted to the United Nations for new or amended classification of substances

Submitted by Germany

Date 25.04.2022

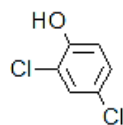
Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions - If necessary, state "not known" or "not applicable" - If data is not available in the form requested, provide what is available with details. Delete inappropriate words.

#### Section 1. SUBSTANCE IDENTITY

1.1 Chemical name: 2,4-Dichlorophenol

1.2 Chemical formula:  $C_6H_4Cl_2O$ 

1.3 Other names/synonyms: 2,4-DCP



1.4.1 UN number:

1.4.2 CAS number: 120-83-2

1.5 Proposed classification for the Recommendations:

UN XXXX CHLOROPHENOLS, CORROSIVE, TOXIC, SOLID, N. O. S., CLASS 8 (6.1), PG II

1.5.1 proper shipping name (3.1.2<sup>1</sup>) 2,4-DICHLOROPHENOL

1.5.2 class/division 8 subsidiary hazard(s): 6.1 packing group PG II

1.5.3 proposed special provisions, if any:

- Limited and excepted quantities: 1 kg, E2
- Special packing provisions: B2, B4
- Portable tanks and bulk containers:
  - Instructions: T3
  - Special provisions: TP33

1.5.4 proposed packing instruction(s): P002, IBC08

#### Section 2. PHYSICAL PROPERTIES

2.1 Melting point or range 42-45 °C

2.2 Boiling point or range 209-210 °C

2.3 Relative density at:

2.3.1 15 °C \_\_\_\_

2.3.2 20 °C 1,4 g\*cm-3

2.3.3 50 °C \_\_\_\_

2.4 Vapour pressure at:

2.4.1 50 °C 0,13 kPa

2.4.2 65 °C \_\_\_\_ kPa

2.5 Viscosity at 20 °C<sup>2</sup> \_\_\_\_ m<sup>2</sup>/s

2.6 Solubility in water at 20 °C 4,5 g/100 ml

- 2.7 Physical state at 20°C (2.2.1.1<sup>1</sup>) solid/liquid/gas<sup>2</sup>
- 2.8 Appearance at normal transport temperatures, including colour and odour: colourless crystals with a phenolic, medicinal odour
- 2.9 Other relevant physical properties: The substance is readily soluble in non-polar, organic solvents (hydrocarbons) as well as oils and fats. Solubility in methanol 10 g/100 ml, in ethanol 50 mg/ml.

### Section 3. FLAMMABILITY

- 3.1 Flammable vapour
- 3.1.1 Flash point (2.3.3<sup>1</sup>) 113 °C oc/cc
- 3.1.2 Is combustion sustained? (2.3.1.3<sup>1</sup>) yes/no
- 3.2 Autoignition temperature \_\_\_\_ °C
- 3.3 Flammability range (LEL/UEL) \_\_\_\_ %
- 3.4 Is the substance a flammable solid? (2.4.2<sup>1</sup>) yes/no
- 3.4.1 If yes, give details \_\_\_\_

### Section 4. CHEMICAL PROPERTIES

- 4.1 Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity? yes/no

If yes, state:

- 4.1.1 Inhibitor/stabilizer used \_\_\_\_
- 4.1.2 Alternative method \_\_\_\_
- 4.1.3 Time effective at 55 °C \_\_\_\_
- 4.1.4 Conditions rendering it ineffective \_\_\_\_
- 4.2 Is the substance an explosive according to paragraph 2.1.1.1? (2.1<sup>1</sup>) yes/no
- 4.2.1 If yes, give details \_\_\_\_
- 4.3 Is the substance a desensitized explosive? (2.4.2.4<sup>1</sup>) yes/no
- 4.3.1 If yes, give details \_\_\_\_
- 4.4 Is the substance a self-reactive substance? (2.4.1<sup>1</sup>) yes/no

If yes, state:

- 4.4.1 exit box of flow chart \_\_\_\_

What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? °C

Is the temperature control required? (2.4.2.3.4<sup>1</sup>) yes/no

- 4.4.2 proposed control temperature for a 50 kg package \_\_\_\_ °C
- 4.4.3 proposed emergency temperature for a 50 kg package \_\_\_\_ °C
- 4.5 Is the substance pyrophoric? (2.4.3<sup>1</sup>) yes/no
- 4.5.1 If yes, give details \_\_\_\_
- 4.6 Is the substance liable to self-heating? (2.4.3<sup>1</sup>) yes/no
- 4.6.1 If yes, give details \_\_\_\_
- 4.7 Is the substance an organic peroxide (2.5.1<sup>1</sup>) yes/no

If yes state:

4.7.1 exit box of flow chart \_\_\_\_

What is the self-accelerating decomposition temperature (SADT) for a 50 kg package?  
\_\_\_\_ °C

Is temperature control required? (2.5.3.4.1<sup>1</sup>)                      yes/no

4.7.2 proposed control temperature for a 50 kg package \_\_\_\_ °C

4.7.3 proposed emergency temperature for a 50 kg package \_\_\_\_ °C

4.8 Does the substance in contact with water emit flammable gases? (2.4.4<sup>1</sup>)                      yes/no

4.8.1 If yes, give details \_\_\_\_

4.9 Does the substance have oxidizing properties (2.5.1<sup>1</sup>)                      yes/no

4.9.1 If yes, give details \_\_\_\_

4.10 Corrosivity (2.8<sup>1</sup>) to:

4.10.1 mild steel \_\_\_\_ mm/year at \_\_\_\_ °C

4.10.2 aluminium \_\_\_\_ mm/year at \_\_\_\_ °C

4.10.3 other packaging materials (specify)

\_\_\_\_ mm/year at \_\_\_\_ °C

\_\_\_\_ mm/year at \_\_\_\_ °C

4.11 Other relevant chemical properties \_\_\_\_

## Section 5. HARMFUL BIOLOGICAL EFFECTS

5.1 LD<sub>50</sub>, oral (2.6.2.1.1<sup>1</sup>) 1276 mg/kg bw to 1352 mg/kg bw

Animal species: Mouse<sub>m/f</sub> (CD-1)

5.2 LD<sub>50</sub>, dermal (2.6.2.1.2<sup>1</sup>) 780 mg/kg bw    Animal species: Rat<sub>m/f</sub> (Sprague-Dawley)

5.3 LC<sub>50</sub>, inhalation (2.6.2.1.3<sup>1</sup>) \_\_\_\_ mg/litre    Exposure time \_\_\_\_ hours

or \_\_\_\_ ml/m<sup>3</sup>                      Animal species \_\_\_\_

5.4 Saturated vapour concentration at 20 °C (2.6.2.2.4.3<sup>1</sup>) \_\_\_\_ ml/m<sup>3</sup>

5.5 Skin exposure (2.8<sup>1</sup>) results Exposure time 15 minutes

Animal species: Rabbit

5.6 Other data \_\_\_\_

5.7 Human experience \_\_\_\_

## Section 6. SUPPLEMENTARY INFORMATION

6.1 Recommended emergency action

6.1.1 Fire (include suitable and unsuitable extinguishing agents) \_\_\_\_

6.1.2 Spillage \_\_\_\_

6.2 Is it proposed to transport the substance in:

6.2.1 Bulk Containers (6.8<sup>1</sup>)                      yes/no

6.2.2 Intermediate Bulk Containers (6.5<sup>1</sup>)?                      yes/no

6.2.3 Portable tanks (6.7<sup>1</sup>)?                      yes/no

If yes, give details in Sections 7, 8 and/or 9.



**Section 7. BULK CONTAINERS (only complete if yes in 6.2.1)**

7.1 Proposed type(s) \_\_\_\_

**Section 8. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.2)**

8.1 Proposed type(s) IBC08

**Section 9. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.3)**

9.1 Description of proposed tank (including IMO tank type if known) T3

9.2 Minimum test pressure \_\_\_\_

9.3 Minimum shell thickness \_\_\_\_

9.4 Details of bottom openings, if any \_\_\_\_

9.5 Pressure relief arrangements \_\_\_\_

9.6 Degree of filling \_\_\_\_

9.7 Unsuitable construction materials \_\_\_\_  
  
\_\_\_\_\_



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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 5 (c) of the provisional agenda

**Transport of Gases:****Miscellaneous****Consequential amendments in the context of the pV-product  
of salvage pressure receptacles and document  
ST/SG/AC.10/C.3/2023/1****Transmitted by the expert from Germany\*****Introduction**

1. At the sixty-second session of the Sub-Committee the final report of the intersessional working group on the pV-product limit for pressure receptacles was presented in document ST/SG/AC.10/C.3/2023/1. This document included four proposals for amending the definitions of different pressure receptacles in section 1.2.1 of the United Nations Model Regulation which were adopted in square brackets during that session of the Sub-Committee.
2. Following the discussion concerning document ST/SG/AC.10/C.3/2023/1, Germany subsequently submitted informal document INF.44 with a proposal on an additional requirement in 6.2.3.5 on the safe handling of salvage pressure receptacles.
3. This document and the proposals below take into account the feedback received in the discussion of informal document INF.44 during last session as well as comments received after that session from members of the former working group. The proposals below include the introduction of additional information requirements for the safe handling of salvage pressure receptacles as well as the indication of the maximum pressure-volume-product in the marking of salvage pressure receptacles.
4. Proposal 1 through 4 constitute consequential amendments to the amendments on the pV-product of salvage pressure receptacles that have already been adopted in square brackets. Proposal 5 invites the Sub-Committee to consider the deletion of the square brackets to the amendments in section 1.2.1 adopted at the last session of the Sub-Committee (see: report ST/SG/AC.10/C.3/124/Add.1, para. 2).

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\* A/77/6 (Sect. 20), table 20.6



5. This document supports Sustainable Development Goal 3: Good health and well-being of the 2030 Agenda for Sustainable Development by advancing regulations for the safe transport of gases in pressure receptacles.

### Proposal 1

6. Amend 4.1.1.19.3 (c) as follows (new text is underlined, ~~deleted text in strikethrough~~):

“(c) The contents of the contained pressure receptacle(s) are limited in pressure ~~and volume~~, its useable water capacity and its pressure-volume-product so that if totally discharged into the salvage pressure receptacle, the pressure in the salvage pressure receptacle at 65 °C will not exceed the test pressure of the salvage pressure receptacle (for gases, see packing instruction in P200 (3) in 4.1.4.1). The reduction of the useable water capacity of the salvage pressure receptacle, e.g. by any contained equipment and cushioning, shall be taken into account.”

7. Rational for proposal 1:

This proposal is a consequential amendment to the existing text reflecting the additional criteria of the new introduced pressure volume product.

### Proposal 2

8. Amend the second paragraph in 6.2.3.5 as follows:

“Instructions on the safe handling and use of the salvage pressure receptacle shall be clearly shown in the documentation for the application to the competent authority and shall form part of the approval certificate. In the approval certificate, the pressure receptacles authorized to be transported in a salvage pressure receptacle shall be indicated. This indication of authorized pressure receptacles shall contain the following information:

The test pressure to which it is allowed to load the salvage pressure receptacle at maximum temperature, which limits the storage of pressure receptacles filled with liquified gases.

The usable water capacity and the maximum pV-product authorized for stored pressure receptacles(s), which limits the storage of pressure receptacles filled with compressed gases. The value of this maximum pV-product is the lowest value of either of the following:

(a) the general limit of the pV-product of 1.5 Mio bar litres; or

(b) the pV-product of the salvage pressure receptacle based on the test pressure to which it is allowed to be loaded at maximum temperature and the usable water capacity.

A list of the materials of construction of all parts likely to be in contact with the dangerous goods shall also be included in the approval certificate.”

9. Rational for proposal 2:

This proposal describes the necessary consideration of the new pV-limit instead of the substituted limit of the water capacity. The amendment in the last sentence of the second paragraph is for clarification purposes to ensure that the original meaning of the last sentence of paragraph 2 is not changed.

### Proposal 3

10. Amend the fourth paragraph in 6.2.3.5 and delete the NOTE in the current text as follows:

“The marking of salvage pressure receptacles according to 6.2.3 shall be determined by the competent authority taking into account suitable marking provisions of 6.2.2.7 as appropriate. The marking shall include the useable water capacity, ~~and~~ test pressure of the salvage pressure receptacle and the maximum pressure-volume-product indicated by PVP as follows:

e.g. PVP1500 000BAR.L

For a better readability this marking starts with the letters “PVP” followed by the PVP-value and the relevant units. The PVP value includes a space in front of the last 3 digits of the value. The units of pressure and water capacity are indicated by “BAR.L” with a dot between BAR and L. For a harmonised readability and for avoidance of later manipulation the marking shall not contain more spaces.

~~*NOTE: These provisions for salvage pressure receptacles may be applied for new salvage pressure receptacles as from 1 January 2013, unless otherwise authorized, and shall be applied for all new salvage pressure receptacles as from 1 January 2014. Salvage pressure receptacles approved in accordance with national regulations may be used with the approval of the competent authorities of the countries of use.*~~

~~*NOTE 1: Since the marked PVP stands for the maximum capacity of the salvage pressure receptacle, which is related to the limitation of pressure receptacles authorized for being stored inside, the PVP-mark can be less than the product of the marked values for test pressure PH and water capacity V, which indicate technical properties of the salvage pressure receptacle.*~~

~~*NOTE 2: For a transitional period until 31 December 2030 salvage pressure receptacles with a water capacity of not more than 3000 litres may be used without baring the additional PVP-mark.”*~~

#### 11. Rational for proposal 3

Due to the limitation of the inventory of a salvage pressure receptacle to 1.5 million bar litres and individual safety concepts, the authorized pV-product value might be lower than the product of marked test pressure and the marked usable water capacity. For avoidance of human errors and with respect to an over-loading, it is a safety-plus to indicate the value of the maximum accepted PVP value.

The order of letters and numbers for the proposed marking should be clearly readable and distinctive for indicating the maximum pV-product value.

Since there are a lot of salvage pressure receptacles with a volume of maximum 3000 litres in use the request for an additional marking needs some time for getting implemented.

The current NOTE has no relevance anymore.

## Proposal 4

#### 12. Introduce the following definition of “pressure volume product” in section 1.2.1:

“Pressure volume product (pV-product; PVP) means the value resulting from multiplying the useable water capacity of a containment with its maximum pressure as indicated in the relevant paragraph. Expressed in bar litres.”

#### 13. Rational for proposal 4:

The pressure volume product is used in different places in the Model Regulations, e.g., “charge pressure” in special provision (SP) 283 or “test pressure” in SP 406 as well as in 6.2.3.5. Additionally, it is used in other regulations harmonized with the Model Regulations (e.g., ADR/RID). In all cases this pressure indicates the maximum pressure during filling and usage, which in general service means the test pressure.

## **Proposal 5**

14. Delete square brackets from the amendments to section 1.2.1 proposed in document ST/SG/AC.10/C.3/2023/1 and adopted during the sixty-second session of the Sub-Committee (see: report ST/SG/AC.10/C.3/124/Add.1, para. 2).

15. Rational for proposal 5:

Without the deletion, the adoption of the proposals above as consequential amendments would add square brackets in several places throughout the Model Regulations. So far, no concerns have been raised against the amendments already adopted in square brackets and all relevant questions have been answered. Therefore, after having discussed the principle issue since summer 2020, it seems to be disproportional to add substantial text and individual phrases in three different chapters throughout the Model Regulations while putting them in square brackets.

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 3 of the provisional agenda

**Listing, classification and packing****Classification of articles****Transmitted by the expert from Germany\*****Introduction**

1. Within the context of the introduction of UN numbers 2337 to 2548, a new section 2.0.5 was introduced into the United Nations Model Regulations, which governs the classification of articles containing dangerous goods. 2.0.5.5 states that these articles have to be assigned to the appropriate class or division determined by the hazards present using, where applicable, the precedence of hazards table in 2.0.3.3 for each of the dangerous goods contained in the article.
2. However, the precedence of hazards table in 2.0.3.3 does not cover all classes and divisions. The assignment of an article to a class or division may as well be determined in accordance with other regulations contained in section 2.0.3. Consequently, the reference to the precedence of hazards table in 2.0.5.5 is not sufficient when applying the provisions on the classification of articles.
3. Therefore, 2.0.5.5 should be amended to reflect that other provisions of section 2.0.3 may be applied where the precedence of hazards table in 2.0.3.3 is not applicable.
4. The following proposal intends to improve the consistency and legal clarity of the Model Regulations and its application thereby promoting the building of effective, accountable and inclusive institution at all levels under the Sustainable Development Goal 16 of the 2030 Agenda for Sustainable Development.

**Proposal**

5. Amend the first sentence of 2.0.5.5 as follows (new text is underlined):  
“Articles containing dangerous goods shall be assigned to the appropriate Class or Division determined by the hazards present in accordance with 2.0.3 and using, where

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\* A/77/6 (Sect. 20), table 20.6



applicable, the Precedence of Hazards table in 2.0.3.3 for each of the dangerous goods contained in the article.”

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 3 of the provisional agenda

**Listing, classification and packing****Organic peroxides: new formulations to be listed in 2.5.3.2.4  
and packing instruction IBC520****Submitted by the European Chemical Industry Council (Cefic)\*****I. Introduction**

1. Since several new organic peroxides and formulations have become commercially available there is a need to include them in 2.5.3.2.4 and 4.1.4.2, packing instruction IBC520.
2. One new organic peroxide and one already listed organic peroxide with a lower concentration are proposed to be included in 2.5.3.2.4. Further, one organic peroxide, already listed but with a higher concentration in diluent type A, is proposed to be included in intermediate bulk containers (IBC) packing instruction IBC520.
3. The list of products, proposed classification, the accompanying competent authority approval references as well as a summary of the supporting test data are given in the annex to this proposal.

**II. Proposals**

4. Cefic proposes to include two entries in 2.5.3.2.4, list of currently assigned organic peroxides, as indicated in proposal 1 below (amendments to 2.5.3.2.4). Further, Cefic proposes to include one entry to be included in packing instruction IBC520, as indicated in proposal 2 below (amendments to 4.1.4.2).

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\* A/77/6 (Sect. 20), table 20.6





# 1. Proposed amendments to 2.5.3.2.4, list of currently assigned organic peroxides

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B <sup>1</sup> (%)	Inert solid (%)	Water (%)	Packing Method	Control temperature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary risks and remarks
<b>Add to the existing entry in the list:</b> tert-AMYL PEROXYPIVALATE	≤ 72	≥ 28				OP7	+10 °C	+15 °C	3115	
<b>Add this new entry to the list:</b> 1,2,4,5,7,8-HEXOXONANE, 3,6,9-TRIMETHYL-3,6,9-tris (Ethyl and Propyl) derivatives	≤ 41	≥ 59				OP7			3105	35)

Add the following new note to 2.5.3.2.4:

35) Available oxygen ≤ 7.3 %

## 2. Proposed amendments to 4.1.4.2, packing instruction IBC520

Add IBC type 31HA1 to the existing entry as follows:

UN No.	Organic peroxide	Type of IBC	Maximum quantity (litres)	Control temperature	Emergency temperature
3119	ORGANIC PEROXIDE TYPE F, LIQUID, TEMPERATURE CONTROLLED				
	ADD to the list:				
	tert-Butyl peroxy-2-ethylhexanoate, not more than 52 %, in diluent type A	31HA1 31A	1 000 1 250	+30 °C	+35 °C

## Annex

### Test result of organic peroxides and formulations to be added (2.5.3.2.4 or IBC520)

No	Product	Packaging	UN	Detonation	T/P/ C.1	Deflagration / C.2	Koenen/ E.1	DPVT/ E.2	(mod) Trauzl F.3 or F.4 or F5	SADT (H.3 or H.4)	Competent authority approval number
1	tert-AMYL PEROXYPIVALATE , ≤ 72 in diluent type A	OP7	3115	Test A.1, No (77 %)	3622 ms Yes slowly	1.28 mm/s Yes slowly	1.5 mm Medium	8.0 mm (10 g), Medium	n.a.	H.4 25 °C (500 ml)	NL TNO 16EM/0042
2	1,2,4,5,7,8-HEXOXONANE, 3,6,9-TRIMETHYL-3,6,9-tris (Ethyl and Propyl) derivatives, ≤ 41 in diluent type A	OP7	3105	Test A.6, No	< 2170 kP, No	0.033 mm/s, No	1.5 mm, Medium	4.0 mm (10 g) Medium	F.4 8.0 ml Low	H.4 110 °C (500 ml)	NL TNO 14EM/0672
3	tert-Butyl peroxy-2-ethylhexanoate, not more than 52 %, in diluent type A	IBC520	3119	Test A.1, No (100 %)	1953 ms, Yes slowly	0.15 mm/s, No	1.0 mm, Low (70 %)	<3.5 mm (10 g) Low	F.5 56 J/g Low	H.3 +40 °C (IBC)	NL TNO 09DV3/2722 NL TNO 06DV3/1070



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**Listing, classification and packing****Amendment of the packing group for UN 2862 VANADIUM  
PENTOXIDE, non-fused form****Transmitted by the expert from Germany\*****I. Introduction**

1. In the *Model Regulations*, UN 2862 *VANADIUM PENTOXIDE, non-fused form* is assigned to packing group III. However, test results indicate that the substance should be assigned to packing group II. Among other things, the amendment is due to an amendment of annex VI to Regulation (EC) No. 1272/2008 on classification, labelling and packaging (CLP) made within the scope of the 18th ATP<sup>1</sup>, which will apply from 23 November 2023.

**II. Background**

2. Vanadium pentoxide, CAS-No. 1314-62-1, is listed in annex VI to Regulation (EC) No. 1272/2008 on classification, labelling and packaging (CLP) under Index No. 023-001-00-8 and was previously (before 18th ATP) assigned the following dangerous goods classifications:

Acute Tox. 4 \*, H302

Acute Tox. 4 \*, H332

Aquatic Chronic 2, H411

The asterisk describes the minimum classification. In the *Model Regulations*, the substance is currently assigned to packing group III.

3. With the 18th ATP of the CLP Regulation, the classifications regarding toxicity were amended due to new findings on the oral and inhalation toxicity (amendments underlined):

Acute Tox. 3, H301Acute Tox. 2, H330

Aquatic Chronic 2, H411

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\* A/77/6 (Sect. 20), table 20.6

<sup>1</sup> ATP = Adaption to Technical Progress



4. According to the “*Opinion proposing harmonized classification and labelling at EU level of Vanadium pentoxide*”, which was published in 2020 by the Committee for Risk Assessment (RAC) of the European Chemicals Agency (ECHA), vanadium pentoxide is acute toxic both via oral and inhalation route.

5. In a reliable acute oral toxicity study (Leuschner et al., 1994) in accordance with the Organization for Economic Cooperation and Development (OECD) Test guidelines 401, performed on Sprague-Dawley rats, an LD<sub>50</sub> value of 221.1 mg/kg was determined in females and 313.8 mg/kg in males. The LD<sub>50</sub> values from females and from males and females combined justify category 3 for acute oral toxicity for vanadium pentoxide.

6. In an acute inhalation toxicity study (anonymous, 2011) according to OECD Test guideline 436, performed on Fischer 344 rats, an LC<sub>50</sub> value of 0.25 mg/l was determined after a 4-hour exposure period. In the same study, an LC<sub>50</sub> value of less than 0.056 mg/l in female B6C3F1 mice and more than 0.5 mg/l in male B6C3F1 mice was found after 4 hours exposure. Since the rat is the preferred test species for the evaluation of acute inhalation toxicity (2.6.2.1.3 of the *Model Regulations*), the LC<sub>50</sub> value of male and female rats for vanadium pentoxide guarantees category 2.

7. The new inhalation toxicity classification (Acute Tox. 2, H330) corresponds to an assignment to packing group II in accordance with the Model Regulations (2.6.2.2.4.1).

8. According to the *Guiding Principles*, when strengthening the packing group some changes would have to be applied to the Dangerous Goods List. In accordance with tables 3.4 and 3.5.1 of the *Guiding Principles* a smaller amount of limited and excepted quantities is allowed. In accordance with table 4.3 the portable tanks instruction should rather be T3 instead of T1 so that the required test pressure rises from 1.5 bar to 2.65 bar. According to 4.1.4.3 of the *Model Regulations* packing instruction LP02 concerning the use of large packagings is only allowed for packing group III but not for packing group I or II. As vanadium pentoxide is inhalation toxic, the intermediate bulk containers (IBCs) in which it is transported shall be sift-proof or fitted with a sift-proof liner as required by special packing provisions B2 and B4.

9. In addition, this working document supports Sustainable Development Goal 3: Good Health and Well-Being as part of the 2030 Agenda for Sustainable Development by promoting the safe transport of UN 2862.

### III. Proposal

10. Given that the GHS classification and the dangerous goods provisions are harmonized, Germany proposes that the entry for UN 2862 *VANADIUM PENTOXIDE, non-fused form* in the Model Regulations be amended as follows (amendments are underlined, entries to be deleted are ~~stricken through~~):

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instructions	Special provisions
2862	VANADIUM PENTOXIDE, non-fused form	6.1		III II		5 kg 500 g	E1 E4	P002 IBC08 LP02	B3 <u>B2, B4</u>	T1 <u>T3</u>	TP33

11. Regarding the proposed change of the portable tank instruction, the introduction of a transitional measure is adequate. At the end of 4.2.6, add the following new paragraph:

“UN 2862 VANADIUM PENTOXIDE, non-fused form may be transported in portable tanks under portable tank instruction T1 until 31 December 2028.”

## Annex

### Data sheet to be submitted to the United Nations for new or amended classification of substances

Submitted by Germany

Date 25 August 2023

Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions - If necessary, state "not known" or "not applicable" - If data is not available in the form requested, provide what is available with details. Delete inappropriate words.

#### Section 1. SUBSTANCE IDENTITY

- 1.1 Chemical name: Vanadium pentoxide
- 1.2 Chemical formula:  $V_2O_5$
- 1.3 Other names/synonyms: Vanadium(V)-oxide, Divanadium pentaoxide
- 1.4.1 UN number: UN 2862
  - 1.4.2 CAS number: 1314-62-1
- 1.5 Proposed classification for the Recommendations: CLASS 6.1
- 1.5.1 Proper shipping name (3.1.2<sup>1</sup>) *VANADIUM PENTOXIDE, non-fused form*
- 1.5.2 Class/division: 6.1 subsidiary hazard(s): -
- 1.5.3 Proposed special provisions, if any: none
  - Limited and excepted quantities: 500 g, E4
  - Special packing provisions: B2, B4
  - Portable tanks and bulk containers:
  - Instructions: T3
  - Special provisions: TP33
- 1.5.4 proposed packing instruction(s): P002, IBC08

#### Section 2. PHYSICAL PROPERTIES

- 2.1 Melting point or range 690 °C
- 2.2 Boiling point or range: does not have a boiling point, it decomposes at 1750 °C
- 2.3 Relative density at: 3,654 at 21.7 °C
- 2.4 Vapour pressure at:
- 2.5 Viscosity at 20 °C<sup>2</sup> \_\_\_\_ m<sup>2</sup>/s
- 2.6 Solubility in water at 20 °C: slightly soluble, 0.92 g/l
- 2.7 Physical state at 20°C (2.2.1.1<sup>1</sup>) solid/liquid/gas<sup>2</sup>
- 2.8 Appearance at normal transport temperatures, including colour and odour: yellow/orange to red/brown, solid, crystalline powder, with a characteristic odour
- 2.9 Other relevant physical properties: stable, incompatible with chlorine, chlorates, acids, alkali metals, interhalogens. Soluble in concentrated acids and alkalis, and insoluble in ethanol.

#### Section 3. FLAMMABILITY

- 3.1 Flammable vapour
- 3.1.1 Flash point (2.3.3<sup>1</sup>) °C oc/cc
  - 3.1.2 Is combustion sustained? (2.3.1.3<sup>1</sup>)      yes/no
- 3.2 Autoignition temperature °C
- 3.3 Flammability range (LEL/UEL) \_\_\_\_ %
- 3.4 Is the substance a flammable solid? (2.4.2<sup>1</sup>)      yes/no
  - 3.4.1 If yes, give details \_\_\_\_

#### Section 4. CHEMICAL PROPERTIES

- 4.1 Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity?    yes/no  
If yes, state:

- 4.1.1 Inhibitor/stabilizer used \_\_\_\_
- 4.1.2 Alternative method \_\_\_\_
- 4.1.3 Time effective at 55 °C \_\_\_\_
- 4.1.4 Conditions rendering it ineffective \_\_\_\_
- 4.2 Is the substance an explosive according to paragraph 2.1.1.1? (2.1<sup>1</sup>)    yes/no
- 4.2.1 If yes, give details \_\_\_\_
- 4.3 Is the substance a desensitized explosive? (2.4.2.4<sup>1</sup>)    yes/no
- 4.3.1 If yes, give details \_\_\_\_
- 4.4 Is the substance a self-reactive substance? (2.4.1<sup>1</sup>)    yes/no
- If yes, state:
- 4.4.1 exit box of flow chart \_\_\_\_
- What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? °C
- Is the temperature control required? (2.4.2.3.4<sup>1</sup>)    yes/no
- 4.4.2 proposed control temperature for a 50 kg package \_\_\_\_ °C
- 4.4.3 proposed emergency temperature for a 50 kg package \_\_\_\_ °C
- 4.5 Is the substance pyrophoric? (2.4.3<sup>1</sup>)    yes/no
- 4.5.1 If yes, give details \_\_\_\_
- 4.6 Is the substance liable to self-heating? (2.4.3<sup>1</sup>)    yes/no
- 4.6.1 If yes, give details \_\_\_\_
- 4.7 Is the substance an organic peroxide (2.5.1<sup>1</sup>)    yes/no
- If yes state:
- 4.7.1 exit box of flow chart \_\_\_\_
- What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? \_\_\_\_ °C
- Is temperature control required? (2.5.3.4.1<sup>1</sup>)    yes/no
- 4.7.2 proposed control temperature for a 50 kg package \_\_\_\_ °C
- 4.7.3 proposed emergency temperature for a 50 kg package \_\_\_\_ °C
- 4.8 Does the substance in contact with water emit flammable gases? (2.4.4<sup>1</sup>)    yes/no
- 4.8.1 If yes, give details \_\_\_\_
- 4.9 Does the substance have oxidizing properties (2.5.1<sup>1</sup>)    yes/no
- 4.9.1 If yes, give details \_\_\_\_
- 4.10 Corrosivity (2.8<sup>1</sup>) to:
- 4.10.1 mild steel \_\_\_\_ mm/year at \_\_\_\_ °C
- 4.10.2 aluminium \_\_\_\_ mm/year at \_\_\_\_ °C
- 4.10.3 other packaging materials (specify) \_\_\_\_ mm/year at \_\_\_\_ °C  
\_\_\_\_ mm/year at \_\_\_\_ °C
- 4.11 Other relevant chemical properties \_\_\_\_

## Section 5. HARMFUL BIOLOGICAL EFFECTS

- 5.1 LD<sub>50</sub>, oral (2.6.2.1.1<sup>1</sup>)    221 mg/kg for female Sprague-Dawley rats  
314 mg/kg for male Sprague-Dawley rats
- 5.2 LD<sub>50</sub>, dermal (2.6.2.1.2<sup>1</sup>)    no signs of toxicity (> 2500 mg/kg)
- 5.3 LC<sub>50</sub>, inhalation (2.6.2.1.3<sup>1</sup>) 0.056 mg/l, dust and mist, 4 h, female B6C3F1 mice  
> 0.5 mg/l, dust and mist, 4 h, male B6C3F1 mice  
0.25 mg/l, 4 h, dust and mist, male and female Fischer  
344 rats
- 5.4 Saturated vapour concentration at 20 °C (2.6.2.2.4.3<sup>1</sup>) \_\_\_\_ ml/m<sup>3</sup>
- 5.5 Skin exposure (2.8<sup>1</sup>)
- 5.6 Other data \_\_\_\_
- 5.7 Human experience \_\_\_\_

## Section 6. SUPPLEMENTARY INFORMATION

- 6.1 Recommended emergency action
- 6.1.1 Fire (include suitable and unsuitable extinguishing agents) \_\_\_\_
- 6.1.2 Spillage \_\_\_\_
- 6.2 Is it proposed to transport the substance in:
- 6.2.1 Bulk Containers (6.8<sup>1</sup>)    yes/no
- 6.2.2 Intermediate Bulk Containers (6.5<sup>1</sup>)?    yes/no

- 6.2.3 Portable tanks (6.7<sup>1</sup>)? yes/no  
If yes, give details in Sections 7, 8 and/or 9.

**Section 7. BULK CONTAINERS (only complete if yes in 6.2.1)**

- 7.1 Proposed type(s)

**Section 8. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.2)**

- 8.1 Proposed type(s) IBC08

**Section 9. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.3)**

- 9.1 Description of proposed tank (including IMO tank type if known)  
9.2 Minimum test pressure 2.65 bar  
9.3 Minimum shell thickness see 6.7.2.4.2  
9.4 Details of bottom openings, if any see 6.7.2.6.2  
9.5 Pressure relief arrangements normal (see 6.7.2.8)  
9.6 Degree of filling \_\_\_\_  
9.7 Unsuitable construction materials \_\_\_\_
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**Listing, classification and packing****Refrigerating machines and heat pumps****Transmitted by the expert from Germany\*****I. Introduction**

1. Refrigerating machines transported under UN Nos. 2857 or 3358 may be fully exempted from the dangerous goods regulations if they comply with the requirements of special provisions 119 or 291. Heat pumps work on exactly the same principle as refrigerating machines, except that in this case it is not the aim to produce cold but, as the name suggests, heat. Therefore, it would be logically to apply the same transport conditions to these articles since the hazards in transport are comparable.

**II. Discussion**

2. Documents addressing this issue have already been submitted to the RID/ADR/ADN Joint Meeting on its autumn 2021 session by the International Association of Dangerous Goods Safety Advisors (IASA) (see document ECE/TRANS/WP.15/AC.1/2021/25 and INF.45 of the March 2021 session). The discussion at this session of the RID/ADR/ADN Joint Meeting led to the adoption of amendments to special provisions 119 and 291 in RID, ADR and ADN for entry into force on 1 January 2023 (see report ECE/TRANS/WP.15/AC.1/162).

3. At the sixty-first session of the Sub-Committee, informal document INF.34 was submitted proposing similar amendments to special provisions 191 and 291 in chapter 3.3 of the Model Regulations. While the proposal received general support, a preference for the introduction of a new UN number with a proper shipping name as well as corresponding special provisions was expressed to address this issue in the *Model Regulations*.

4. Based on this feedback, this document proposes the necessary amendments to the *Model Regulations*. In addition, this proposal supports Sustainable Development Goal 13: Climate Action. Heat pumps can provide an energy-efficient and eco-friendly form of heating by reducing carbon dioxide emissions.

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\* A/77/6 (Sect. 20), table 20.6



### III. Proposal

5. Amend the Dangerous Goods List in chapter 3.2 as follows (new text is underlined):

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
						(7a)	(7b)	Packing instruction	Special packing provisions	Instructions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
<del>XXXX</del>	HEAT PUMPS containing non-flammable, non-toxic, gases or ammonia solutions (UN 2672)	<u>2.2</u>			<del>xxx</del>	<u>0</u>	<u>E0</u>	<u>P003</u>	<u>PP32</u>		
<del>XXXY</del>	HEAT PUMPS containing flammable, non-toxic, liquified gas	<u>2.1</u>			<del>xyy</del>	<u>0</u>	<u>E0</u>	<u>P003</u>	<u>PP32</u>		

6. Insert in chapter 3.3 the following special provision xxx and xxy:

“xxx Heat pumps include pumps or other appliances which have been designed for the specific purpose to extract energy from an object or medium to generate heat. Heat pumps and heat pump components are not subject to these Regulations if they contain less than 12 kg of gas in Division 2.2 or less than 12 litres ammonia solution (UN 2672).”

“xxy Flammable liquified gases shall be contained within heat pump components. These components shall be designed and tested to at least three times the working pressure of the pump. The heat pumps shall be designed and constructed to contain the liquified gas and preclude the risk of bursting or cracking of the pressure retaining components during normal conditions of transport. Heat pumps and heat pump components are considered not subject to these Regulations if they contain less than 12 kg of gas.”

7. Amend in 4.1.4 special packing provisions PP32 in packing instruction P003 as follows (new text is underlined, deleted text in ~~strike through~~):

“**PP 32** UN Nos. 2857, ~~and~~ 3358, ~~XXXX and XXXY~~ and robust articles consigned under UN 3164 may be transported unpackaged, in crates or in appropriate overpacks.”

8. Add the following new entries to the alphabetical index of substances and articles:

HEAT PUMPS containing non-flammable, non-toxic, gases or ammonia solutions (UN 2672)	2.2	XXXX
HEAT PUMPS containing, flammable, non-toxic, liquified gas	2.1	XXXY



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**Listing, classification and packing****Proposal to add class 8 as subsidiary hazard to UN 1040,  
UN 1041 and UN 3300****Transmitted by the expert from Germany\*****I. Introduction**

1. According to the *Model Regulations*, UN 1040 *ETHYLENE OXIDE or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1 MPa (10 bar) at 50 °C* is classified in division 2.3 (toxic gas) with the subsidiary hazard 2.1 (flammable).
2. A new harmonised classification of ethylene oxide showing corrosive properties was published within the 14<sup>th</sup> ATP<sup>1</sup>, Annex VI of the Regulation (EC) No. 1272/2008 on classification, labelling and packaging (CLP) and entered into force on 9 September 2021. Classification corresponding to class 8 was proposed in an informal document (UN/SCETDG/60/INF.25) at the sixtieth session of the Sub-Committee.
3. After receiving the comments from the Netherlands at the sixtieth session of the Sub-Committee, the expert from Germany submitted an official document (ST/SG/AC.10/C.3/2022/54) at the sixty-first session including UN 3300 *ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 87 % ethylene oxide* and a data sheet concerning the properties of ethylene oxide.
4. Taking into account the questions raised as part of the sixty-first session of the Sub-Committee, the expert from Germany prepared an updated proposal providing extensive data regarding the corrosivity of ethylene oxide. It was clear, that UN 1040 and UN 3300 are not the only UN Numbers that are related to ethylene oxide. Considering the comment by Sweden, this proposal also applies to UN 1041 *ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 9 % but not more than 87 % ethylene oxide*.
5. While most experts at the sixty-second session of the Sub-Committee expressed their support to amend the classification of ethylene oxide by adding class 8 as subsidiary hazard, the majority of experts agreed to retain portable tank instruction T50 as there were no issues with the current requirements.

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\* A/77/6 (Sect. 20), table 20.6

<sup>1</sup> ATP = Adaption to Technical Progress



## II. Background

6. Ethylene oxide, CAS No. 75-21-8, is currently listed under Index No. 603-023-00-X in Annex VI of Regulation (EC) No. 1272/2008 on classification, labelling and packaging and is classified as:

Flam. Gas 1, H220

Acute Tox. 3\*, H331

This meets the criteria for classification as dangerous good according to the *Model Regulations* under class 2, division 2.3, with subsidiary hazard 2.1.

7. With the 14<sup>th</sup> ATP entering into force, the following amendments were added (*italics*), resulting in the classification of ethylene oxide as follows:

Acute Tox. 3, H331

*Acute Tox. 3, H301*

*Skin Corr. 1, H314*

8. According to the “*Opinion proposing harmonised classification and labelling at EU level of ethylene oxide*”, which was published in 2017 by the Committee for Risk Assessment (RAC) of the European Chemicals Agency (ECHA), liquid ethylene oxide can cause severe skin lesions. According to 2.2.2.1 (c) and 2.2.3 (c) of the *Model Regulations* there are gases which “are known to be so toxic or corrosive to humans as to pose a hazard to health”. Since there are no accepted test methods for the corrosivity of gases or gas mixtures, classification should rely on human data and tests on animal skin.

Human data:

(a) A series of aqueous solutions with ethylene oxide concentrations between 1 % and 90 % were tested on human skin (Sexton et al., 1950). The 50 % solution caused the most severe skin reactions since the more concentrated solutions evaporated quickly preventing prolonged skin contact.

(b) Corrosive effects such as progressive skin lesions, burns, pain, erythema, redness, damage to subcutaneous tissue, scar formation, blisters have also been noted in varying degrees after exposure to medical materials and devices in case reports (Alomar et al., 1981, Hanifin et al., 1971, Cardenas-Camarena et al., 1998, Karacalar et al., 2000). The materials and devices have been sterilized with ethylene oxide gas and not adequately ventilated afterwards.

(c) Exposure of large areas of human skin to a 1 % aqueous solution of ethylene oxide (the lowest concentration tested) for about 2 hours resulted in severe blistering after 12-14 hours (Sexton et al., 1949).

Animal test data:

(d) Skins of New Zealand White rabbits were exposed to 0.5 ml of undiluted ethylene oxide for 4 hours and subdermal haemorrhages and chemical burns were observed immediately, 24 hours and 72 hours after exposure (Celanese et al., 1972).

(e) Skins of rabbits were exposed to 10 % and 50 % aqueous solutions of ethylene oxide for less than 60 minutes (Hollingsworth et al. 1956). In animals exposed for six minutes or longer, hyperaemia and oedema were observed.

9. Based on the available data, it can be stated that ethylene oxide is skin corrosive even in lower concentrations. As the data does not allow exact differentiation between the subcategories, the RAC concluded that ethylene oxide should be classified as Skin Corr. Cat. 1, H314 (without subcategorization).

10. Ethylene oxide can be released from tanks in the event of accidents or from leaking caps and can cause frostbite in contact with skin, which exhibits similar symptoms as chemical burns (as described above in paragraph 8). Both outcomes can lead to irreversible skin damage.

11. Ethylene oxide is transported as liquefied gas. The data presented in paragraph 8 refer to solutions. Hence, in the event of even short direct skin contact of higher concentrations more severe reactions resulting in irreversible skin damage are to be expected meeting the criteria of 2.8.1 of the *Model Regulations* (class 8, Skin Corr. Cat. 1).

12. This corresponds to a division 2.3 classification in the dangerous goods list with the subsidiary risks 2.1 and 8 in the case of UN 1040 and UN 3300. The classification of UN 1041 results in division 2.1 with subsidiary risk 8.

13. The discussion at the last session of the Sub-Committee did show a majority for maintaining the assignment of portable tank instruction T50 to UN 1040 and UN 1041 since there are no issues relating to the transport and not enough data that would justify a deletion. In this case, Germany believes that the *Guiding Principles* would benefit from a minor amendment – included below in proposal 2 – in order to reflect the transport of ethylene oxide in portable tanks under portable tank instruction T50.

14. In addition, this working document supports Sustainable Development Goal 3: Good Health and Well-Being as part of the 2030 Agenda for Sustainable Development by promoting the safe transport of UN 1040, UN 1041 and UN 3300.

### III. Proposal 1

15. As ethylene oxide meets the criteria for class 8, and within the scope of harmonizing GHS classification with the transport regulations of dangerous goods, Germany proposes to amend UN 1040 *ETHYLENE OXIDE or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1 MPa (10 bar) at 50 °C*, UN 1041 *ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 9 % but not more than 87 % ethylene oxide* and UN 3300 *ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 87 % ethylene oxide* as follows (new text is underlined):

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
						(7a)	(7b)	Packing instruction	Special packing provisions	Instructions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
1040	ETHYLENE OXIDE or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1 MPa (10 bar) at 50 °C	2.3	2.1, <u>8</u>		342	0	E0	P200		T50	TP20
1041	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 9 % but not more than 87 % ethylene oxide	2.1	<u>8</u>			0	E0	P200		T50	
3300	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 87 % ethylene oxide	2.3	2.1, <u>8</u>			0	E0	P200			

### IV. Proposal 2

16. Amend table 4.3 of the *Guiding Principles* as follows (new text is underlined, deleted text is ~~stricken through~~):

Class / Division	PG	Subsidiary hazard	Tank instruction	Notes
2.1			T50/T75	T50 applies to non-refrigerated liquified flammable gases <del>and flammable</del> chemicals under pressure (UN 3501, 3504, <del>and</del> 3505 and 1041). T75 applies to refrigerated liquified gases. These are evaluated on a case by case basis.

## Annex

### Data sheet to be submitted to the United Nations for new or amended classification of substances

Submitted by Germany

Date 09.02.2023

Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions - If necessary, state "not known" or "not applicable" - If data is not available in the form requested, provide what is available with details. Delete inappropriate words.

#### Section 1. SUBSTANCE IDENTITY

- 1.1 Chemical name: Ethylene oxide
- 1.2 Chemical formula: C<sub>2</sub>H<sub>4</sub>O
- 1.3 Other names/synonyms: oxirane
- 1.4.1 UN number: UN 1040 / UN 1041 / UN 3300
  - 1.4.2 CAS number: 75-21-8
- 1.5 Proposed classification for the Recommendations:  
CLASS 2.3 (2.1, 8) / CLASS 2.1(8) / CLASS 2.3 (2.1, 8)
- 1.5.1 proper shipping name (3.1.2<sup>1</sup>)  
*ETHYLENE OXIDE or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1 MPa (10 bar) at 50 °C*  
*ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 9 % but not more than 87 % ethylene oxide*  
*ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 87 % ethylene oxide*
- 1.5.2 UN 1040: class/division 2.3 subsidiary hazard(s): 2.1, 8  
 UN 1041: class/division 2.1 subsidiary hazard(s): 8  
 UN 3300: class/division 2.3 subsidiary hazard(s): 2.1, 8
- 1.5.3 proposed special provisions, if any: 342 / none / none
  - Limited and excepted quantities: 0, E0
  - Special packing provisions: none
  - Portable tanks and bulk containers:
    - Instructions: none
    - Special provisions: none
- 1.5.4 proposed packing instruction(s): P200

#### Section 2. PHYSICAL PROPERTIES

- 2.1 Melting point or range -111-112 °C
- 2.2 Boiling point or range 10-12 °C
- 2.3 Relative density at:  
1.5 (air=1)
- 2.4 Vapour pressure at:  
20 °C 146 kPa
- 2.5 Viscosity at 20 °C<sup>2</sup> \_\_\_\_ m<sup>2</sup>/s
- 2.6 Solubility in water at 20 °C: miscible
- 2.7 Physical state at 20°C (2.2.1.1<sup>1</sup>) solid/liquid/gas<sup>2</sup>
- 2.8 Appearance at normal transport temperatures, including colour and odour: ether-like odor, colorless
- 2.9 Other relevant physical properties: soluble in benzene, acetone, ethanol, ether

#### Section 3. FLAMMABILITY

- 3.1 Flammable vapour
  - 3.1.1 Flash point (2.3.3<sup>1</sup>) -18 °C oc/cc  
Flash point (2.3.3<sup>1</sup>) -29 °C oc/cc
  - 3.1.2 Is combustion sustained? (2.3.1.3<sup>1</sup>) yes/no
- 3.2 Autoignition temperature 429 °C

- ## Section 4. CHEMICAL PROPERTIES

- If yes, state:

- If yes, state:

- If yes state:

- Is temperature control required? (2.5.3.4.1<sup>1</sup>)

- ## Section 5. HARMFUL BIOLOGICAL EFFECTS

- 5

## Section 6. SUPPLEMENTARY INFORMATION

6.1.1 Fire (include suitable and unsuitable extinguishing agents) \_\_\_\_\_

6.2 Is it proposed to transport the substance in:

6.2.2 Intermediate Bulk Containers (6.5<sup>1</sup>)? yes/no

If yes, give details in Sections 7, 8 and/or 9.

### 7.1 Proposed type(s)

### 8.1 Proposed type(s)

9.1 Description of proposed tank (including IMO tank type if known)

9.2 Minimum test pressure \_\_\_\_\_

9.3 Minimum shell thickness \_\_\_\_\_

9.4 Details of bottom openings, if any \_\_\_\_\_

### 9.5 Pressure relief arrangements \_\_\_\_\_

9.6 Degree of filling \_\_\_\_\_

### 9.7 Unsuitable construction materials \_\_\_\_\_

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 3 of the provisional agenda

**Listing, classification and packing****Transport of liquid organic hydrogen carrier - new special  
provision to UN 3082****Submitted by the expert from Germany\*****I. Introduction**

1. Hydrogen will play an important role in decarbonizing the energy systems. There are different options for transportation, one being the chemical binding of hydrogen molecules to chemical carriers. Rules for transporting hydrogen via different pathways will have to be adapted in the future.
2. Germany is convinced that the transport conditions when transporting liquid organic hydrogen carriers (LOHC) based on benzyltoluene (BT) could benefit from clarification. In addition, Germany is of the opinion that the interpretations and amendments proposed in this document lead to a higher level of protection for the transport of hydrogen when chemically bound to this carrier and result in more coherent measures. Currently, the *Model Regulations* do not properly define the levels of physically dissolved hydrogen for benzyltoluene as a hydrogen carrier. By introducing the requirements proposed below, Germany intends to increase safety when transporting hydrogen via this carrier.
3. This document was originally presented as a late informal document at the last session of Sub-Committee. Considering the positive feedback to this document, Germany decided to resubmit this proposal as a working document to provide the experts with more time for further review. In addition, Germany plans to promote the discussion by submitting a supporting informal document for the upcoming session of the Sub-Committee.

**II. Discussion**

4. Benzyltoluene (BT) can be used as a liquid organic hydrogen carrier (LOHC) when hydrogen is chemically bound to it. Benzyltoluene is classified in dangerous goods class 9 under UN 3082 (ENVIRONMENTALLY DANGEROUS SUBSTANCE, LIQUID, N.O.S. (Dibenzylbenzene, ar-methyl derivative)). The chemically bound hydrogen cannot be released

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\* A/77/6 (Sect. 20), table 20.6



under transport conditions. For the release of the chemically bound hydrogen, a catalytic system and suitable temperatures are necessary. In addition to the chemically bound hydrogen, traces of hydrogen are dissolved physically in the LOHC due to high partial pressures of the hydrogen during the reaction. The phenomenon of the dissolution of gases with high partial pressures up to an equilibrium concentration is well known from other liquids.

5. To gain better insight into safety-related effects of physically dissolved hydrogen for LOHC transport, the PTB (Physikalisch Technische Bundesanstalt) was commissioned as an external institution to conduct basic tests. These tests examined the formation of a potentially explosive atmospheres above the liquid phase of the hydrogenated and dehydrogenated material due to the release of physically dissolved hydrogen during transport. To simulate a worst-case transport scenario, the samples (sample vessels 90 % filled) were cooled down to -30 °C and subsequently heated up to 70 °C. Ignition experiments of the overlaying gas phase revealed that there is a small risk of the formation of an explosive atmosphere if there is no previous treatment of the physically dissolved hydrogen in LOHC.

6. A result of these tests is that it is necessary to define a suitable limit for physically dissolved hydrogen to minimize transport risks and to prevent harmful situations. There is currently no regulation which takes this transport problem into account. It is therefore necessary to define an additional, specific special provision to UN 3082.

7. An existing regulation that could analogously be used as the limit for the formation of flammable gases (which can evolve from substances in contact with water) is class 4.3, which is defined as 1 L(gas)/kg(substance) per hour. To increase safety, since this can only be used analogously, Germany proposes a lower limit of 0.5 L(H<sub>2</sub>)/kg(LOHC) (as an absolute limit instead of a degassing rate) for transport reasons.

8. This limit can be technically adhered to either via equilibration with overlying nitrogen or via a degassing process (proprietary or state of the art as vacuum degassing or stripping). The proof of this limit value can be achieved by a dissolved gas analysis (DGA), either via sampling of representative samples or via online analysis.

9. This document supports Sustainable Development Goal 13 – Climate Action of the UN Agenda 2030 by promoting the safe transport of alternative low-carbon fuels.

### III. Proposal

10. Amend the Dangerous Goods List in chapter 3.2 as follows (new text is underlined):

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instructions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S	9		III	274 331 335 375 <u>XXX</u>	5 L	E1	P001 IBC03 LP01	PP1	T4	TP1 TP29

11. Amend chapter 3.3 by introducing the following special provision XXX:

“XXX Liquid organic hydrogen carriers (LOHC) based on benzyltoluene with physically dissolved hydrogen can be transported under this entry when the limit of physically dissolved hydrogen of 0.5 L (H<sub>2</sub>)/kg (LOHC) is not exceeded.”



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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 6 (c) of the provisional agenda

**Miscellaneous proposals for amendments to the Model Regulations  
on the Transport of Dangerous Goods:****Portable tanks****Modification of the definitions of "FRP tank" and "FRP  
shell" in 6.9.2.1 of the Model Regulations****Transmitted by the expert from Poland\*****I. Introduction**

1. During the sixty-second session of the Sub-Committee of Experts on the Transport of Dangerous Goods, which took place in Geneva in July 2023, the following documents were considered:

(a) ST/SG/AC.10/C.3/2023/20 - Modification of the definitions of "FRP tank" and "FRP shell" in 6.9.2.1 of the Model Regulations (submitted by Poland) and

(b) UN/SCETDG/62/INF.43 - Comments of the informal working group on fiber reinforced plastics (FRP) service equipment for portable tanks on document ST/SG/AC.10/C.3/2023/20 (submitted by the informal working group),

relating to the definition of an FRP tank and the definition of an FRP shell in Chapter 6.9 of the Model Regulations.

2. In Annex I (Draft amendments to the twenty-third revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC.10/1/Rev.23)) to document ST/SG/AC.10/AC.3/124/Add.1 (Report of the Sub-Committee of Experts on the Transport of Dangerous Goods on its sixty-second session), in the entry for Chapter 6.9, the version given in the informal document INF.43 was tentatively adopted.

3. Due to the doubts of some experts, draft amendments to the twenty-third revised edition of the Recommendations on the Carriage of Dangerous Goods, the *Model Regulations*, have been enclosed in square brackets for further consideration at the next session.

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\* A/77/6 (Sect. 20), table 20.6



4. Poland has undertaken to present a new document which will take into account the proposals contained in the above-mentioned documents and the comments of the delegates presented during the session.
5. In addition, Poland proposes to introduce in chapter 6.9 a correction of terms related to the change in the definition of an FRP shell and an FRP portable tank.
6. Poland proposes the following solutions.

## II. Proposals

### 1. Proposal 1

7. In 6.9.2.1, in the definition of FRP shell, in the first sentence, Poland proposes to replace the conjunction "or" with the conjunction "and".
8. The revised definition of the *FRP shell* will be as follows (changes from text adopted in previous session in **underlined bold**):

“*FRP shell* means the part of the portable tank constructed from FRP, which retains the substance intended for transport (tank proper), including openings and their closures, but does not include service equipment **and** external structural equipment. Openings and their closures may be manufactured from metallic materials or FRP;”

#### Justification

9. If we use the conjunction “or” it means that three cases are allowed:
  - (a) FRP shell does not include service equipment but includes external structural equipment,
  - (b) FRP shell includes service equipment but does not include external structural equipment,
  - (c) FRP shell includes neither service equipment nor structural equipment.
10. Poland considers that only the third case should occur as neither service equipment nor structural equipment should be considered as a component of an FRP shell (as well as other shell of tank).
11. Therefore, in our opinion, the correction consisting in replacing the conjunction “or” with the conjunction “and” in the definition of FRP shell is correct and should be introduced.

### 2. Proposal 2

12. Poland proposes to extend the definition of FRP portable tanks in 6.9.2.1 as follows (changes from text adopted in previous session in **underlined bold** or ~~strikethrough~~):

“*FRP portable tank* means a portable tank, **as defined in 6.7.2.1, equipped constructed with an FRP shell, intended for the carriage of dangerous goods of Classes or Divisions 1, 3, 5.1, 6.1, 6.2, 8 and 9;**”

#### Justification

13. The proposed definition of an FRP portable tank corresponds to the assumptions adopted in 6.9.1 (Application and general requirements) of the *Model Regulations*. In accordance with the provisions of 6.9.1.1, the requirements of 6.9.2 apply to portable tanks with FRP shells intended for the carriage of dangerous goods in the scope limited to Classes or Divisions 1, 3, 5.1, 6.1, 6.2, 8 and 9.
14. Thus, the proposed definition of an FRP portable tank reflects the assumptions made for FRP portable tanks in 6.9.1 of the *Model Regulations*.

### **3. Proposal 3**

15. Leave unchanged (remove the square brackets):

6.9.2.2.3.14.1 Replace “FRP tanks” with “FRP portable tanks”.

### **4. Proposal 4**

16. Poland proposes to replace the existing amendment:

[6.9.2.8.1 In the first sentence, replace “FRP tanks” by “FRP portable tanks”.]

by the following:

6.9.2.8.1 In the first sentence, replace “portable FRP tanks” by “FRP portable tanks”.

and to remove square brackets.

### **5. Proposal 5**

17. Leave the existing amendment unchanged:

6.9.2.2.3.16.2 In the first sentence, replace “weight” by “mass”.

### **6. Proposal 6**

18. Poland proposes to add a new amendment:

6.9.2.5 In the first sentence, replace “FRP tanks” by “FRP portable tanks”.

### **7. Proposal 7**

19. We propose to add a new amendment:

6.9.2.6.4 Replace “tank” with “FRP portable tank”.

### **8. Proposal 8**

20. We propose to add a new amendment:

6.9.2.7.1.5.1 Replace “tank” with “FRP shell”.

### **9. Proposal 9**

21. We propose to add a new amendment:

6.9.2.8.3 Replace “tank” with “FRP portable tank”.

### **10. Proposal 10**

22. We propose to add a new amendment:

6.9.2.8.4 Replace “shell” with “FRP shell” (twice).

### **11. Proposal 11**

23. We propose to add a new amendment:

6.9.2.9 Replace “shell” by “FRP shell” (twice) and “tank” by “FRP portable tank”

## **12. Proposal 12**

24. Poland proposes to add a new amendment:

6.9.2.10.2 Replace “Shell” with “FRP shell”.

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 3 of the provisional agenda

**Listing, classification and packing****Classification of UN 1727 AMMONIUM  
HYDROGENDIFLUORIDE, SOLID****Transmitted by the expert from Sweden\*****I. Introduction**

1. UN 1727 AMMONIUM HYDROGENDIFLUORIDE, SOLID, also known as ammonium bifluoride, (CAS number 1341-49-7) is a chemical compound used as a sterilizer, in electroplating, and in the ceramic and glass industries. It is also used as a cleaning product, in the treatment of metallic and non-metallic surfaces and as a chemical intermediate in the production of hydrofluoric acid.
2. According to the *Model Regulations*, UN 1727 is a corrosive substance in Class 8, assigned to packing group II without any secondary hazards. However, after an incident during loading, it was revealed that ammonium hydrogendifluoride also seems to meet the criteria for oral toxicity in Division 6.1. For safety reasons, this hazard should then be made visible during transport.
3. In the material safety data sheet (MSDS) linked to the substance involved in the incident, the LD<sub>50</sub> value of 130 mg/kg for oral toxicity was stated. This value is also stated under the toxicological information (endpoint summary for acute toxicity) in the European Chemicals Agency (ECHA) registration dossier<sup>1</sup> for ammonium hydrogendifluoride.
4. If the toxicity data would be applied in accordance with 2.6.2.2.4.1 of the *Model Regulations*, this substance would meet the criteria for oral toxicity in packing group III (for packing group III, the limits for oral toxicity are  $50 < LD_{50} \leq 300$  mg/kg). Consequently, it seems appropriate to also classify this substance in Division 6.1 in addition to Class 8.
5. Under ANNEX VI Harmonised classification and labelling for certain hazardous substances in the Regulation (EC) No. 1272/2008 on classification, labelling and packaging (CLP)<sup>2</sup> (derived from the classification system in GHS), ammonium hydrogendifluoride is

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\* A/77/6 (Sect. 20), table 20.6

<sup>1</sup> <https://echa.europa.eu/nl/registration-dossier/-/registered-dossier/14195>.

<sup>2</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008R1272&qid=1692953836996>.



classified as Skin Corr. 1B (H314) and Acute Tox 3 oral (H301), again indicating its toxic properties. Further information about the substance may be found in the ECHA database<sup>3</sup>.

6. Also, table A1.18 of annex 1<sup>4</sup> of the *GHS* indicates that substances that are in Acute toxicity 3 oral (H301) would require a Division 6.1 label during transport. As such, providing yet another signal that UN 1727 has toxic properties that would meet the Division 6.1 criteria according to the *Model Regulations*.

7. When applying the precedence of hazard criteria given in 2.0.3.3 for a substance that meets the criteria for Class 8, PG II and Division 6.1, PG III, it follows that Class 8, PG II should remain as the primary hazard and that Division 6.1 should be assigned as a subsidiary hazard.

8. There are currently only two existing entries for solid substances classified in Class 8 with a Division 6.1 subsidiary hazard. These are UN 1811 and UN 2923, and when comparing their transport conditions with UN 1727, it seems no change in the transport conditions would be necessary for UN 1727 in the *Model Regulations* except for an additional Division 6.1 label. This is also confirmed by the guidelines in the *Guiding Principles*.

## II. Proposals

9. Amend in the Dangerous Goods List the entry for UN 1727, as follows (new text in bold and underlined):

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instructions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
1727	AMMONIUM HYDROGENDIFLUORIDE, SOLID	8	<b><u>6.1</u></b>	II	<b><u>SP</u></b> <b><u>XXX</u></b>	1 kg	E2	P002 IBC08	B2, B4	T3	TP33

10. Since an additional label will be required for UN 1727, it seems reasonable to foresee a transitional period. In line with what was decided for UN 1835 and UN 3423 in special provision 409 due to their changed classification (ST/SG/AC.10/C.3/122/Add.1)<sup>5</sup>, add a new special provision with transitional measures in Chapter 3.3:

“XXX The provisions of Chapter 3.2 from the twenty-third revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied until [31 December 2028].”

## III. Sustainable development goals

11. This document contributes to Sustainable Development Goal 12 “Ensure sustainable consumption and production patterns” and more specifically its target 12.4 “Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.”.

<sup>3</sup> <https://echa.europa.eu/sv/information-on-chemicals/cl-inventory-database/-/discli/details/35243>.

<sup>4</sup> <https://unece.org/sites/default/files/2023-07/GHS%20Rev10e.pdf>.

<sup>5</sup> ST/SG/AC.10/C.3/122/Add.1.





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

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

#### Sixty-third session

Geneva, 27 November-6 December 2023

Item 4 (e) of the provisional agenda

Electric storage systems:

Sodium ion batteries

## Inclusion in 5.2.1.9.1 of a reference to special provision 400

### Transmitted by the expert from Spain\*

## I. Introduction

1. During the last biennium amendments were adopted to include sodium ion batteries into the *Model Regulations*. Inter alia, amendments to 5.2.1.9. were adopted, to include here a reference to the sodium ion batteries.
2. Nevertheless, it has been noted that a reference to special provision (SP) 400 should also be included into 5.2.1.9.1, just as there is a reference to SP 188, to ensure that in the cases prescribed in SP 400 for sodium ion batteries, the corresponding mark is included.
3. During the last meeting of the Sub-Committee of Experts on the Transport of Dangerous Goods, when discussing informal document INF.24 from ICAO, opinions were divided on the benefits and drawbacks of including the battery mark on packages for the cases when SP 400 would be applicable and some delegates proposed to remove SP 400 (c) (see report ST/SG/AC.10/C.3/124, paragraphs 62-65).
4. If paragraph (c) of SP 400 would be deleted, the amendment proposed here would not be necessary. But until that discussion is concluded, it would be better to include the reference to SP 400 into 5.2.1.9.1, so that the *Model Regulations* would be complete and coherent.
5. Amendments relating to sodium ion batteries will enter the modal regulations in 2025; to be able to include also this consequential amendment into the modal regulations, it would be good to take a decision on this issue at the present session.

## II. Proposal

6. Include in 5.2.1.9.1 of the *Model Regulations* a reference to SP 400 to read as follows (new text **bold and underlined**; text based on the text of 5.2.1.9.1 as modified through informal document INF.13 at the sixty-second session of the Sub-Committee):

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\* A/77/6 (Sect. 20), table 20.6



“5.2.1.9.1 Packages containing lithium cells or batteries or sodium ion cells or batteries prepared in accordance with special provisions 188 **or 400** shall be marked as shown in figure 5.2.5.”

### **III. Justification**

7. Ensuring a more systematic approach and a better rationale in the *Model Regulations* helps to create clearer legal texts and to avoid different criteria among different countries and inspection services, and thus helps to implement target 16.6 of the 2030 Agenda for sustainable development (*Develop effective, accountable and transparent institutions at all levels*).

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November 2023-6 December 2023

Item 6 (d) of the provisional agenda

**Miscellaneous proposals for amendments to the Model Regulations  
on the Transport of Dangerous Goods:****Other miscellaneous proposals****Mass and weight****Transmitted by the expert from Spain\*****I. Introduction**

1. During the sixty-second session, document ST/SG/AC.10/C.3/2023/3 was adopted, in which the use of mass and weight for the *Model Regulations* was analysed. At the same session, informal document UN/SCETDG/62/INF.8 was presented, extending this analysis of the correct use of mass and weight to the *Manual of Tests and Criteria*. During the June session, an informal group worked on the proposals contained in informal document UN/SCETDG/62/INF.8, and the amendments agreed by this group have been included in this document.
2. The amendments proposed in informal document UN/SCETDG/62/INF.8 were based on the seventh revised edition of the Manual; an additional case has now been included (28.4.2.2.2.3), considering the eighth revised edition of the Manual.
3. Ensuring a more systematic approach, a better rationale and less differences between the different language versions of the *Manual of Test and Criteria* help creating clearer legal texts and avoiding different criteria in between different countries and inspection services, and therefore helps to implement SDG target 16.6 of the UN Agenda 2030 (*Develop effective, accountable and transparent institutions at all levels*).

**II. Analysis**

4. In several different cases, the use of the concepts of mass and weight is not completely accurate in one or more of the languages analysed (English, French and Spanish). The cases noted are analysed one by one. The proposed amendments for the different language versions analysed (English, French and Spanish) are all included into paragraphs 36 to 67 below.

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\* A/77/6 (Sect. 20), table 20.6



**A. 11.6.1.3.1**

5. A specific case has been spotted in 11.6.1.3.1 where the use of weight or mass in the French, English and Spanish versions would need to be reviewed. The English, French and Spanish versions of this paragraph are as follows:

11.6.1.3.1 "If, even with light tamping, it is impossible to get all the 5.0 g of sample in, then the charge is fired after filling the vessel to capacity. Note should be taken of the charge weight used."

11.6.1.3.1 "Si un léger tassement ne le permet pas, le tir doit s'effectuer avec un récipient rempli complètement. On doit alors enregistrer le poids de la charge."

11.6.1.3.1 "Si, incluso retacándola ligeramente, no resulta posible introducir la muestra en su totalidad, se activa la sustancia tras llenar el recipiente por completo (en tal supuesto, se anota el peso de la muestra utilizada)."

6. In this case, it seems more appropriate to use the concept of mass instead of weight, as reference is made to the unit g to measure the sample. The mass should be noted, not the weight. The proposed amendments can be found below (see paragraphs 36, 43 and 52 below for the different language versions).

**B. 12.6.1.3.1**

7. The same text as in 11.6.1.3.1 has also been included into 12.6.1.3.1. The English, French and Spanish versions of this paragraph are as follows:

12.6.1.3.1 "If, even with light tamping, it is impossible to get all the 5.0 g of sample in, then the charge is fired after filling the vessel to capacity. Note should be taken of the charge weight used."

12.6.1.3.1 "Si un léger tassement ne le permet pas, le tir doit s'effectuer avec un récipient rempli complètement. On doit alors enregistrer le poids de la charge."

12.6.1.3.1 "Si, incluso retacándola ligeramente, no resulta posible introducir la muestra en su totalidad, se activa la sustancia tras llenar el recipiente por completo (en tal supuesto, se anota el peso de la muestra utilizada)."

8. The same considerations as for the previous paragraph can be done, and the proposed amendments can be found below (see paragraphs 37, 44 and 53 below).

**C. 13.4.1.3.1**

9. In 13.4.1.3.1 the use of weight or mass in the French, English and Spanish versions would need to be reviewed. The English, French and Spanish versions of this paragraph are as follows:

13.4.1.3.1 "A 10 mg sample is loaded onto the die (C). ..."

13.4.1.3.1 "On dépose sur le galet intermédiaire (C) un échantillon de 10 mg de matière. ..."

13.4.1.3.1 "Se pone en el tope (C) una muestra de 10 mg de peso. ..."

10. In this case, if reference should be made to weight or mass, it should be made to mass, as the unit referenced is mg. This way, the Spanish language version should be corrected exchanging "peso" (weight) by "masa" (mass); but to completely harmonize the text with the English version it is suggested to delete "de peso" completely, without including additional text. In addition, in the French language version the additional words "de matière" could also be deleted, to fully harmonize the language versions, as was agreed by the informal working group meeting during the Sixty-second session. These amendments can be found in paragraphs 45 and 54 below.

**D. 13.4.2.2.2**

11. In 13.4.2.2.2 the use of weight or mass in the French, English and Spanish version would need to be reviewed. The English, French and Spanish versions of this paragraph are as follows:

13.4.2.2.2 "...Three drop weights are available with the following masses, 1,00 kg, 5,00 kg and 10,00 kg...."

13.4.2.2.2 "Il existe trois masses de chute, pesant respectivement 1 kg, 5 kg et 10 kg. ..."

13.4.2.2.2 "...Se dispone de tres mazas de distinto peso: 1 kg, 5 kg y 10 kg. ..."

12. In this case, it is correct to use the concept of mass, as has been done in the English version. The reference to weight in the Spanish version has to be amended (see paragraph 50 below). The French language version, even if correct, could be also amended to have a more similar wording, as was agreed by the informal meeting during the sixty-second session (see paragraph 46 below). Also, both the Spanish and French versions should include the double zeros after the comma for all the mass indications.

**E. 13.4.2.3.3**

13. In 13.4.2.3.3 the English, French and Spanish versions of this paragraph are as follows:

13.4.2.3.3 "...The impact energy used is calculated from the mass of the drop weight and the fall height (e.g.  $1 \text{ kg} \times 0.5 \text{ m} \sim 5 \text{ J}$ ). ..."

13.4.2.3.3 "...Pour calculer l'énergie d'impact, on multiplie la masse de l'élément de chute par la hauteur de chute (exemple :  $1 \text{ kg} \times 0.5 \text{ m} \sim 5 \text{ J}$ ). ..."

13.4.2.3.3 "...La energía de choque aplicada se calcula a partir del peso de la maza y de la altura de caída (por ejemplo,  $1 \text{ kg} \times 0.5 \text{ m} \sim 5 \text{ J}$ ). ..."

14. In this case, it is correct to use the concept of mass, as has been done in the English and French versions. The proposed amendment for the Spanish language version can be found below (see paragraph 56 below).

**F. 13.4.3.2.2**

15. In 13.4.3.2.2 the English, French and Spanish versions of this paragraph are as follows:

13.4.3.2.2 "...A 2 kg weight is employed. ..."

13.4.3.2.2 "...La masse de chute est de 2 kg. ..."

13.4.3.2.2 "...El peso de la maza es de 2 kg. ..."

16. The use of the concept of weight in the Spanish language version is not correct, mass should be used in correspondence with the employed units (kg). The proposed amendment can be found below (see paragraph 57 below).

**G. 21.4.1.2**

17. In 21.4.1.2 the English, French and Spanish versions of this paragraph are as follows:

21.4.1.2 "...The booster consists of a cylindrical pellet of 50 g RDX/wax (95/5) compressed..."

21.4.1.2 "...Le relais est constitué par une charge cylindrique de 50 g d'hexocire (95/5) "

21.4.1.2 "...La carga multiplicadora consiste en una galleta de forma cilíndrica de 50 g de peso, compuesta deciclonita/cera (95/5)..."

18. In this case, as the previous one, in the Spanish language version it is incorrect to make a reference to weight, mass should be used in correspondence with the used unit (g).

Nevertheless, it seems more appropriate to use the similar writing as in the French and English versions, and do not refer nor to mass nor to weight, as this is not really needed. The proposed amendment can be found below (see paragraph 58 below).

## **H. 22.3.1**

19. In 22.3.1 the English, French and Spanish versions of this paragraph are as follows:

22.3.1 "The test from series B should be applied to substances in packages (not larger than 50 kg) in the condition and form in which they are offered for classification."

22.3.1 "L'épreuve de la série B s'applique aux matières en colis (d'une contenance ne dépassant pas 50 kg) dans l'état et la forme dans lesquels elles ont été préparées pour la classification."

22.3.1 "La prueba de la serie B debe aplicarse a las sustancias contenidas en los bultos (cuyo peso no exceda de 50 kg) en el estado y en la forma en que se presenten para la clasificación."

20. In this case, as the previous one, in the Spanish language version it is incorrect to make a reference to weight, mass should be used in correspondence with the used units (kg). Similarly, it seems more appropriate to use the similar writing as in the French and English versions, and do not refer nor to mass nor to weight, as this is not really needed. The proposed amendment can be found below (see paragraph 59 below).

## **I. 23.4.1.3.1**

21. In 23.4.1.3.1 the English, French and Spanish versions of this paragraph are as follows:

23.4.1.3.1 "If, even with light tamping, it is impossible to get all the 5.0 g of sample in, then the charge is fired after filling the vessel to capacity. Note should be taken of the charge weight used."

23.4.1.3.1 "Si même un léger tassement ne le permet pas, le tir doit s'effectuer avec un récipient rempli au maximum de sa contenance. On doit alors enregistrer le poids de la charge."

23.4.1.3.1 "Si, incluso retocándola ligeramente, no resulta posible introducir la muestra en su totalidad, se activa la sustancia tras llenar el recipiente por completo (en tal supuesto, se anota el peso de la muestra utilizada)."

22. In this case the text is the same as in 11.6.1.3.1 and 12.6.1.3.1 analysed above. The same considerations as for those paragraphs can be done, and the proposed amendments can be found below (see paragraphs 38, 47 and 60 below). Additionally, The French version of 23.4.1.3.1 is slightly different than the text used in 11.6.1.3.1 and 12.6.1.3.1, while the texts in Spanish and English are exactly the same. A small editorial error in the Spanish version has to be corrected (see paragraph 60 below), this should additionally be corrected (see paragraph 47 below).

## **J. 26.4.1.2.1**

23. In 26.4.1.2.1 the English, French and Spanish versions of this paragraph are as follows:

26.4.1.2.1 "...The total weight is approximately 113.2 kg and the suspension length is 2,080 mm. ..."

26.4.1.2.1 "...La masse de l'ensemble est d'environ 113,2 kg et la longueur de suspension de 2 080 mm. ..."

26.4.1.2.1 "...El peso total es de aproximadamente 113,2 kg y la longitud de suspensión de 2.080 mm. ..."

24. In this case, it is more appropriate to use the concept of mass, as has been done in the French version, as the corresponding units that have been used are kg. The proposed amendments to the English and Spanish language versions can be found below (see paragraphs 39 and 61 below).

#### **K. 28.4.2.2.2.3**

25. In 28.4.2.2.2.3 the English, French and Spanish versions of this paragraph are as follows:

28.4.2.2.2.3 "The closed version of the test is preferred for substances with a high vapour pressure at the test temperature to prevent mass loss due to evaporation or for substances that decompose with severe pressure rises (which in case of an open version of the test would throw off the insulated lid or eject the sample from the test cell). The weight of the sample should be determined after the measurement to detect mass loss during the test. Leakage from the system and the resulting evaporation cooling can result in a significant loss of sensitivity in the test and a large margin of error in the results. The suitability of a test run in the open version can be evaluated by determining the mass loss of the sample after the test. "

28.4.2.2.2.3 "L'épreuve en circuit fermé est préférée pour les matières ayant une pression de vapeur élevée à la température d'épreuve afin d'éviter la perte de masse due à l'évaporation ou pour les matières dont la décomposition s'accompagne de fortes augmentations de pression (ce qui, dans le cas d'une épreuve en circuit ouvert, provoquerait l'arrachage du couvercle thermique isolé ou l'expulsion de l'échantillon de la chambre d'épreuves). Le poids de l'échantillon doit être déterminé après la mesure pour détecter la perte de masse pendant l'épreuve. Toute fuite du système et le refroidissement par évaporation qui en résulte peut entraîner une perte importante de sensibilité pendant l'épreuve et introduire une marge d'erreur élevée dans les résultats. On peut déterminer l'intérêt qu'il y a à effectuer une épreuve en circuit ouvert en déterminant la perte de masse de l'échantillon après l'épreuve. "

28.4.2.2.2.3 "La versión cerrada de la prueba es preferible para las sustancias con una alta presión de vapor a la temperatura del ensayo para evitar la pérdida de masa por evaporación, o para las sustancias que se descomponen con fuertes aumentos de presión (que en el caso de una versión abierta de la prueba podrían levantar la tapa aislada o expulsar la muestra de la celda de ensayo). Debe determinarse el peso de la muestra después de la medición para detectar la pérdida de masa durante la prueba. Las fugas del sistema y el consiguiente enfriamiento por evaporación pueden provocar una importante pérdida de sensibilidad de la prueba y dar lugar a un gran margen de error en los resultados. La idoneidad de una prueba realizada en la versión abierta puede evaluarse determinando la pérdida de masa de la muestra después del ensayo. "

26. In this case (second sentence), it is more appropriate to use the concept of mass instead of weight, as indeed has been done during the rest of the paragraph (see paragraphs 40, 48 and 62 below for the different language versions).

#### **L. 37.4.3**

27. In 37.4.3 the English, French and Spanish versions of this paragraph are as follows:

37.4.3 "...In those cases an unexposed reference specimen needs to be treated in the same manner (time, temperature, concentration, surface preparation) to determine the mass loss caused by the pickling solution. This value needs to be subtracted before evaluating the corrosion rate. After final cleaning with alcohol and acetone in an ultrasound bath, and once dry, the metal samples shall be weighed. The resulting mass under consideration of the specific mass of the metal leads to the corrosion rate."

37.4.3 "...Dans ces cas, un échantillon témoin non exposé devrait être traité de la même manière (en durée, température, concentration et préparation de surface) pour permettre de déterminer la perte de masse causée par le décapage. Cette valeur devrait être déduite avant l'évaluation de l'effet de corrosion. Après nettoyage final à l'alcool et à l'acétone dans un bain à ultrasons suivi d'un séchage, les échantillons métalliques doivent être pesés. La masse

alors obtenue permet d'établir, après prise en compte de la masse spécifique du métal, le taux de corrosion."

37.4.1.3 "... En esos casos, habría que tratar de la misma manera una muestra testigo (en duración, temperatura, concentración y preparación de la superficie) para poder determinar la pérdida de peso causada por la desoxidación. Este valor habría que deducirlo antes de la evaluación del efecto de corrosión. Después de una limpieza final con alcohol y acetona en un baño de ultrasonidos, seguido de un secado, hay que pesar las muestras metálicas. El peso entonces obtenido, después de tomar en cuenta el peso específico del metal, da la tasa de corrosión."

28. In this case, the concept of mass has to be used, as has been done in the English and French versions. The proposed amendment to the Spanish version can be found below (see paragraph 63 below).

#### M. 37.4.4.1

29. In 37.4.4.1 the English, French and Spanish versions of this paragraph are as follows:

37.4.4.1 "In case of uniform corrosion attack the mass loss of the most corroded sample shall be used. The test is considered positive if for any specimen the mass loss on the metal specimen is more than the amount stated in the following table:

**TABLE- 37.4.4.1:** Minimum mass loss of specimens after different exposure times

Exposure time (days)      Mass loss (%)..."

37.4.4.1 "Dans le cas de la corrosion uniforme, on détermine la perte de masse de l'échantillon le plus corrodé. L'épreuve est considérée comme réussie si pour chaque éprouvette la perte de masse enregistrée sur l'éprouvette en métal est supérieure à la valeur indiquée dans le tableau ci-après.

**TABLEAU :** Perte de masse minimale des échantillons après différentes durées d'exposition

Durée d'exposition (jours)      Perte de masse (%) ..."

37.4.4.1 "En el caso de la corrosión uniforme, se determina la pérdida de peso de la muestra más fuertemente atacada. Se considera que el resultado de la prueba es positivo y que la sustancia no es corrosiva si la pérdida de peso con una probeta de metal es superior al valor indicado en el cuadro que figura a continuación.

**Cuadro 37.4.4.1:** Pérdida de peso mínima de las muestras tras diferentes tiempos de exposición

Tiempo de exposición      Pérdida de peso ..."

30. For the Spanish language version, it is more appropriate to use the concept of mass, as has been done in the English and French versions. Additionally, the missing units have to be included into the heading of table 37.4.4.1. The proposed amendment to the Spanish language version can be found below (see paragraph 64 below).

#### N. A7.2.2

31. In A7.2.2. the English, French and Spanish versions of this paragraph are as follows:

A7.2.2 "...d) A mild steel confinement sleeve (weighing approximately 3 kg) having an outside diameter of 63 mm and a minimum length..."

A7.2.2 "...Un manchon de confinement en acier doux (pesant environ 3 kg) d'un diamètre extérieur de 63 mm et d'une longueur minimale de..."

A7.2.2. "...Una funda de contención de acero dulce (de unos 3 kg de peso) con un diámetro exterior de 63 mm y una longitud mínima de..."

32. In this case, in the Spanish language version the reference to weight has been used (which is not correct, as the concept corresponding to kg is mass), while the English and



French versions have used the verbs weighing/pesant, which are used both for mass and weight. For more clarity, and as agreed in the informal meeting during the sixty-second session, the concept mass could be used in all language versions (see proposals 41, 49 and 65 below).

33. Additionally, we would suggest numbering the indents of the Spanish and French language versions from a) to f) as has been done for the English version, as this clarifies the text (see paragraphs 50 and 66 below).

#### O. A10.3.2.2.1

34. In the appendix the English, French and Spanish versions of paragraph A10.3.2.2.1 are as follows:

A10.3.2.2.1 "A sample of dry nitrocellulose weighing  $2.50 \pm 0.01$  g. ..."

A10.3.2.2.1 "Un échantillon de nitrocellulose sèche de  $2,50 \pm 0,01$  g. ..."

A10.3.2.2.1 "Muestra de nitrocelulosa seca de un peso de  $2,50$  g  $\pm$   $0,01$  g. ..."

35. In this case, as in the previous one, in the Spanish language version the reference to weight has been used (which is not correct, as the concept corresponding to kg is mass), while in the English language version the verb "weighing" has been used, which is used for both mass and weight, and while in the French language version no additional wording is included. Similarly to the previous case, in the informal meeting held during the sixty-second session it was decided to use the expression "with a mass of" for all cases, for more clarity (see paragraphs 42, 51 and 67 below).

### III. Proposals

#### A. Proposals for the English language version

36. Amend 11.6.1.3.1 (deleted text is shown ~~stricken through~~, new text in **bold**):

"If, even with light tamping, it is impossible to get all the 5.0 g of sample in, then the charge is fired after filling the vessel to capacity. Note should be taken of the charge ~~weight~~ **mass** used."

37. Amend 12.6.1.3.1 (deleted text is shown ~~stricken through~~, new text in **bold**):

"If, even with light tamping, it is impossible to get all the 5.0 g of sample in, then the charge is fired after filling the vessel to capacity. Note should be taken of the charge ~~weight~~ **mass** used."

38. Amend 23.4.1.3.1 (deleted text is shown ~~stricken through~~, new text in **bold**):

"If, even with light tamping, it is impossible to get all the 5.0 g of sample in, then the charge is fired after filling the vessel to capacity. Note should be taken of the charge ~~weight~~ **mass** used."

39. Amend 26.4.1.2.1 (deleted text is shown ~~stricken through~~, new text in **bold**):

6.4.1.2.1 "2...The total ~~weight~~ **mass** is approximately 113.2 kg and the suspension length is 2,080 mm. ..."

40. Amend 28.4.2.2.2.3 to read as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

28.4.2.2.2.3 "...The ~~weight~~ **mass** of the sample should be determined after the measurement to detect mass loss during the test. ..."

41. Amend A7.2.2 as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

A7.2.2 "...d) A mild steel confinement sleeve (~~weighing with a mass of~~ **weighing with a mass of** approximately 3 kg) having an outside diameter of 63 mm and a minimum length..."

42. Amend A10.3.2.2.1 to read as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

A10.3.2.2.1 "...A sample of dry nitrocellulose ~~weighing~~ **with a mass of**  $2.50 \pm 0.01$  g. ..."

## B. Proposals for the French language version

43. Amend 11.6.1.3.1 as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

11.6.1.3.1 "Si un léger tassement ne le permet pas, le tir doit s'effectuer avec un récipient rempli complètement. On doit alors enregistrer ~~le poids~~ **la masse** de la charge."

44. Amend 12.6.1.3.1 as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

12.6.1.3.1 "Si un léger tassement ne le permet pas, le tir doit s'effectuer avec un récipient rempli complètement. On doit alors enregistrer ~~le poids~~ **la masse** de la charge."

45. Amend 13.4.1.3.1 (deleted text is shown ~~stricken through~~,):

13.4.1.3.1 "On dépose sur le galet intermédiaire (C) un échantillon de 10 mg ~~de matière~~. ..."

46. Amend 13.4.2.2.2 to read as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

13.4.2.2.2 "Il existe trois masses de chute, ~~pesant~~ respectivement de 1,00 kg, 5,00 kg et 10,00 kg. ..."

47. Amend 23.4.1.3.1 (deleted text is shown ~~stricken through~~, new text in **bold**):

23.4.1.3.1 "Si ~~même~~ un léger tassement ne le permet pas, le tir doit s'effectuer avec un récipient rempli ~~au maximum de sa contenance~~ **complètement**. On doit alors enregistrer ~~le poids~~ **la masse** de la charge."

48. Amend 28.4.2.2.2.3 to read as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

28.4.2.2.2.3 « ... ~~Le poids~~ **La masse** de l'échantillon doit être déterminée après la mesure pour détecter la perte de masse pendant l'épreuve. .... »

49. Amend A7.2.2 to read as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

A7.2.2 "...Un manchon de confinement en acier doux (~~pesant~~ **d'une masse d'**environ 3 kg) d'un diamètre extérieur de 63 mm et d'une longueur minimale de..."

50. Amend A7.2.2 by numbering the indents of the French language version from a) to f) as has already been done for the English version.

51. Amend A10.3.2.2.1 to read as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

A10.3.2.2.1 "Un échantillon de nitrocellulose sèche **d'une masse** de  $2,50 \pm 0,01$  g. ..."

## C. Proposals for the Spanish language version

52. Amend 11.6.1.3.1 (deleted text is shown ~~stricken through~~, new text in **bold**):

11.6.1.3.1 "Si, incluso retacándola ligeramente, no resultapossible introducir la muestra en su totalidad, se activa la sustancia tras llenar el recipiente por completo (en tal supuesto, se anota ~~el peso~~ **la masa** de la muestra utilizada)."

53. Amend 12.6.1.3.1 (deleted text is shown ~~stricken through~~, new text in **bold**):

12.6.1.3.1 "Si, incluso retacándola ligeramente, no resultapossible introducir la muestra en su totalidad, se activa la sustancia tras llenar el recipiente por completo (en tal supuesto, se anota ~~el peso~~ **la masa** de la muestra utilizada)."

54. Amend 13.4.1.3.1 (deleted text is shown ~~stricken through~~):

"Se pone en el tope (C) una muestra de 10 mg ~~de peso~~. ..."

55. Amend 13.4.2.2.2 (deleted text is shown ~~stricken through~~, new text in **bold**):

13.4.2.2.2 "...Se dispone de tres mazas de **distinta masa de distinto peso**: 1,00 kg, 5,00 kg y 10,00 kg. ..."

56. Amend 13.4.2.3.3 (deleted text is shown ~~stricken through~~, new text in **bold**):

13.4.2.3.3 "...La energía de choque aplicada se calcula a partir ~~del peso de la masa~~ de la maza y de la altura de caída (por ejemplo,  $1\text{ kg} \times 0.5\text{ m} \sim 5\text{ J}$ ). ..."

57. Amend 13.4.3.2.2 (deleted text is shown ~~stricken through~~, new text in **bold**):

13.4.3.2.2 "...~~El peso~~ **La masa** de la maza es de 2 kg. ..."

58. Amend 21.4.1.2 (deleted text is shown ~~stricken through~~, new text in **bold**):

21.4.1.2 "...La carga multiplicadora consiste en una galleta de forma cilíndrica de 50 g ~~de peso~~ compuesta de ciclonita/cera (95/5)..."

59. Amend 22.3.1 (deleted text is shown ~~stricken through~~, new text in **bold**):

22.3.1 "La prueba de la serie B debe aplicarse a las sustancias contenidas en los bultos (~~cuyo peso no exceda de~~ **no excediendo** 50 kg) en el estado y en la forma en que se presenten para la clasificación."

60. Amend 23.4.1.3.1 (deleted text is shown ~~stricken through~~, new text in **bold**):

23.4.1.3.1 "Si, incluso ~~retroc~~acándola ligeramente, no resulta posible introducir la muestra en su totalidad, se activa la sustancia tras llenar el recipiente por completo (en tal supuesto, se anota ~~el peso la masa~~ de la muestra utilizada)."

61. Amend 26.4.1.2.1 (deleted text is shown ~~stricken through~~, new text in **bold**):

26.4.1.2.1 "...~~El peso~~ **La masa** total es de aproximadamente 113,2 kg y la longitud de suspensión de 2.080 mm. ..."

62. Amend 28.4.2.2.2.3 to read as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

28.4.2.2.2.3 "...Debe determinarse ~~el peso la masa~~ de la muestra después de la medición para detectar la pérdida de masa durante la prueba. ...."

63. Amend 37.4.1.3 (deleted text is shown ~~stricken through~~, new text in **bold**):

37.4.1.3 "... En esos casos, habría que tratar de la misma manera una muestra testigo (en duración, temperatura, concentración y preparación de la superficie) para poder determinar la pérdida de ~~peso masa~~ causada por la desoxidación. Este valor habría que deducirlo antes de la evaluación del efecto de corrosión. Después de una limpieza final con alcohol y acetona en un baño de ultrasonidos, seguido de un secado, hay que pesar las muestras metálicas. ~~El peso~~ **La masa** entonces obtenida, después de tomar en cuenta ~~el peso específico la masa específica~~ del metal, da la tasa de corrosión."

64. Amend 37.4.4.1 to read as follows (deleted text is shown ~~stricken through~~, new text in **bold**):

37.4.4.1 "En el caso de la corrosión uniforme, se determina la pérdida de ~~peso masa~~ de la muestra más fuertemente atacada. Se considera que el resultado de la prueba es positivo y que la sustancia no es corrosiva si la pérdida de ~~peso masa~~ con una probeta de metal es superior al valor indicado en el cuadro que figura a continuación.

Cuadro 37.4.4.1: Pérdida de ~~peso masa~~ mínima de las muestras tras diferentes tiempos de exposición

Tiempo de exposición (**días**)      Pérdida de ~~peso masa~~ (%) ..."

65. Amend A7.2.2 (deleted text is shown ~~stricken through~~, new text in **bold**):

A7.2.2. "...Una funda de contención de acero dulce (**con una masa** de unos 3 kg de peso) con un diámetro exterior de 63 mm y una longitud mínima de..."

66. Amend A7.2.2 by numbering the indents of the Spanish language version from a) to f) as has already been done for the English version.

67. Amend A10.3.2.2.1 (deleted text is shown stricken through,):

A10.3.2.2.1 "Muestra de nitrocelulosa seca ~~de un peso de~~ **con una masa de** 2,50 g  $\pm$  0,01 g.  
..."

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 6 (c) of the provisional agenda

**Miscellaneous proposals for amendments to the Model Regulations  
on the Transport of Dangerous Goods:****Portable tanks****Requirements for design, construction, inspection and testing  
of fibre reinforced plastic (FRP) service equipment for  
portable tanks****Transmitted by the expert from the Russian Federation on behalf of the  
informal working group on FRP service equipment\*****I. Introduction**

1. The informal working group on FRP service equipment for portable tanks met in conjunction with the sixty-second session of the Sub-Committee and discussed comments on document ST/SG/AC.10/C.3/2023/22 received during the July 2023 session as well as those received via correspondence and via teleconferences since April 2023. Summing up the comments, document ST/SG/AC.10/C.3/2023/22 was updated and improved during in-person meeting of the informal working group held on 3-5 July 2023. The updates were given in informal document UN/SCETDG/62/INF.42.
2. According to report of the Sub-Committee ST/SG/AC.10/C.3/124, paragraph 78, informal document UN/SCETDG/62/INF.42 was finally reviewed with national experts. Comments were received via correspondence.
3. Considering the comments received, sub-chapter 6.9.3 “Requirements for design, construction, inspection and testing of fibre reinforced plastic (FRP) service equipment for portable tanks”, amendments to 6.7.2.5.11, 6.9.1.5 and 6.9.2.5 of the *Model Regulations*, and section 42 “Fire resistance test of FRP service equipment for portable tanks” for the *Manual of Test and Criteria*, including amendments to section 40 have been updated (see annexes I to IV to this document).

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\* A/77/6 (Sect. 20), table 20.6



## **II. Actions requested**

4. The Sub-Committee is invited to adopt the proposed new sub-chapter 6.9.3 to the *Model Regulations* “Requirements for design, construction, inspection and testing of FRP service equipment for portable tanks” (annex I);
5. The Sub-Committee is invited to adopt the proposed new section 42 for the *Manual of Tests and Criteria* (annex II);
6. The Sub-Committee is invited to adopt the proposed amendments to the *Model Regulations* (annex III);
7. The Sub-Committee is invited to adopt the proposed amendments to the *Manual of Tests and Criteria* (annex IV).

## Annex I

### New section 6.9.3 for the *Model Regulations*

#### **6.9.3 Requirements for design, construction, inspection and testing of FRP service equipment for portables tanks**

##### **6.9.3.1 Definitions**

For the purposes of this section, the definitions in 6.7.2.1 and 6.9.2.1 apply except for definitions related to metal materials for the construction of the service equipment of portable tanks.

Additionally, the following definitions apply to FRP service equipment.

*FRP service equipment* means measuring instruments and filling, discharge, venting, safety devices, cleaning hatches and blind flanges made of FRP including parts fabricated from other materials, as gate and seal assemblies, metallic parts, e.g. springs, fixings, applicable to the both metallic and FPR shells of the portable tanks.

*Injection moulding* means a process of melting plastic pellets (thermosetting/thermoplastic polymers) and mixing with reinforcement agents like chopped glass fibres. Then, the mixture is metered into a mould with the help of high-pressure pumps or injection cylinders, which fills and solidifies to produce the final product.

*Compression moulding* means a process for producing composite parts in a wide range of volumes typically employing a matched metal tool in a heated (normally hydraulic) press to consolidate sheet materials or moulding compounds at relatively high pressures.

*Reinforced reaction injection moulding (RRIM)* means a process of mixing of two or more resins together in the mixing chamber to form a thermosetting polymer under high pressure. Reinforcement agents like glass fibres are added to the mixture. Then, the resin mixture is metered into a mould with the help of high-pressure pumps or injection cylinders.

*Coupon-sample* means an FRP sample fabricated and tested in accordance with national and/or international standards to determine design allowables.

*Inspection-sample* means a sample cut out from the FRP service equipment to establish the identity of the serial FRP device to the prototype.

*FRP constituents* means reinforcement fibres and/or particles, thermoset or thermoplastic polymer (matrix), adhesives, and additives.

##### **6.9.3.2 General design and construction requirements**

6.9.3.2.1 For the purposes of this section, the requirements of 6.7.2.2.11, 6.7.2.5.1 to 6.7.2.5.6, 6.7.2.5.10, 6.7.2.6.3, 6.7.2.8.2, 6.7.2.8.3, 6.7.2.9 and 6.7.2.12 to 6.7.2.15 shall be applied to FRP service equipment including metallic parts (springs, fixings, etc.). FRP service equipment shall be designed and constructed in accordance with the requirements of a pressure vessel code and national and international standards, applicable to FRP materials and recognized by the competent authority.

##### **6.9.3.2.2 Manufacturer's quality system**

6.9.3.2.2.1 FRP service equipment manufacturers shall have a documented quality system ensuring conformity of every item of the serial production of FRP service equipment to the approved prototype. The quality assurance program shall be submitted to the competent authority for approval. All manufacturer's suppliers of material and components for FRP service equipment shall have a documented quality system. The quality system shall be developed in compliance with the general principles of international and national quality standards.

6.9.3.2.2.2 The applicable provisions of 6.9.2.2.2 shall apply to FRP service equipment manufacturer's quality system.

#### 6.9.3.2.3 *FRP service equipment*

6.9.3.2.3.1 FRP service equipment shall have appropriate rigid joints to the portable tank shell. The connections shall cause no local stress concentrations exceeding the design allowables for all operating and test conditions.

6.9.3.2.3.2 FRP service equipment shall be made of suitable materials, capable of operating within a minimum design temperature range of -40 °C to +50 °C, unless temperature ranges are specified for specific more severe climatic or operating conditions (e.g. heating elements), by the competent authority of the country where the transport operation is being performed.

6.9.3.2.3.3 FRP service equipment shall be designed and manufactured to withstand a test pressure that is not less than 1.5 times MAWP. Stop valves, piping devices and pipefittings intended for filling or discharging shall be designed and manufactured to withstand a pressure that is not less than 4 times MAWP. Specific provisions are stated substances in the applicable portable tank instruction indicated in column 10 of the Dangerous Goods List and described in 4.2.5, or by the portable tank special provision indicated in column 11 of the Dangerous Goods List and described in 4.2.5.3.

6.9.3.2.3.4 FRP service equipment shall withstand vibration, service impacts, exposure to substance temperature and environmental effects.

6.9.3.2.3.5 Design calculations for FRP service equipment and its joints to the portable tank shell shall be performed by the finite element method or another method recognized by the competent authority.

6.9.3.2.3.6 FRP service equipment shall meet the same requirements as given in 6.9.2.2.3.14 for the carriage of substances with a flash point of not more than 60 °C.

#### 6.9.3.2.4 *Materials*

##### 6.9.3.2.4.1 *Resins*

The processing of the resin mixture shall be carried out in strict compliance with the recommendations of the supplier. This concerns mainly the use of hardeners, initiators and accelerators. The resins can be:

- (a) Unsaturated polyester resins;
- (b) Vinyl ester resins;
- (c) Epoxy resins;
- (d) Phenolic resins; or
- (e) Thermoplastic resins.

The heat distortion temperature (HDT) of the resin and FRP, determined in accordance with standard ISO 75-1:2020 shall be at least 20°C higher than the maximum service temperature of the tank, but shall in any case not be lower than 70°C.

##### 6.9.3.2.4.2 *Additives*

Additives necessary for the treatment of the resin, such as catalysts, accelerators, hardeners and thixotropic substances as well as materials used to improve the FRP service equipment, such as fillers, colours, pigments, etc. shall not cause weakening of the material, taking into account lifetime and temperature expectancy of the design.

##### 6.9.3.2.4.3 *Reinforcement fibres*

Reinforcement fibres shall be chopped or continuous fibres of several types.

6.9.3.2.4.4 FRP service equipment shall be manufactured by compression moulding, injection moulding, reinforced reaction injection moulding or hand lay-up. Other manufacturing technologies may be applied with the agreement of the competent authority.



### 6.9.3.3 *Design criteria*

6.9.3.3.1 FRP service equipment shall be of a design capable of being stress-analyzed mathematically or experimentally by resistance strain gauges, or by other methods approved by the competent authority.

6.9.3.3.2 FRP service equipment shall be designed and manufactured to withstand the test pressures specified in 6.9.3.2.3.3.

6.9.3.3.3 At the specified test pressure, the maximum tensile relative deformation measured in mm/mm in the FRP service equipment shall not result in the formation of microcracks, and therefore not be greater than the first measured point of elongation-based fracture or damage of the resin, measured during the tensile tests prescribed under 6.9.2.7.1.2 (c) and 6.9.3.4.1.1.

6.9.3.3.4 For the internal test pressure specified in 6.9.3.2.3.3, the failure criteria ( $FC$ ) shall not exceed the following value:

$$FC \leq \frac{1}{K}$$

where:

$$K = K_0 \times K_1 \times K_2 \times K_3 \times K_4 \times K_5$$

where:

$K$  shall have a minimum value of 4.

$K_0, K_1, K_2, K_3, K_4$  are given in 6.9.2.3.4.

$K_5$  is a factor related to the deterioration in the material properties due to effects of salt fog spray and ultraviolet exposure. It shall be determined by the formula:

$$K_5 = \frac{\sigma_n}{\sigma_{eff}},$$

where:

$\sigma_n$  is the nominal (under normal conditions) tensile strength of the FRP material and  $\sigma_{eff}$  is the tensile strength of the material after consecutive salt fog exposure in accordance with ISO 12944-2:2017, ISO 12944-6:2018, 168 hours at  $+(35 \pm 2)^\circ\text{C}$  and ultraviolet exposure in accordance with ISO 4892-2, 168 hours at  $+(23 \pm 2)^\circ\text{C}$ .

$\sigma_{eff}$  is the minimum of  $\sigma_{eff1}, \sigma_{eff2}, \dots, \sigma_{effk}$ , where 1, 2, ... k are identifiers of substances approved for transportation by the given portable tank. If a protective coating is used, the samples with the coating shall be fabricated and tested.

A design validation exercise using numerical analysis and a suitable composite failure criteria is to be undertaken to verify that the FRP service equipment are below the allowables. Suitable composite failure criteria include, but are not limited to strain invariant failure theory, maximum strain, or maximum stress. Other relations for the strength criteria are allowed upon agreement with the competent authority. The method, a proof of suitability for the chosen failure criteria with a list of relevant experiments for all parameters used in the chosen failure criteria, and results of this design validation exercise are to be submitted to the competent authority.

The parameters used in the chosen failure criteria are to be determined using the relevant experiments and the maximum strain in tension prescribed in 6.9.2.3.5, combined with factor of safety  $K$ . At least all experiments defined in 6.9.3.4.2 shall be performed.

6.9.3.3.5 Check calculations of the strength for FRP service equipment and its joints to the portable tank shell shall be performed by finite element method. Treatment of singularities shall be undertaken using an appropriate method according to the applicable pressure vessel code.

**6.9.3.4 Material testing****6.9.3.4.1 Resins**

Where neat resin specimens are used for the materials testing set out in 6.9.3.4.1.1 and 6.9.3.4.1.2, the resin shall be processed in the same manner as when it is used in a composite material, taking into account mix ratios, resin additives, post-cure, and any other parameters deemed relevant to cure.

6.9.3.4.1.1 Resin tensile elongation shall be tested according to ISO 527-2:2012.

6.9.3.4.1.2 Heat distortion temperature shall be tested according to ISO 75-1:2020.

**6.9.3.4.2 Coupon-samples**

Coupon-samples shall be manufactured by the same technology as the appropriate FRP service equipment.

6.9.3.4.2.1 Ultimate tensile strength and elongation shall be tested according to ISO 527-4:2021 or ISO 527-5:2021 according to reinforcing fibers and layups.

6.9.3.4.2.2 Determination of compressive properties shall be tested in the in-plane direction according to ISO 14126:1999 + Cor 1:2001.

6.9.3.4.2.3 Determination of the in-plane shear stress/strain response and shear modulus shall be tested according to ISO 20337:2018.

6.9.3.4.2.4 Mass density shall be tested according to ISO 1183-1:2019.

6.9.3.4.2.5 Mass content and composition of the reinforcement fibres shall be tested according to ISO 1172:1996 or ISO 14127:2008. The fibre mass content of the coupon-samples shall be between 90 % and 100 % of the minimum fibre mass content specified for the appropriate FRP service equipment and obtained from testing of the inspection-samples.

6.9.3.4.2.6 Heat distortion temperature shall be tested according to ISO 75-1:2020, ISO 75-2:2013, ISO 75-3:2004 according to reinforcing fibers and layups.

6.9.3.4.2.7 Hardness shall be tested according to ISO 868:2003.

6.9.3.4.2.8 Creep factor  $\alpha$  shall be measured according to procedure prescribed by 6.9.2.7.1.2 (e). The test samples shall be taken according to ISO 14125:1998.

6.9.3.4.2.9 Aging factor  $\beta$  shall be determined according to the procedure prescribed by 6.9.2.7.1.2 (f). The test samples shall be taken according to ISO 14125:1998. This testing may be undertaken on either pristine samples or on samples pre-subjected to salt fog spray exposure conditioning as outlined in 6.9.3.2.4.10.

6.9.3.4.2.10 Salt fog exposure test shall be determined in accordance with ISO 12944-2:2017, ISO 12944-6:2018, 168 hours at  $+(35 \pm 2)^\circ\text{C}$ .

6.9.3.4.2.11 Ultraviolet exposure test shall be determined in accordance with ISO 4892-2:2013, 168 hours at  $+(23 \pm 2)^\circ\text{C}$ .

6.9.3.4.2.12 The chemical compatibility with the transported substances shall be tested according to 6.9.2.7.1.3.

**6.9.3.4.3 Additional material tests**

The additional material tests shall be carried out for determination of material properties required for design calculation.

6.9.3.4.3.1 Flexural strength shall be measured according to ISO 14125:1998.

6.9.3.4.3.2 Bearing test shall be determined according to ISO 12815:2013.

**6.9.3.4.4 Inspection-samples**

Prior to testing all coatings shall be removed from the samples. The tests shall cover 6.9.3.4.2.1 to 6.9.3.4.2.8.

**6.9.3.5 Design approval**

6.9.3.5.1 The competent authority or its authorized body shall issue the type approval certificate for FRP service equipment. This certificate shall attest that the design has been surveyed by the authority and is suitable for its intended purpose and meets the requirements of this chapter. The certificate shall have a reference that prototype testing was carried out according to 6.9.3.5.2, the information on the substances allowed for transportation, body and seal materials and certificate number.

6.9.3.5.2 The FRP service equipment prototype test report shall include at least the following:

- (a) Results of the material tests used for fabrication of FRP service equipment in accordance with 6.9.3.4.1 to 6.9.3.4.3.
- (b) Results of tests according to ISO 4126-1:2013 for the appropriate relief devices.
- (c) Results of the pressure tests carried out in accordance with relevant ISO standards, where applicable, or according to procedure approved by the competent authority. The test pressure shall not be less than the pressure defined in 6.9.3.2.3.3.
- (d) A representative prototype of FRP service equipment shall be subjected to the fire test prescribed in the *Manual of Tests and Criteria*, part IV, section 42.
- (e) Results of the electrical resistance tests according to a procedure recognized by the competent authority.
- (f) Results of the other tests prescribed in applicable pressure equipment standards or codes in agreement with the competent authority.

6.9.3.5.3 A service life inspection program shall be established, which shall be a part of the operation manual, to monitor the condition of the FRP service equipment at periodic inspections. The service life inspection program shall be approved by the competent authority.

**6.9.3.6 Inspection and testing**

6.9.3.6.1 FRP service equipment shall be inspected and tested before being put into service. The initial inspection and test after manufacture shall include a check of the design characteristics and an external examination of FRP service equipment with due regard to the substances to be transported, and a pressure test. Before putting the FRP service equipment into service, a leakproofness test and a test of the satisfactory operation shall also be performed. Relief valves shall be tested for opening/closing pressure before installation. The initial inspection and testing program shall be approved by the competent authority.

6.9.3.6.2 Periodic inspection and testing of FRP service equipment shall be carried out during inspection of the portable tank according to 6.7.2.19.2, 6.7.2.19.4, and 6.7.2.19.5 or 6.9.2.8.1 according to the service life inspection program approved by the competent authority.

6.9.3.6.3 The inspections and tests in 6.9.3.6.1 and 6.9.3.6.2 shall be performed or witnessed by an expert approved by the competent authority.

6.9.3.6.4 Repair work of FRP service equipment shall be limited to replacement of damaged components by components covered by the type approval of the service equipment.

**6.9.3.7 Marking****6.9.3.7.1 Marking of relief devices**

Each relief device shall be marked as follows:

- (a) name of the manufacturer and the serial number of the equipment;
- (b) name of body and seal materials;
- (c) type approval certificate number;
- (d) the pressure at which the device is set to discharge (MPa or bar);
- (e) the allowable tolerance at the discharge pressure for spring-loaded devices;
- (f) the rated flow capacity of spring-loaded pressure relief devices under normal conditions (external pressure is 1 bar and ambient temperature is 0 °C) in standard (normal) cubic meters of air per second, m<sup>3</sup>/s (determined according to 6.7.2.13.2);
- (g) cross-sectional area of spring-loaded pressure relief devices, mm<sup>2</sup>;
- (h) maximum allowable working pressure (MAWP), MPa or bar;
- (i) external design pressure (if relevant), MPa or bar; and
- (j) design temperature range.

#### **6.9.3.7.2 Marking of stop valves**

Each stop valves shall be marked as follows:

- (a) name of the manufacturer and the serial number of the equipment;
- (b) name of body and seal materials;
- (c) type approval certificate number;
- (d) designation of the stop device;
- (e) nominal diameter, mm;
- (f) maximum allowable working pressure (MAWP), MPa or bar;
- (g) test pressure, MPa or bar;
- (h) direction of medium flow; and
- (i) design temperature range.

#### **6.9.3.7.3 Marking of cleaning hatches and blind flanges**

Each cleaning hatches and blind flanges shall be marked as follows:

- (a) name of the manufacturer and the serial number of the equipment;
- (b) type approval certificate number;
- (c) name of body and seal materials;
- (d) nominal diameter, mm;
- (e) maximum allowable working pressure (MAWP), MPa or bar;
- (f) test pressure, MPa or bar; and
- (g) design temperature range.

## Annex II

### New section 42 of the *Manual of Tests and Criteria*

#### SECTION 42

#### FIRE RESISTANCE TEST OF FRP SERVICE EQUIPMENT FOR PORTABLE TANKS

##### 42.1 General

42.1.1 This test method is intended to prove the fire resistance of FRP service equipment for portable tanks which meet the requirements of 6.7.2 or 6.9.2 of the *Model Regulations*.

42.1.2 The representative prototype of FRP service equipment meeting the definition of 6.9.3.1 of the *Model Regulations* shall be subjected to and satisfy the requirements of the fire resistance test. The fire resistance test shall be conducted by test facilities approved by the competent authorities.

##### 42.2 Definitions

*Test specimen* means an instance of FRP service equipment including gate and seal assemblies subjected to the fire resistance test.

Relevant definitions of standard ISO 21843:2018 and chapters 6.7.2, 6.9.2 and 6.9.3 of the *Model Regulations* are applicable to this section.

##### 42.3 Test method

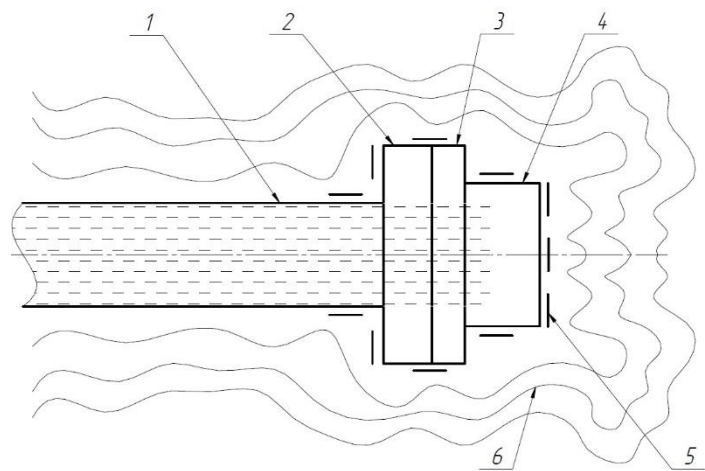
42.3.1 The fire resistance test is carried out for the test specimen installed in a closed position, filled with water with initial temperature of  $20 \pm 5^\circ\text{C}$  under maximum allowable working pressure (MAWP, 6.7.2.1 of the *Model Regulations*), and exposures to flame for at least 30 minutes. The test specimen shall be completely engulfed in the flame including the gate and seal assemblies. The general test scheme is given in figure 42.3.1. If the test specimen is an part of equipment which is not intended to be the outermost closure in a multi-closure system (such as a valve), then the test specimen may be equipped with a blind flange, at its outermost interface which would otherwise be exposed to flame during the test.

42.3.2 The fire exposure parameters shall comply with paragraph 6.9.2.7.1.5.1 of the *Model Regulations*. The fire shall be equivalent to a theoretical fire with a flame temperature of  $800^\circ\text{C}$ , emissivity of 0.9 and a minimum net heat flux of  $75 \text{ kW/m}^2$  calibrated according to ISO 21843:2018.

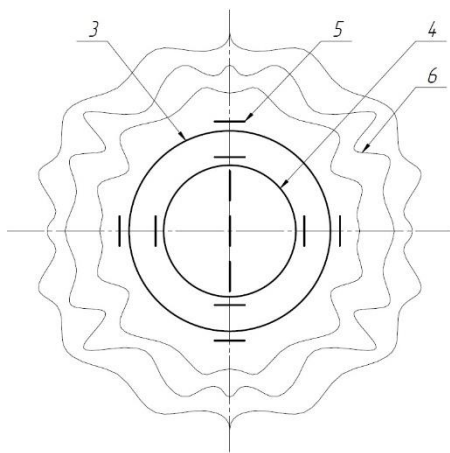
42.3.3 The intensity of heat exposure shall be measured using temperature and heat flux sensors in accordance with the requirements of ISO 21843-2018.

42.3.4 After the fire exposure and cooling the test specimen is subjected to leakproofness test under MAWP.

Figure 42.3.1: Fire resistance test scheme



A



B

(A) Side view	(B) End-face view
(1) Pressure system with water supply	(2) Fixture to join the test specimen to the pressure system
(3) Flange of the test specimen	(4) Test specimen
(5) Temperature and heat flow measuring system	(6) Flame

## **42.4 Test apparatus**

### **42.4.1 General requirements**

42.4.1.1 The fire resistance test bed shall include:

- (a) a fire chamber with dimensions sufficient to accommodate the test specimen and the temperature and heat flux measuring system;
- (b) a fuel supply and combustion system;
- (c) a pressure system with water supply ((1) in figure 42.3.1);
- (d) a fixture to join the test specimen to the test bed ((2) in figure 42.3.1); and
- (e) a temperature and heat flux measuring system ((5) in figure 42.3.1) according to ISO 21843:2018.

42.4.1.2 The specific types of testing equipment can be modified and supplemented in accordance with the requirements of the testing laboratory.

42.4.1.3 The test bed facilities shall not expose the test specimen to external influences that can affect the test results.

42.4.1.4 The heat regime shall be provided by burning liquid fuel or gas.

42.4.1.5 The test bed shall ensure uniform flame coverage of the test specimen.

42.4.1.6 The firing chamber shall provide a horizontal gap between any part of the test specimen and its own shell of at least 150 mm.

42.4.1.7 The fire source (nozzles) shall be at least 150 mm away from the test specimen and temperature sensors and shall provide sufficient power to ensure that the test specimen is completely engulfed in flame.

42.4.1.8 The fuel supply and combustion system shall be controlled.

### **42.4.2 Requirements of the measuring system**

42.4.2.1 During the test the following parameters shall be measured:

- (a) temperature and heat flux on the surface of the test specimen;
- (b) internal pressure during fire and cooling (pressure gauge records);
- (c) leakproofness of the test specimen.

42.4.2.2 The general scheme of installation of the test specimen and temperature and heat flow sensors is shown in figure 42.3.1. Measurement errors shall not be more than:

± 3 % when measuring pressures;

± 5 % when measuring temperature and heat flux;

± 2 % when measuring time.

## **42.5 Test procedure**

42.5.1 The temperature and heat flux sensors shall be installed and calibrated according to ISO 21843:2018.

42.5.2 Before the test, the test specimen and attachments shall be completely filled with water.

42.5.3 After the system is completely filled with water, the system shall be loaded with MAWP at a temperature of 20 °C. Then the leakproofness of the test specimen and pipelines shall be checked.

42.5.4 The fuel supply to the burners shall be opened, ignited and the flame be adjusted with a control valve. The fire parameters shall be maintained in accordance with 42.3.2 at least for 30 minutes. The temperature and heat flux are recorded every 30 seconds with separate records for each sensor during the test.

42.5.5 The fuel supply shall be turned off after the test (at least 30 minutes).

42.5.6 The test specimen shall be removed after complete cooling (wall temperature less than 50 °C). Then the test specimen shall be subjected to leakproofness test at MAWP.

42.5.7 At least 3 “open-closed” cycles (if any) shall be performed for pressure relief devices.

#### **42.6** *Performance criteria*

42.6.1 The test specimen shall demonstrate leakproofness under MAWP after fire exposure. At least 3 “open-closed” cycles (if any) shall be performed for pressure relief devices. If this condition is met, the test specimen is considered to have passed the fire resistance test.

#### **42.7** *Test report*

The test report shall contain:

- (a) the name of the organization conducting the tests;
- (b) the name of the manufacturer of the FRP service equipment;
- (c) the date of the fire resistance tests;
- (d) a description of the FRP service equipment, including dimensions, weight, diameter of the gate section, body and lid materials, seal material, marking;
- (e) a recording of the controlled parameters according to 42.4.2.1 and the results of their processing and analysis;
- (f) the results of visual observations;
- (g) a description of the damage or failure (if any);
- (h) the start time of the test (i.e. the ignition of the burners);
- (i) the conclusion on the compliance or non-compliance of the FRP service equipment with the requirements of 42.6.

#### **42.8** *Safety requirements*

As the fire resistance test of the FRP service equipment is potentially dangerous, the safety of personnel shall be assured. Considering the possibility of damage and failure of the test, protective screens and other appropriate means to protect personnel shall be used.



## Annex III

### Other amendments to the *Model Regulations*

#### A.

Amend 6.7.2.5.11, to read as follows (new text is underlined):

“Ductile metals or fibre reinforced plastic (FRP) in accordance with section 6.9.3 shall be used in the construction of valves and accessories.”

#### B.

Add a new 6.9.1.5 to read as follows:

“6.9.1.5 The requirements of section 6.9.3 are applied to FRP service equipment for portable tanks with shells made of metallic or FRP materials intended for the carriage of dangerous goods of Classes or Divisions 1, 3, 5.1, 6.1, 6.2, 8 and 9 by all modes of transport.”

#### C.

In 6.9.2.5, amend the paragraph under the heading to read as follows (new text is underlined, deleted text in ~~strike through~~):

“Service equipment, ~~bottom openings, pressure relief devices, gauging devices,~~ supports, frameworks, lifting and tie-down attachments of portable tanks shall meet the requirements of 6.7.2.5 to 6.7.2.17. If any other metallic features are required to be integrated into the FRP shell, then the provisions of 6.9.2.3.8 shall apply. FRP service equipment in accordance with section 6.9.3 may be used.”

#### D.

Add a new 6.9.3 as reproduced in annex I to this document.

## **Annex IV**

### **Other amendments to the *Manual of Tests and Criteria***

#### **A.**

Amend 40.1.1, to read as follows (new text is underlined):

“Part IV of the Manual presents the United Nations schemes for:

a. dynamic and longitudinal impact testing of portable tanks and MEGCs (see section 41 of this Manual and 6.7.2.19.1, 6.7.3.15.1, 6.7.4.14.1 and 6.7.5.12.1 of the *Model Regulations*);

b. the requirements to the fire resistance test of service equipment made from fibre reinforced plastic (FRP) for portable tanks (see section 42 of this Manual and 6.9.2.7.1.5, and 6.9.3.5.2 (d) of the *Model Regulations*).”

#### **B.**

Add a new section 42 as reproduced in annex II to this document.

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 5 (c) of the provisional agenda

**Transport of gases:****Miscellaneous****Updated ISO standards for class 2****Transmitted by the International Organisation for Standardisation  
(ISO)\*****I. Introduction**

1. This document concerns one amended ISO standard: ISO 11114-1:2020/Amd 1:2023, Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials — Amendment 1

**II. Proposal**

2. This concerns ISO 11114-1:2020 which is referenced in a number of places in the *Model Regulations* and has been amended to include an update on the material compatibility of aluminium silicon bronze.
3. In 3.3.1, special provision 379 (d) (i) replace ISO 11114-1:2020 with ISO 11114-1:2020/Amd 1:2023.
4. In 4.1.6.1.2 replace ISO 11114-1:2020 with ISO 11114-1:2020/Amd 1:2023.
5. In the table in 6.2.2.2, replace the row ISO 11114-1:2020, Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials, with ISO 11114-1:2020/Amd 1:2023, Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials — Amendment 1.
6. In 6.2.2.7.4 (p) replace ISO 11114-1:2020 with ISO 11114-1:2020/Amd 1:2023
7. In 6.2.2.9.2 (j) replace ISO 11114-1:2020 with ISO 11114-1:2020/Amd 1:2023
8. In 6.7.5.2.5 (a) replace ISO 11114-1:2020 with ISO 11114-1:2020/Amd 1:2023

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\* A/77/6 (Sect. 20), table 20.6



### **III. Justification**

9. The purpose of this amendment is to update the compatibility of Aluminium Silicon Bronze (ASB) with halogenated gases.
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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 2 (h) of the provisional agenda

**Explosives and related matters: Miscellaneous****Including an acceptable level of risk in classification criteria****Transmitted by the Sporting Arms and Ammunition Manufacturers'  
Institute (SAAMI)\*****I. Introduction**

1. Pursuant to the *Guiding Principles for the Development of the Model Regulations on the Transport of Dangerous Goods*<sup>1</sup>:

“The transport of dangerous goods is regulated to prevent or mitigate, as far as possible, incidents that could endanger public safety or harm the environment. At the same time, regulations should be framed so that they do not hamper the movement of dangerous goods, other than those too dangerous to be accepted for transport.”

2. It is also specified that “[t]he aim of the regulations, therefore, is to make transport feasible and safe by reducing risks to a minimum.”

3. Risk is not defined in the *Model Regulations* nor the *Guiding Principles*. The term “risk” refers both to the probability of a transport incident and the magnitude of the hazard. The *Model Regulations* accommodate the transport of low, medium and high hazard dangerous goods, all combined with a low probability of incident. An injury resulting from such an incident, although unlikely, may not be trivial for any hazard level.

4. While decisions based on probability are not left to the discretion of stakeholders, risk management is a normal and necessary part of the Sub-Committee’s work. For example, the Sub-Committee incorporates risk into choices about the severity of controls for different classifications. Risk must be balanced by supporting the public interest for the safe and unhampered transport of dangerous goods.

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\* A/77/6 (Sect. 20), table 20.6

<sup>1</sup> Seventh version (2023), Part 0, paragraph 5.



## II. Classification of hazard levels

5. All classes of dangerous goods cover a range of hazard levels and may have certain de minimis criteria for exclusion from the *Model Regulations*. Classes 3, 8, and certain divisions of classes 4, 5, 6 and 8 are divided by classification criteria into packing groups (PG) I, II and III. These represent high, medium and low levels of danger<sup>2</sup>.

6. In addition, while explosives do not have packing groups, they are also categorized into high, medium, and low hazard groups, which have been explicitly assigned in the “Globally Harmonized System of Classification and Labelling of Chemicals” (*GHS*) as sub-categories 2A, 2B and 2C. These groupings are also implied in the *Model Regulations* and modal regulations when looking at requirements.

7. A cursory look at PG III and the chemicals it contains, as well as the explosive equivalent 1.4S, reveals that, in the unlikely event of an incident, these chemicals are capable of causing minor injury to an unprotected human body. In other words, all dangerous goods are dangerous.

8. The scope of injuries which may result from a low hazard dangerous good is not defined. Conversations about low hazard may include the terms “first aid injury” or “walk-away factor.” The *GHS* defines low hazard for explosives as:

“Sub-category 2C represents a low explosion hazard. An explosive in this sub-category can cause minor damage to objects and moderate injuries to persons. Injuries would not normally result in permanent impairment.”

## III. Acknowledgement of hazard

9. Based on experience, SAAMI believes it would be helpful to include a statement in the *Guiding Principles* on the possibility of injury relating to a dangerous goods incident. It should be accepted that, while the probability may be very low, if an incident occurs, it would be reasonable to expect some form of damage or injury.

## IV. Proposal

10. SAAMI asks the Sub-Committee to consider such guidance to preclude the development of criteria which eliminate rather than manage risk, and inordinately hamper commerce. It is the goal of the regulations to mitigate risk to an acceptable level to promote safe commerce. Based on the discussion, SAAMI may return with another proposal.

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<sup>2</sup> See section 2.0.1.3 of the *Model Regulations*.



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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 3 of the provisional agenda

**Listing, classification and packing****Infectious substance transport****Transmitted by the Council on the Safe Transportation of Hazardous  
Articles (COSTHA), Dangerous Goods Trainers Association (DGTA)  
and the Food and Agriculture Organization (FAO)\*****I. Introduction**

1. For the last 20 years, and also during the COVID-19 pandemic, the Sub-Committee has held several discussions on infectious substance transportation challenges in using the *Model Regulations* and transporting infectious substances.
2. Given that infectious substance transport regulations have matured over the years, COSTHA, DGTA and FAO believe they can be successfully updated with lessons learned.

**II. Proposal for a lunchtime working group**

3. COSTHA, DGTA and FAO would like to propose a lunchtime working group for the sixty-third session. We request the discussion be held on day 4 (Thursday, 30 November 2023).
4. Topics that may be addressed:
  - (a) Managing the indicative list of category A pathogens;
  - (b) Removal of the technical name requirement for UN 2814 and UN 2900 from shippers declaration;
  - (c) Packing instruction P650 restriction in UN 3373 and lithium batteries (other dangerous good) in the same package;
  - (d) Used medical device exception not applicable with lithium batteries (other dangerous good) are in the same package;
  - (e) Dry shipper (special provision 346) to transport UN 3373; and

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\* A/77/6 (Sect. 20), table 20.6



(f) Packing instruction P650 (6) and 6.3.5.3 versus packing instruction P650 (9) and 5.5.3 – test requirements.

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 2 (h) of the provisional agenda

**Explosives and related matters: Miscellaneous****Introduction of new entries for 1,4-benzoquinone dioxime****Transmitted by the Council on the Safe Transportation of Hazardous  
Articles (COSTHA)\*****I. Introduction**

1. By provision of testing through two independent laboratories, 1,4-benzoquinone dioxime (QDO) satisfies the defining criteria of an explosive substance class 1. This conclusion was verified by the competent authority in Germany (BAM) and subsequently by the United States (US) of America competent authority (PHMSA). However, QDO is manufactured globally and distributed to end users throughout the world under various dangerous and non-dangerous classifications. This document proposes to harmonize the transport classification, *against the backdrop of empirical testing and application of the classification criteria*, by introduction of new UN entry.

**II. Background**

2. During the REACH registration process in 2016 an ECHA reviewer found that QDO did not pass the screening criteria in appendix 6 of the *Manual of Tests and Criteria*, and testing was required to re-evaluate the historical classification (UN 1325, flammable solid, 4.1, PG II, and/or classified as non-regulated by some). Test series 3 was performed with passing results for stability and sensitivity.

3. QDO underwent small scale laboratory energy testing and passed the test series 1 (a) gap test, indicating that it will not detonate. However, it failed the Koenen 2 (b) test with a limiting diameter of 5 mm instead of 2 mm, indicating the potential to deflagrate by overcoming venting. A similar indication for the potential of deflagration was provided by borderline passing results in the test series 2 (c) time-pressure test.

4. QDO was tested in the test series 6 (a) single package test with a negative result, and then the 6 (c) bonfire test was performed four times in various packagings ranging from 45 kg down to 2 kg. The largest packaging of 45 kg net quantity exhibited a 2 m flame radius

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\* A/77/6 (Sect. 20), table 20.6



(COSTHA will provide test report in a later submission of an informal document), which dissipated to zero in the subsequent tests of smaller packagings. No explosion behaviour was observed, but the burn times and heat flux measurements aligned with a Division 1.4 classification based on thermal flux measurements.

5. The flame radius measurements, however, ranged from a maximum of 2 meters for a 45 kg per unit quantity to less than 1 meter for smaller unit quantities (COSTHA will provide test report in a later submission of an informal document). The latter is a 1.4S result, in which case a chemical like QDO which is not intentionally energetic would exit class 1 (see section 2.1.3.6.2 of the *Model Regulations*). These results are much less energetic than those seen for propellants.

6. Flux measurements continued to control the classification even for smaller packages. Such measurements are frequently not employed by test laboratories, in favour of the flame radius measurement. Some experts question whether the flux measurement should result in stricter transport controls than for other flammable goods, especially considering the critical nature of these goods for rubber manufacturing. An explosive classification may preclude normal use by industry. As mentioned above, the practice of non-dangerous declaration of QDO continues. We wonder if a more pragmatic solution could be achieved.

7. QDO was hence classified as a Division 1.4 explosive based on thermal flux characteristics alone. Explosives acceptance testing was repeated by a US laboratory in 2021 with identical results.

### III. Discussion

8. The disconnect in terms of classification at the substance level calls into question transportation safety first and foremost, as well as commercial competitiveness. Classification globally should be harmonized when substances of identical composition are manufactured and tested in different regions. As a result of regional testing, this material which is used in the vehicle tire manufacturing and specialty rubber industries has been regionally re-classified from a Division 4.1 material to a Division 1.4, resulting in significant transportation complications.

9. Based on certain testing, the product could be identified in some cases as a Division 1.4 Compatibility Group C material. However, it is also recognized that this classification is not being used universally. COSTHA believes it is important to properly classify and identify relevant hazards when shipping QDO. To remove ambiguity with the classification of the QDO, we believe a new entry should be introduced reflecting a Division 1.4 Compatibility Group C classification.

10. The value of new entries was discussed by the Explosives Working Group (EWG) during the sixty-second session of the Sub-Committee based on an informal document (UN/SCETDG/62/INF.62). In the report from the EWG (informal document UN/SCETDG/62/INF.47), the group provided support for two entries to be considered by the Sub-Committee.

11. COSTHA proposes two new entries for 1,4-benzoquinone dioxime (QDO) that reflect the hazards this material represents and would allow for safe and proper packaging and hazard communication.

### IV. Data sheet to be submitted to the United Nations for new or amended classification of substances

#### Section 1. SUBSTANCE IDENTITY

1.1 Chemical name: 1,4-benzoquinone dioxime

1.2 Chemical formula: C6H6N2O2

1.3 Other names/synonyms: p-benzoquinone dioxime; 2,5-Cyclohexadiene-1,4-dione, 1,4-dioxime; QDO

- 1.3.1 CAS number: **105-11-3**
- 1.4 Proposed classification for the Recommendations
- 1.5.1 Proper shipping name (3.1.2): **1,4-benzoquinone dioxime**
- 1.5.2 Class/division: **1.4C** Subsidiary risk(s): **None** Packing group: **N/A**
- 1.52 Class/division: **4.1** Subsidiary risk(s): **None** Packing group: **II**

## V. Proposal

12. Amend 2.4.2.4.1 to include “UN 35XX” in the list of solid desensitized explosives (new text is underlined, deleted text in strike-through).

13. Amend the Dangerous Good List to include the following entries:

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instructions	Special provisions
05XX	1,4-BENZOQUINONE DIOXIME	1.4C				0	E0	P114(b)	PP48		
35XX	1,4-BENZOQUINONE DIOXIME, <u>DESENSITIZED</u>	4.1		II	XYZ	0	E0	P406			

14. Add in 3.3 a new special provision XYZ to read:

“XYZ This entry is permitted only when testing of the product meets the exclusion criteria from Class 1 in 2.1.3.6. If the material does not meet the exclusion criteria, the entry UN 05XX shall be used.”

15. Amend 4.1.4.1, P114(b), PP48 to read:

“PP48 For UN Nos. 0508 ~~and~~, 0509, and 05XX, metal packagings shall not be used. 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.”

16. The entry name in the alphabetical index should be amended as follows:

Name and description	Class	UN No.
<u>1,4-Benzoquinone dioxime</u>	<u>1.4C</u>	<u>05XX</u>
<u>1,4-Benzoquinone dioxime, desensitized</u>	<u>4.1</u>	<u>35XX</u>



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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 6 (d) of the provisional agenda

**Miscellaneous proposals for amendments to the Model Regulations  
on the Transport of Dangerous Goods:****Other miscellaneous proposals****Stacking test****Transmitted by the expert from Spain\*****I. Introduction**

1. In document ST/SG/AC.10/C.3/2023/2 presented by Spain at the last session of the Sub-Committee, amendments to the note under 1.2.2.1 were proposed to eliminate the use of kg as a unit of force. Additionally, consequential amendments were analysed in proposals 4 and 5, and the stacking test was singled out as one occasion when kg was still used as a reference for forces.
2. The amendments to the note under 1.2.2.1 were adopted at the last session. The proposals related to the stacking test are further analysed in this document. The proposed amendments take into account the comments received during the discussions at the last meeting of the Sub-Committee and the comments received afterwards in written form.

**II. Analysis**

3. The stacking test is described in 6.1.5.6 as “the test sample shall be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during transport”. This gives a relationship between the force applied (measured in N) and the weight (measured in N); it does not establish a direct relationship to the mass (measured in kg) and, therefore, the wording is accurate and in accordance with the international system of units.
4. Also, the stacking test defined in 6.4.15.5 indicates an equivalency between the load and the weight.
5. In several other paragraphs, nevertheless, a comparison is made in between loads (measured in N) and mass (measured in kg); this should not be done, as it is only possible to compare values measured in the same units. Specifically, reference is made directly to the

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\* A/77/6 (Sect. 20), table 20.6



stacking test load and its value in kg, which is in principle incorrect, as the load should be measured in N. Therefore, the different paragraphs related to the stacking test have been analysed, and those which are not coherent in themselves, as they compare forces with mass, or apply an incorrect unit, have been singled out.

6. This happens in the following occasions:

- Primary marking for intermediate bulk containers (IBCs) under 6.5.2.1.1:

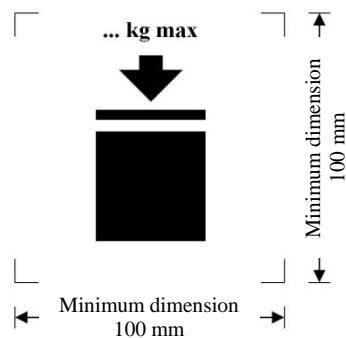
(g) “The stacking test load in kg. For IBCs not designed for stacking, the figure “0” shall be shown;”

- 6.5.2.1.3 Examples of marking for various types of IBC in accordance with (a) to (h) above, first example:

... “/the stacking test load in kg/” ...

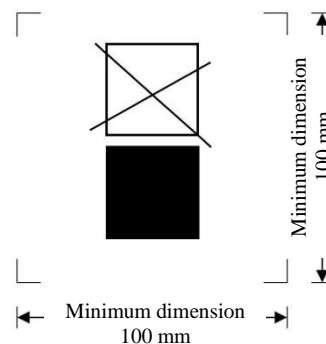
- 6.5.2.2.2 “The maximum permitted stacking load applicable shall be displayed on a symbol as shown in Figure 6.5.1 or Figure 6.5.2. The symbol shall be durable and clearly visible.

**Figure 6.5.1**



IBCs capable of being stacked

**Figure 6.5.2**



IBCs NOT capable of being stacked ”

- 6.5.6.6.4

*“Calculation of superimposed test load*

The load to be placed on the IBC surface shall be 1.8 times the combined maximum permissible gross mass of the number of similar IBCs that may be stacked on top of the IBC during transport.”

- 6.6.3.1 Primary marking:

(g) “The stacking test load in kg. For large packagings not designed for stacking the figure “0” shall be shown;”

- 6.6.3.2 Examples of markings, first and second examples:

... “stacking load: 2 500 kg;” ... (twice)

- 6.6.3.3 “The maximum permitted stacking load applicable shall be displayed on a symbol as shown in Figure 6.6.1 or Figure 6.6.2.

The symbol shall be durable and clearly visible.

Figure 6.6.1

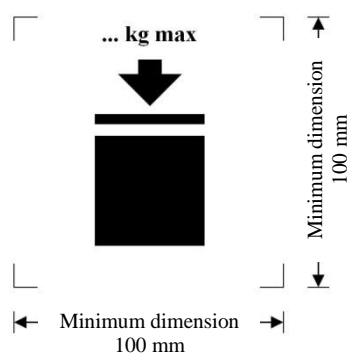
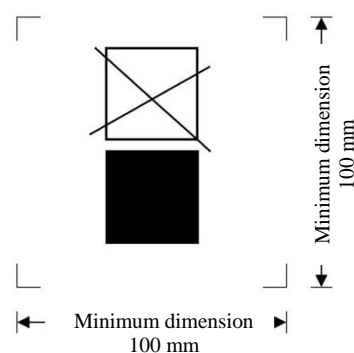


Figure 6.6.2



Large packagings capable of being stacked      Large packagings NOT capable of being stacked ”

• 6.8.5.5 Marking

(g) “The stacking test load in kg;”

7. In all these cases, amendments to the texts have been proposed, with the objective of avoiding contradictions (comparing masses with forces, or using the wrong unit), but avoiding any further amendments.

8. The most fundamental change is referring to the superimposed stacking mass instead of referring to the test load. This is coherent as in the stacking mark reference is done to kg that are to be stacked on top. The mark shown in figure 6.5.1 and figure 6.6.1 is very intuitive; it shows the maximum mass that can be stacked on the IBC or large packaging during transport. This mark is not modified, only the language of the text referring to it.

### III. Proposals

9. The following amendments are proposed (new text in **bold**, deleted text ~~stricken through~~)

(a) Primary marking of IBCs under 6.5.2.1.1 (g):

“The **superimposed stacking mass** ~~test load~~ in kg. For IBCs not designed for stacking, the figure “0” shall be shown;”

(b) Examples of marking in 6.5.2.1.3, first example:

“... /the **superimposed stacking mass** ~~test load~~ in kg/ ...”

(c) Text in 6.5.2.2.2:

“The maximum permitted **superimposed stacking mass** ~~load~~ applicable shall be displayed on a symbol as shown in figure 6.5.1 or figure 6.5.2. The symbol shall be durable and clearly visible.”

(d) 6.5.6.6.4 “Calculation of superimposed test load

The ~~mass load to be~~ placed on the IBC **surface to create the superimposed test load** shall be 1.8 times the combined maximum permissible gross mass of the number of similar IBCs that may be stacked on top of the IBC during transport.”

(e) Primary marking of large packagings under 6.6.3.1 (g):

“The **superimposed stacking mass** ~~test load~~ in kg. For IBCs not designed for stacking, the figure “0” shall be shown;”

(f) Examples of marking in 6.6.3.2, first and second examples:

“... **superimposed stacking mass** ~~load~~: 2 500 kg; ...” (twice)

(g) Text in 6.6.3.3:

“The maximum permitted **superimposed** stacking **mass load** applicable shall be displayed on a symbol as shown in figure 6.6.1 or figure 6.6.2. The symbol shall be durable and clearly visible.”

(h) Marking of bulk containers in 6.8.5.5.1 (g):

“The **superimposed** stacking **mass test-load** in kg;”

## IV. Justification

10. Ensuring a more systematic approach and a better rationale in the *Model Regulations* helps to create clearer legal texts and to avoid different criteria among different countries and inspection services, and thus helps to implement target 16.6 of the 2030 Agenda for sustainable development (*Develop effective, accountable and transparent institutions at all levels*).

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 2 (h) of the provisional agenda

**Explosives and related matters: Miscellaneous****Net explosive weight****Transmitted by the expert from Spain\*****I. Introduction**

1. In document ST/SG/AC.10/C.3/2023/2 presented by Spain at the last session of the Sub-Committee, amendments to the note under 1.2.2.1 were proposed to eliminate the use of kg as a unit of force. Additionally, consequential amendments were analysed in further proposals. Proposal 6 of document ST/SG/AC.10/C.3/2023/2 proposed to delete in the definition of net explosive mass the reference to net explosive weight.

2. The amendments to the note under 1.2.2.1 were adopted, and the language related to the net explosive mass is further analysed in this document. The proposed amendments take into account the comments received during the previous discussions in the last plenary session of the Sub-Committee, the discussions in the explosive working group and the comments received afterwards in written form.

**II. Analysis**

3. The present definition for “net explosive mass” in 1.2.1 is the following:

*“Net explosive mass (NEM) means the total mass of the explosive substances, without the packagings, casings, etc. (Net explosive quantity (NEQ), net explosive contents (NEC), or net explosive weight (NEW) are often used to convey the same meaning.)”*

4. This definition of “net explosive mass” indicates an equivalency of the concepts of net explosive mass and net explosive weight; even if the concepts are related, they do not represent the same concepts, as mass is measured in (kg) and the weight is the force created by that mass, measured in (N); the relationship in between both units is as  $1N = 1kg \cdot \frac{m}{s^2}$ .

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\* A/77/6 (Sect. 20), table 20.6





5. Both the mass and the weight are concepts clearly defined with their corresponding units, included into paragraph 1.2.2.1 of the *Model Regulations*, and are part of the International System of Units.
6. Therefore, the present definition of “net explosive mass” in the *Model Regulations* is in conflict with the definition of units in 1.2.2.1. The indication that “net explosive weight” has the same meaning than “net explosive mass” should be removed from the definition of “net explosive mass” in 1.2.1.
7. The “net explosive weight (NEW)” is introduced in 1.2.1, but not used in the *Model Regulations*, so deleting NEW from the definition of 1.2.1 has no further consequences for the *Model Regulations*.
8. Nevertheless, it seems that in some parts of North America “net explosive weight” is used to refer to the net explosive mass, but measured in pounds (lb). This use for “weight” is not in accordance with the international system of units, and the general definitions in the *Model Regulations*, but is used in the United States industry of explosives. And therefore, they would like to retain a reference to NEW in the *Model Regulations*.
9. The aim of the *Model Regulations* is to prepare a harmonized regulation, that can be applied in all parts of the world. Maintaining a reference to the “net explosive weight” in the *Model Regulations* would be counterproductive to this goal, when reading “net explosive weight”, the “international system unit-reader” would think about a force measured in N, while the “North American reader” would think about a mass measured in pounds. This different interpretation is not good to be backed up by the *Model Regulations*; if there is a very specific use for the concept of “net explosive weight” in one region, it would perhaps be better to regulate this concept in the regional regulation.
10. Therefore, the expert from Spain proposes to delete “net explosive weight” in the definition for “net explosive mass”, as shown in paragraph 11 below. The expert from Spain seeks the opinions of the Sub-Committee and its Explosive Working Group on this proposal.

### III. Proposal

11. Amend the definition of “*net explosive mass*” in 1.2.1 to read as follows (new text in **underlined bold**, deleted text ~~stricken through~~):

“*Net explosive mass (NEM)* means the total mass of the explosive substances, without the packagings, casings, etc. (*Net explosive quantity (NEQ)*; **or net explosive contents (NEC)**, ~~or net explosive weight (NEW)~~ are often used to convey the same meaning.);”

### IV. Justification

12. Ensuring a more systematic approach and a better rationale in the *Model Regulations* helps to create clearer legal texts and to avoid different criteria among different countries and inspection services, and thus helps to implement target 16.6 of the 2030 Agenda for sustainable development (*Develop effective, accountable and transparent institutions at all levels*).
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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 6 (a) of the provisional agenda

**Miscellaneous proposals for amendments to the Model Regulations  
on the Transport of Dangerous Goods:****Marking and labelling****Amendments to the location of the lithium battery or sodium  
ion battery mark****Transmitted by the expert from China\*****I. Introduction**

1. The location of the lithium battery or sodium ion battery mark has not been stated explicitly in the *Model Regulations*. However, information can be missed or misunderstood during transport, if the lithium battery or sodium ion battery mark is not located on the same surface of the package near the hazard labels.
2. In document ST/SG/AC.10/C.3/2023/10, it was proposed to add a note at the end of 5.2.1.9.1 to read as follows: “**NOTE:** *Lithium battery mark shall be located adjacent to the marks required by 5.2.1.1. The requirements of 5.2.1.2 and 5.2.1.4 shall be met.*”.
3. At the sixty-second session, some experts supported in principle the proposal, but preferred to insert the text of the note into the provisions. Others were hesitant to adopt already at that stage the text as proposed and questioned the necessity for such amendments.
4. The expert from China took account of the comments from last session and would like to further explain the necessity of this amendment.
5. Nowadays, more and more lithium batteries or sodium ion batteries are transported in the same packages with other dangerous goods. Electronic tracing loggers with lithium ion batteries have been attached to cargo, such as infectious substances and magnetic resonance imaging (MRI). Furthermore, articles containing dangerous goods transported as UN Nos. 3537, 3538, 3539, 3540, 3541, 3542, 3543, 3544, 3545, 3546, 3547 and 3548 can all contain lithium batteries or sodium ion batteries. Both hazard labels and the lithium battery or sodium ion battery marks shall apply if the batteries installed in these articles comply with special provision (SP) 188, according to 5.2.2.1.13.1.

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\* A/77/6 (Sect. 20), table 20.6



6. The incomplete information of marks and labels will affect cargo handling and emergency response. Take an article classified as UN 3534 containing a lithium battery which complies with SP 188 as an example. The label for Division 4.3 and the lithium or sodium ion battery mark shall apply. When this article is on fire, using water as an extinguishing agent may exacerbate the situation, because dangerous goods of Division 4.3 can emit flammable gases when in contact with water. However, it will be very likely for the cargo handler to use water if the battery mark is not located on the same surface with the hazard label and he unfortunately only notices the battery mark, considering a large amount of water is the recommended fire extinguisher method for lithium batteries.

7. For reference, the environmentally hazardous substance mark shall be located adjacent to the marks required by 5.2.1.1 according to 5.2.1.6.2. Furthermore, the hazard labels shall be located on the same surface of the package near the proper shipping name mark if the package dimensions are adequate according to 5.2.2.1.6. Therefore, the environmentally hazardous substance mark and the hazard labels shall be located on the same surface of the package near the proper shipping name mark.

8. Thus, the expert from China invites the Sub-Committee to consider the following proposal.

## II. Proposal

9. It is proposed to add a new 5.2.1.9.3 to read as follows (new text is **bold and underlined**):

**“5.2.1.9.3 The lithium battery or sodium ion battery mark shall be located on the same surface of the package near the hazard labels, if the package dimensions are adequate.”**

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 4 (c) of the provisional agenda

**Electric storage systems:****Transport provisions****Transport provisions for hybrid batteries with both lithium-ion and sodium-ion cells****Submitted by the expert from China\*****I. Introduction**

1. Hybrid batteries with both lithium-ion and sodium-ion cells (hereinafter referred to as hybrid Li-Na batteries) are a new type of battery product, composed of lithium ion cells and sodium ion cells connected in series. By combining the advantages of the high energy density of lithium ion batteries and the adaptability to low-temperature environments of sodium ion batteries, they are expected to be widely used in the automobile and energy storage industries.
2. At the sixty-second session of Sub-Committee, experts from China submitted informal document INF.33 to address transport provisions for these hybrid Li-Na batteries. Considering that the energy density of such batteries is between that of lithium ion and sodium ion ones, as well as the inability to fully discharge, it is proposed to transport the hybrid Li-Na battery according to the testing procedures and other provisions for lithium ion batteries.
3. Most experts who spoke supported the intention of that document and kindly provided their comments for improvement. With this feedback, the experts from China have prepared this modified document for the Sub-Committee's consideration.
4. Experts reminded at the last session that the lithium ion cells and sodium ion cells used in the hybrid Li-Na batteries should be tested in accordance with their respective procedures specified in 38.3 of the *Manual of Tests and Criteria*. Actually, informal document INF.33 (sixty-second session) stated that "component cells of the battery shall be of a type proved to meet the respective testing requirements of the *Manual of Tests and Criteria*, part III, sub-section 38.3". In this new document, we adjusted the wording slightly to emphasize this issue (see paragraph 10 in proposal 1 below).
5. In addition, it was suggested to clarify in the proposed special provision (SP) XXX how such hybrid Li-Na batteries can be regarded as meeting the requirements of SP 188, as

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\* A/77/6 (Sect. 20), table 20.6



in SP 387. Currently, the prerequisite for transporting either a lithium ion or sodium ion battery in accordance with SP 188 is that the battery should have a watt-hour rating of not more than 100 Wh and have the watt-hour rating marked on its outer case. Thus, the experts from China believe the same requirement should be applied to the hybrid Li-Na battery (see paragraph 12 in proposal 1 below).

6. Furthermore, due to the addition of a new paragraph (h) in 2.9.4, all provisions that list specific paragraphs in 2.9.4 also need amendments, including SP 188 (c), the first paragraph of SP 310, SP 363 (f), the ninth paragraph of SP 388 and the first paragraph of SP 389.

7. Meanwhile, it was suggested that a more comprehensive consideration should be given to assess the impact of the proposed amendments on the entire *Model Regulations*, including the need to clarify the transport provisions for hybrid Li-Na battery-powered vehicles and energy storage systems. If the Sub-Committee agrees with the principle of proposal 1 to transport such hybrid Li-Na batteries as lithium ion ones, then vehicles powered by such batteries should be classified as UN 3556 VEHICLE, LITHIUM ION BATTERY POWERED (see proposal 2 below). Similarly, hybrid Li-Na battery energy storage systems should be assigned to entry UN 3536 LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT (see proposal 3 below). Besides, paragraphs in SP 388 addressing hybrid electric vehicles transported with batteries installed should also be amended to include hybrid Li-Na batteries, as well as sodium ion batteries (see proposal 4 below).

8. Finally, some experts recommended to introduce a new UN number, considering that such hybrid Li-Na battery consists of two types of cells which should be classified as different UN numbers when transported separately. On one hand, there has already been a precedent in the *Model Regulations* that batteries containing both lithium metal cells which are classified as UN 3090 and lithium ion cells which are classified as UN 3480 should be transported under the entry UN 3090 (see 2.9.4 (f) and SP 387). On the other hand, we have not yet found the necessity to differentiate transport requirements for the hybrid Li-Na batteries from those for lithium ion batteries. If we choose to introduce new entries, four entries will be needed at least (battery itself, battery contained in or packed with equipment, battery-powered vehicle, and battery installed in cargo transport units (CTUs)). The experts from China believe that the ideal approach in this situation should be to utilize the existing UN numbers to the utmost and insist on the preference on transporting the hybrid Li-Na battery according to the testing procedures and other provisions for lithium ion batteries, as proposed in informal document INF.33 (sixty-second session).

## II. Proposals

### A. Proposal 1

9. The experts from China suggest that hybrid Li-Na batteries should be transported in accordance with provisions for lithium ion batteries. Thus, we propose:

10. To add in 2.9.4 of the *Model Regulations* a new 2.9.4 (h) as follows:

- “(h) Hybrid batteries, containing both lithium ion cells and sodium ion cells (see special provision XXX of chapter 3.3), shall meet the following conditions:
  - (i) The lithium ion cells and sodium ion cells are electrically connected;
  - (ii) The battery has been tested as a lithium ion battery;
  - (iii) Each component lithium ion and sodium ion cell of the battery shall be of a type proved to meet the respective testing requirements of the *Manual of Tests and Criteria*, part III, sub-section 38.3.”

11. To add a new special provision XXX to UN Nos. 3480, 3481, 3551 and 3552 in the dangerous goods list (chapter 3.2 of the *Model Regulations*):

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)
3480	LITHIUM ION BATTERIES (including lithium ion polymer batteries)	9			188 230 310 348 376 377 384 387 <del>XXX</del>
3481	LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT or LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion polymer batteries)	9			188 230 310 348 360 376 377 384 387 390 <del>XXX</del>
3551	SODIUM ION BATTERIES with organic electrolyte	9			188 230 310 348 376 377 384 400 401 <del>XXX</del>
3552	SODIUM ION BATTERIES CONTAINED IN EQUIPMENT or SODIUM ION BATTERIES PACKED WITH EQUIPMENT, with organic electrolyte	9			188 230 310 348 360 376 377 384 400 401 <del>XXX</del>

12. To add a new special provision XXX to chapter 3.3 of the *Model Regulations*:

“XXX Hybrid batteries in conformity with 2.9.4 (h) containing both lithium ion cells and sodium ion cells shall be assigned to UN Nos. 3480 or 3481, as appropriate. When such batteries are transported in accordance with special provision 188, the watt-hour rating of each battery shall be not more than 100 Wh and shall be marked on the outside case.”

13. In addition, due to the amendments proposed in paragraph 10, some relevant paragraphs need to be amended accordingly, including SP 188 (c), the first paragraph of SP 310, SP 363 (f), the ninth paragraph of SP 388 and the first paragraph of SP 389. The proposed amendments are as follows (deleted text appears in ~~strike through~~ and new text in **bold underlined**):

14. Amend SP 188 (c) to read:

“Each lithium cell or battery meets the provisions of 2.9.4 (a), (e), (f) if applicable, ~~and (g)~~ **and (h) if applicable** or for sodium ion cells or batteries, the provisions of 2.9.5 (a), (e) and (f) shall apply;”

15. Amend the first paragraph of SP 310 to read:

“Cells or batteries from production runs of not more than 100 cells or batteries, or pre-production prototypes of cells or batteries when these prototypes are transported for

testing, shall meet the provisions of 2.9.4 with the exception of 2.9.4 (a), (e) (vii), (f) (iii) if applicable, (f) (iv) if applicable, ~~and (g), (h) (ii) if applicable and (h) (iii) if applicable.~~

16. Amend SP 363 (f) to read:

“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 these Regulations. However, lithium batteries shall meet the provisions of 2.9.4, except that 2.9.4 (a), (e) (vii), (f) (iii) if applicable, (f) (iv) if applicable, ~~and (g), (h) (ii) if applicable and (h) (iii) if applicable~~ do not apply when batteries of a production run of not more than 100 cells or batteries, or pre-production prototypes of cells or batteries when these prototypes are transported for testing, are installed in machinery or engines. Furthermore, sodium ion batteries shall meet the provisions of 2.9.5, except that 2.9.5 (a), (e) and (f) do not apply when batteries of a production run of not more than 100 cells or batteries, or pre-production prototypes of cells or batteries when these prototypes are transported for testing, are installed in machinery or engines.

Where a lithium battery installed in a machinery or an engine is damaged or defective, the machinery or engine shall be transported as defined by the competent authority.”

17. Amend the ninth paragraph of SP 388 to read:

“Dangerous goods, such as batteries, airbags, 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 these Regulations. However, lithium batteries shall meet the provisions of 2.9.4, except that 2.9.4 (a), (e) (vii), (f) (iii) if applicable, (f) (iv) if applicable, ~~and (g), (h) (ii) if applicable and (h) (iii) if applicable~~ do not apply when batteries of a production run of not more than 100 cells or batteries, or pre-production prototypes of cells or batteries when these prototypes are transported for testing, are installed in vehicles. Furthermore, sodium ion batteries shall meet the provisions of 2.9.5, except that 2.9.5 (a), (e) and (f) do not apply when batteries of a production run of not more than 100 cells or batteries, or pre-production prototypes of cells or batteries when these prototypes are transported for testing, are installed in machinery or engines.”

18. Amend the first paragraph of SP 389 to read:

“This entry only applies to lithium ion batteries or lithium metal batteries installed in a cargo transport unit and designed only to provide power external to the cargo transport unit. The lithium batteries shall meet the requirements of 2.9.4 (a) to ~~(g)~~~~(h)~~ and contain the necessary systems to prevent overcharge and over discharge between the batteries.”

## B. Proposal 2

19. If the Sub-Committee agrees that the transport of vehicles powered by the hybrid Li-Na batteries should follow provisions for those powered by lithium-ion batteries (UN 3556), the experts from China would then propose to amend SP 360 and SP 388 as follows (deleted text appears in ~~strike through~~ and new text in **bold underlined**):

20. Add a new second sentence to SP 360 to read:

“Vehicles only powered by lithium metal, lithium ion or sodium ion batteries shall be assigned to the entries UN 3556 VEHICLE, LITHIUM ION BATTERY POWERED or UN 3557 VEHICLE, LITHIUM METAL BATTERY POWERED or UN 3558 VEHICLE, SODIUM ION BATTERY POWERED, as applicable. **Vehicles only powered by hybrid batteries containing both lithium ion cells and sodium ion cells shall be assigned to the entry UN 3556 VEHICLE, LITHIUM ION BATTERY POWERED.** Lithium batteries installed in cargo transport units,

designed only to provide power external to the transport unit shall be assigned to entry UN 3536 LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT.”

21. Amend the sixth paragraph of SP 388 to read:

“UN 3556 VEHICLE, LITHIUM ION BATTERY POWERED, UN 3557 VEHICLE, LITHIUM METAL BATTERY POWERED and UN 3558 VEHICLE, SODIUM ION BATTERY POWERED, as applicable, apply to vehicles powered by lithium ion, lithium metal or sodium ion batteries transported with the batteries installed. **Vehicles only powered by hybrid batteries containing both lithium ion cells and sodium ion cells shall be assigned to the entry UN 3556 VEHICLE, LITHIUM ION BATTERY POWERED.**”

### C. Proposal 3

22. Similarly, in the case that the Sub-Committee agrees to transport hybrid Li-Na battery energy storage systems under the entry UN 3536 LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT, the experts from China then propose to amend SP 360 and SP 389 as follows (deleted text appears in ~~strike through~~ and new text in **bold underlined**; those amendments already mentioned in proposals 1 and 2 are not highlighted again):

23. Amend SP 360 to read:

“360 Vehicles only powered by lithium metal, lithium ion or sodium ion batteries shall be assigned to the entries UN 3556 VEHICLE, LITHIUM ION BATTERY POWERED or UN 3557 VEHICLE, LITHIUM METAL BATTERY POWERED or UN 3558 VEHICLE, SODIUM ION BATTERY POWERED, as applicable. Vehicles only powered by hybrid batteries containing both lithium ion cells and sodium ion cells shall be assigned to the entry UN 3556 VEHICLE, LITHIUM ION BATTERY POWERED. Lithium batteries **or hybrid batteries containing both lithium ion cells and sodium ion cells** installed in cargo transport units, designed only to provide power external to the transport unit shall be assigned to entry UN 3536 LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT.”

24. Amend the first paragraph of SP 389 to read:

“389 This entry only applies to lithium ion batteries ~~or~~, lithium metal batteries **or hybrid batteries containing both lithium ion cells and sodium ion cells** installed in a cargo transport unit and designed only to provide power external to the cargo transport unit. The lithium batteries shall meet the requirements of 2.9.4 (a) to (h) and contain the necessary systems to prevent overcharge and over discharge between the batteries.”

### D. Proposal 4

25. The second and third paragraphs of SP 388 are proposed to be amended to include hybrid Li-Na batteries, as well as sodium ion batteries, as follows (deleted text appears in ~~strike through~~ and new text in **bold underlined**):

“Vehicles powered by a fuel cell engine shall be assigned to the entries UN 3166 VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or UN 3166 VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED, as appropriate. These entries include hybrid electric vehicles powered by both a fuel cell and an internal combustion engine with wet batteries, **metallic** sodium batteries, **sodium alloy batteries**, lithium metal batteries ~~or~~, lithium ion batteries, **hybrid batteries containing both lithium ion cells and sodium ion cells or sodium ion batteries**, transported with the battery(ies) installed.

Other vehicles which contain an internal combustion engine shall be assigned to the entries UN 3166 VEHICLE, FLAMMABLE GAS POWERED or UN 3166 VEHICLE, FLAMMABLE LIQUID POWERED, as appropriate. These entries include hybrid electric vehicles powered by both an internal combustion engine and



wet batteries, metallic sodium batteries, sodium alloy batteries, lithium metal batteries ~~or~~, lithium ion batteries, hybrid batteries containing both lithium ion cells and sodium ion cells or sodium ion batteries, transported with the battery(ies) installed.”

### III. Sustainable Development Goals

26. The hybrid Li-Na battery is a burgeoning battery product which combines the advantages of both lithium ion and sodium ion batteries. It is expected to have widespread applications in energy storage systems and automobiles. Its strong energy storage capacity and wide range of operating temperatures will help achieve the temporal and spatial transfer of electricity, allowing remote areas without the conditions to establish power plants and relevant infrastructures to equally have access to electricity. Clarifying transport provisions for these batteries would contribute to sustainable development goal (SDG) 7 “*affordable and clean energy*”, to be specific, to target 7.1 “*Ensure access to affordable, reliable, sustainable and modern energy for all*” and target 7.b “*By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small-island developing States, and land-locked developing countries, in accordance with their respective programmes of support*”.

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 4 (c) of the provisional agenda

**Electric storage systems:****Transport provisions****Transport of articles containing lithium batteries and other  
dangerous goods****Submitted by the expert from China\*****I. Introduction**

1. In 2011, the expert from the United Kingdom submitted the document ST/SG/AC.10/C.3/2011/43, describing a “Torch” cigarette lighter with a lithium metal battery installed and requesting the Sub-Committee to clarify if there were any existing provisions for such products.
2. Entries from UN 3537 to UN 3548 have been introduced into the *Model Regulations* since the twentieth revised edition. By allowing to contain dangerous goods which exceed the permitted limited quantity amounts and which are not permitted to be transported in limited quantities, these twelve entries make the appropriate classification for such articles possible. However, with the rapid development of lithium batteries, recent years have witnessed their application in an increasing variety of commercial products, considering the relatively low cost and extremely high energy density. It becomes more and more common for lithium batteries to be placed in the same article with other dangerous goods, just as in the “Torch” cigarette lighter. Examples can be found in the annex of this document. In some articles, lithium batteries and other dangerous goods cannot even be enclosed separately. This forced us to reconsider the transport provisions for such products.
3. First, is it necessary to add some restrictions on the transport of articles containing both lithium batteries and certain classes/divisions of dangerous goods?
4. In the *Technical Instructions* for air transport, packing instructions 965 and 968 have regulated that UN 3480 and UN 3090 shall not be packed in the same outer packaging with dangerous goods classified in Class 1 other than Division 1.4S, Division 2.1, Class 3, Division 4.1 and Division 5.1. Part 7: 2.2.1.2 also specifies that UN 3480 and UN 3090 shall also not be stowed together with these dangerous goods. Certainly, the *Model Regulations* covers a broader range of transport modes, so segregation requirements in these *Regulations*

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\* A/77/6 (Sect. 20), table 20.6



do not have to be the same as those in air transport. However, the prohibition of lithium batteries from being packaged/stowed together with dangerous goods of these classes/divisions in air transport indicates that risk of such combination is relatively high. Should some additional restrictions be made on the transport of articles that contain both lithium batteries and these classes/divisions of dangerous good?

5. Besides, there are now two paragraphs in the *Model Regulations* dealing with the situations where an article contains more than one item of dangerous goods, provision 2.0.5.6 and special provision (SP) 301. However, descriptions in the two paragraphs are slightly different. Provision 2.0.5.6 states “If the article contains more than one item of dangerous goods and these could react dangerously with one another during transport, each of the dangerous goods shall be enclosed separately (see 4.1.1.6)”, which indicates that only dangerous goods that can react dangerously should be enclosed separately. But SP 301 states “If the articles contain more than one item of dangerous goods, the individual dangerous goods shall be enclosed to prevent them reacting dangerously with one another during transport (see 4.1.1.6)”, which indicates that different dangerous goods in the same article should be enclosed separately anyway, regardless of whether they will undergo dangerous reactions.

6. On one hand, although provision 2.0.5.6 and SP 301 are set for different UN numbers, there seems to be no sufficient reason to support the existing differences in regulations when the articles assigned to these UN numbers contain more than one item of dangerous goods. The experts from China invite the Sub-Committee to consider whether it is necessary to make the two paragraphs consistent.

7. On the other hand, lithium batteries are not allowed to be transported in limited quantities. So, articles containing lithium batteries and other dangerous goods cannot be assigned to UN 3363, no matter which class or division the other dangerous goods belong to. It is 2.0.5.6 that should be applied, instead of SP 301, which means only items with the potential to react dangerously shall be enclosed separately. While it is easy to tell whether two substances can undergo dangerous reactions, it becomes challenging when it comes to manufactured articles such as lithium batteries. If only items which can react dangerously should be enclosed separately, what kinds of dangerous goods should be considered as capable of reacting dangerously with lithium batteries?

8. An additional question is how the word “enclosed” should be understood in the context. Does it mean air-tight, water-tight or simply ensuring that the contents do not leak out of the case or jacket under normal transport conditions?

## **II. Actions to be taken by the Sub-Committee**

9. The experts from China would like to remind the Sub-Committee of the potential danger of the increasing number of products with both lithium batteries and other dangerous goods. This poses a great threat, urging us to take action to regulate their transport as soon as possible. The Sub-Committee is invited to consider:

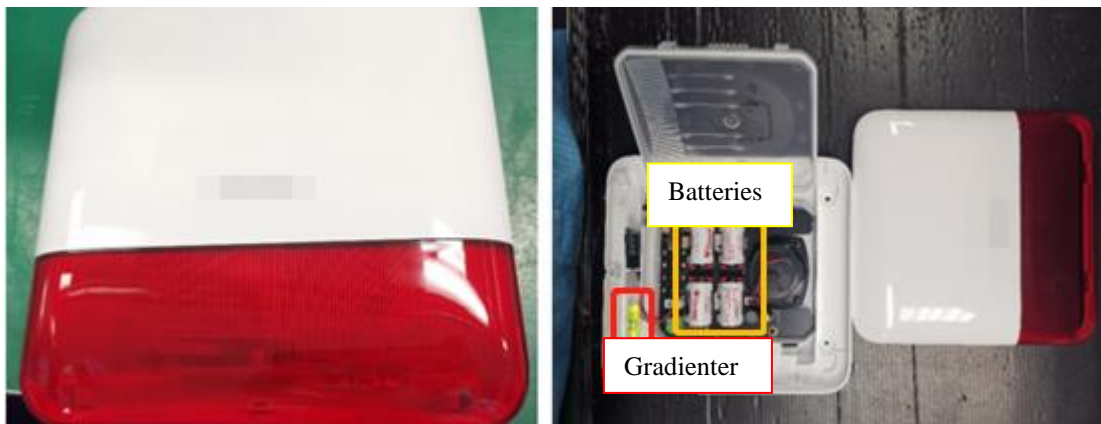
- (a) whether it is necessary to add some restrictions on the transport of articles containing both lithium batteries and certain classes/divisions of dangerous goods (e.g. Class 1 other than Division 1.4S, Division 2.1, Class 3, Division 4.1 and Division 5.1);
- (b) whether the enclosure requirements of dangerous goods in the same article in SP 301 and 2.0.5.6 should be aligned;
- (c) according to the current text in 2.0.5.6, which classes/divisions of dangerous goods shall be enclosed separately with lithium batteries when installed in the same article; and
- (d) how individual dangerous goods in the same article can be regarded as “enclosed separately”.

### III. Annex

#### A. Example 1

1. A wireless outdoor siren containing four primary lithium metal single-cell batteries and a gradienter with a flammable liquid (Class 3) inside.

Lithium content in each cell: 0.47 g



#### B. Example 2:

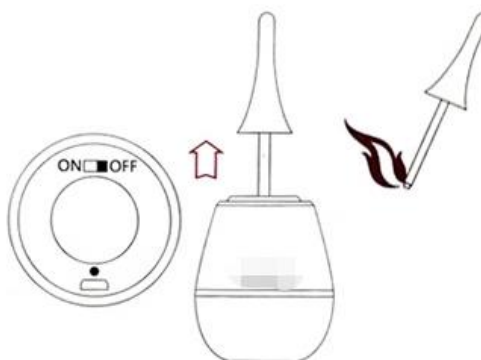
2. An electronic mouth spray containing a rechargeable lithium-ion battery and a flammable breath freshener (Class 3).
3. The breath freshener can also be packed in the same inner packaging with the spray instead of installed in it.

Watt-hour rating of each battery: 0.74 Wh



**C. Example 3:**

4. A “million match” with a lithium-ion battery and flammable kerosene (Class 3) inside.
5. There is a lithium battery ignition device inside the product, as well as a cotton core soaked in kerosene. When the power is turned on, the ignition device will start immediately when the cotton core is pulled up, igniting the cotton core.
6. In some cases, the kerosene may also be replaced by liquefied butane gas (Division 2.1).



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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport  
of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 10 (c) of the provisional agenda

**Issues relating to the Globally Harmonized System:  
Miscellaneous****Sub-Committee of Experts on the Globally Harmonized  
System of Classification and Labelling of Chemicals****Forty-fifth session**

Geneva, 6-8 December 2023

Item 2 (j) of the provisional agenda

**Work on the Globally Harmonized System of  
Classification and Labelling of Chemicals:  
Other matters****Proposal to add hazard communication for substances or  
mixtures evolving flammable vapours in annex 4 of the  
Globally Harmonized System “Guidance on the preparation  
of Safety Data Sheets (SDS)”****Submitted by the expert from China\*****Introduction**

1. In the current version of the Globally Harmonized System (GHS), no hazard communication is required for substances or mixtures that can evolve flammable vapours but do not themselves meet any physical hazard classification criteria (e.g. expandable polymer beads and plastic moulding compounds in dough form containing foaming agents which are classified as UN 2211 and UN 3314 in transport).
2. At the last session, the expert from China submitted informal document INF.16 (forty-fourth session, GHS Sub-Committee) - INF.34 (sixty-second session, TDG Sub-Committee) proposing to add hazard communication in the safety data sheet for those substances or mixtures that do not meet the criteria to be classified as flammable solids or flammable liquids but capable of evolving flammable vapours. Although the substances and mixtures fail to meet the classification criteria for any physical hazard class listed in part 2 of the GHS, a fire can arise and result in injuries or deaths of human, loss in property, and damage to the environment, if the evolved flammable vapours accumulate and encounter with a potential ignition source (including electrical equipment, electrostatic discharge, hot working such as grinding and welding, etc.).
3. Experts who spoke during the last session shared their experiences and expressed general support on the intention of the document. Some editorial comments were given on

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\* A/77/6 (Sect. 20), table 20.6



the wording of the proposed amendments, including reconsideration of the appropriateness of the expression “explosive vapour” and improving the comprehensibility of the text by splitting A4.3.2.3 into two paragraphs. The proposal below takes account of the comments received.

## Proposal

4. The expert from China would like to propose the following amendments to annex 4 of the GHS (deleted text appears in ~~strike through~~ and new text in **bold underlined**):

A4.3.2.3 Split the current paragraph into two paragraphs (A4.3.2.3.1 and A4.3.2.3.2) and add “formation of a flammable /explosive vapour-air mixture” as an example in the new A4.3.2.3.1, as follows:

“A4.3.2.3 *Other hazards which do not result in classification*

**A4.3.2.3.1** Provide information on other hazards which do not result in classification **under the GHS**, but may contribute to the overall hazards of the material, for example, formation of air contaminants during hardening or processing, **formation of a flammable /explosive vapour-air mixture**, dust explosion hazards, **risk of** suffocation, freezing ~~or~~ **and** environmental effects such as hazardous to soil-dwelling organisms.

**A4.3.2.3.2** To communicate combustible dust hazards, and thus a potential risk of dust explosions under the approach described in annex 11 in a standardized manner, competent authorities may allow the use of the phrases identified in A11.2.7.3 on labels, SDSs and/or in operating instructions or may leave the choice to the manufacturer or supplier.”

A4.3.9.9, table A4.3.9.1 For the “Flammability” entry, amend the third indent in the column “Remarks/Guidance” as follows:

“- if available and appropriate, further information may be indicated in addition, e.g.:

- whether the effect of ignition is other than a normal combustion (e.g. an explosion);
- ignitability under non-standard conditions; **and**
- **whether the substance or mixture can evolve flammable vapour.**

A4.3.10.3 Amend as follows:

“A4.3.10.3 *Possibility of hazardous reactions*

If relevant, state if the substance or mixture will react or polymerize, releasing excess pressure or heat, **evolving flammable vapour (see A4.3.2.3)**, or creating other hazardous conditions. Describe under what conditions the hazardous reactions may occur.”.

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 4 (e) of the provisional agenda

**Electric storage systems:****Sodium-ion batteries****Proposed amendments to special provision 400 and  
classification criteria for lithium and sodium ion batteries****Transmitted by the International Civil Aviation Organization (ICAO)\*****I. Introduction**

1. An informal document was presented to the sixty-second session of the Sub-Committee (informal document INF.24) highlighting the views of the ICAO Dangerous Goods Panel (DGP) on the new special provision assigned to UN 3551 and UN 3552 (SP 400) and on the classification criteria for sodium ion batteries. Potential challenges related to special provision (SP) 400 were raised, and suggestions for editorial amendments in chapter 2.9 were made.

**II. Special provision 400**

2. On the marking specified in paragraph (c) of SP 400, opinions were divided on the benefits and drawbacks of including this marking on such packages. For air transport, a compliance statement must be placed on an air waybill when packages bear the mark. This may disrupt the air cargo acceptance process, thus negating the intent of the special provision. It is therefore proposed to remove the requirement for the mark in SP 400.

**III. Proposal for editorial revisions to the classification criteria  
for sodium ion batteries**

3. Most of the Sub-Committee experts who took the floor supported the editorial revisions. It was noted that the revisions to the classification criteria for sodium ion batteries in chapter 2.9, 2.9.5 should also be made to the lithium battery criteria in 2.9.4 if the ones to

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\* A/77/6 (Sect. 20), table 20.6





2.9.5 were agreed. It was agreed that the revisions would be presented in an official document by ICAO at this session.

4. An additional inconsistency was identified by the DGP whereby a note under the classification criteria for lithium batteries clarifying the intent of “make available” with respect to the test summary report is not repeated under the classification criteria for sodium ion batteries. It is proposed that it be added to chapter 2.9, 2.9.5 under sub-paragraph (f).

## IV. Proposal

5. Amend SP 400 as follows (new text is underlined and in bold, deleted text is stricken-through):

“400 Sodium ion cells and batteries and sodium ion cells and batteries contained in or packed with equipment, prepared and offered for transport, are not subject to other provisions of these Regulations if they meet the following:

(a) The cell or battery is short-circuited, in a way that the cell or battery does not contain electrical energy. The short-circuiting of the cell or battery shall be easily verifiable (e.g., busbar between terminals);

(b) Each cell or battery meets the provisions of 2.9.5 (a), (b), (d), (e) and (f);

~~(c) Each package shall be marked according to 5.2.1.9;~~

~~(d)~~ Except when cells or batteries are installed in equipment, each package shall be capable of withstanding a 1.2 m drop test in any orientation without damage to cells or batteries contained therein, without shifting of the contents so as to allow battery to battery (or cell to cell) contact and without release of contents;

~~(e)~~ Cells and batteries, when installed in equipment shall be protected from damage. When batteries are installed in equipment, the equipment shall be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging’s capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained;

~~(f)~~ Each cell, including when it is a component of a battery, shall only contain dangerous goods that are authorized to be transported in accordance with the provisions of chapter 3.4 and in a quantity not exceeding the quantity specified in column 7a of the Dangerous Goods List of chapter 3.2.”

6. Amend 2.9.4 and 2.9.5 as follows (new text is underlined and in bold, deleted text is stricken-through):

“2.9.4 Lithium batteries

... They may be transported under these entries ~~if they meet the following provisions~~ **provided:**

...

(e) Cells and batteries ~~shall be~~ **are** manufactured under a quality management programme that includes:

...

(g) Except for button cells installed in equipment (including circuit boards), manufacturers and subsequent distributors of cells or batteries manufactured after 30 June 2003 ~~shall make available~~ the test summary as specified in the *Manual of Tests and Criteria*, part III, sub-section 38.3, paragraph 38.3.5 **available**.

**NOTE:** The term “make available” means that manufacturers and subsequent distributors ensure that the test summary for lithium cells or batteries or equipment with installed lithium cells or batteries is accessible so that the consignor or other persons in the supply chain can confirm compliance.

## 2.9.5 Sodium ion batteries

...

They may be transported under these entries ~~if they meet the following provisions~~  
**provided:**

...

(e) Cells and batteries ~~shall be~~ **are** manufactured under a quality management program as prescribed under 2.9.4 (e) (i) to (ix);

(f) Manufacturers and subsequent distributors of cells or batteries ~~shall make available~~ the test summary as specified in the *Manual of Tests and Criteria*, part III, sub-section 38.3, paragraph 38.3.5 **available**.

**NOTE: The term "make available" means that manufacturers and subsequent distributors ensure that the test summary for sodium ion cells or batteries or equipment with installed sodium ion cells or batteries is accessible so that the consignor or other persons in the supply chain can confirm compliance."**



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

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

**Sixty-third session**

Geneva, 27 November-6 December 2023

Item 7 of the provisional agenda

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

**Follow up to the amendments proposed by the Ad hoc  
Working Group on the Harmonization of RID/ADR/ADN with  
the United Nations Recommendations on the Transport of  
Dangerous Goods**

Note by the secretariat\*

**I. Introduction**

1. The *Ad hoc Working Group on the Harmonization of RID/ADR/ADN with the United Nations Recommendations on the Transport of Dangerous Goods* met in Geneva on 26 and 27 April 2023 and prepared a proposal to transpose the amendments to the 22<sup>nd</sup> revised edition of the *Model Regulations* into RID/ADR/ADN. During this process, the Working Group identified several potential additional amendments to the *Model Regulations*. These amendments were discussed during the sixty-second session of the Sub-Committee based on an informal document (INF.13 of the sixty-second session). Most of them were considered editorial and were adopted. However, for two groups of amendments, the Sub-Committee requested the secretariat to come back to the next session with an official proposal.

**II. Amendments to 2.0.5.2, P006 and LP03**

**A. Justification**

2. At its sixty-second session, the Sub-Committee considered that the amendments to 2.0.5.2, P006 and LP03 were not editorial ones since they consisted in the application of existing provisions for articles containing lithium batteries to articles containing sodium ion batteries. It was recalled that the initial intention was to apply the same provisions for lithium batteries and sodium ion batteries. The amendments are again reproduced below.

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\* A/77/6 (Sect. 20), table 20.6



## B. Proposal

- 2.0.5.2 In the second sentence, replace “Lithium cells and batteries” by “Lithium metal, lithium ion and sodium ion cells and batteries”. In the third sentence, replace “Lithium cells or batteries” by “Lithium metal, lithium ion or sodium ion cells or batteries” (twice).
- 4.1.4.1, P006 In (5), first sentence, after “lithium cells or batteries”, add “or sodium ion cells or batteries” (twice).
- 4.1.4.3, LP03 In (4), first sentence, after “lithium cells or batteries”, add “or sodium ion cells or batteries” (twice).

## III. Alternative proposal for the name of the battery mark

### A. Justification

3. Several of the amendments proposed in informal document INF.13 of the sixty-second session introduced a more explicit wording to clearly communicate whether the text refers to lithium ion, lithium metal and/or sodium ion batteries, at the cost of being more verbose. To alleviate this drawback, the secretariat would like to propose an alternative wording for the name of the battery mark.

4. The battery mark is used for lithium (ion or metal) and sodium ion batteries. As this is clearly stated in 5.2.1.9.1, there seems to be no need to repeat this each time a reference is made to the mark, which could be simply called the “battery mark”, as there are no other battery marks in the *Model Regulations*. The proposal below would implement this change and is comprised of alternative amendments to those that were adopted during the sixty-second session for special provision (SP) 188 and sections 5.2.1.9 and 5.2.2.1.13.1.

### B. Proposal

- 3.3.1, SP 188 In (f):
- In the first sentence, replace “lithium or sodium battery mark” by “battery mark”.
  - In the note, replace “(*lithium battery mark*)” by “(*battery mark*)”.
  - In the last paragraph, first sentence, replace “lithium or sodium battery mark” by “battery mark”.
- 5.2.1.9 Amend the heading to read “**Battery mark**”.
- Figure 5.2.5 Amend the heading to read “**Battery mark**”.
- 5.2.2.1.13.1 In the second sentence, replace “lithium or sodium ion batteries” by “lithium batteries or sodium ion batteries” and replace “lithium or sodium ion battery mark” by “battery mark”. In the third sentence, replace “lithium or sodium ion batteries” by “lithium batteries or sodium ion batteries”.

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

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

**26 September 2023**

### **Sixty-third session**

Geneva, 27 November-6 December 2023

Item 6 (c) of the provisional agenda

**Miscellaneous proposals for amendments to the Model Regulations  
on the Transport of Dangerous Goods:  
Portable tanks**

## **Miscellaneous issues of the new sub-chapter 6.9.3 of the Model Regulations and new section 42 of the Manual of Test and Criteria**

**Transmitted by the Russian Federation on behalf of the informal  
working group on FRP service equipment**

### **I. Introduction**

1. According to the report of the Sub-Committee ST/SG/AC.10/C.3/124, paragraph 78, the proposal in informal document UN/SCETDG/62/INF.42 was finally reviewed with some national experts. The comments were received via correspondence.
2. Considering the comments received, sub-chapter 6.9.3 “Requirements for design, construction, inspection and testing of fibre reinforced plastic (FRP) service equipment for portable tanks”, amendments to sub-chapters 6.7.2.5.11, 6.9.1.5 and 6.9.2.5, section 42 “Fire resistance test of FRP service equipment for portable tanks” for the Manual of Test and Criteria, amendments to section 40 were updated. The updates were submitted to the secretariat on 31 August 2023 and are published in official document ST/SG/AC.10/C.3/2023/45.
3. Keeping in mind the experience constantly gained on the FRP matters the informal working group on FRP service equipment may wish to discuss any other miscellaneous issues of the new sub-chapter 6.9.3 and new section 42 of the Manual of Test and Criteria or further discuss matters related to FRP, if any.

### **II. Actions requested**

4. The working group kindly requests the secretariat to reserve a room for ten participants for two days to discuss any issues mentioned in paragraph 3 above and submit this paper to inform the TDG Sub-Committee.
  5. The secretariat reserved Room H-209 (H-building) for an informal working group meeting from Tuesday 28 November 2023 to Wednesday 29 November 2023 (from 9:00 – 18:00).
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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals**

2 October 2023

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

**Sixty-third session**

Geneva, 27 November- 6 December 2023

Item 10 (b) of the provisional agenda

**Issues relating to the Globally Harmonized System:  
Simultaneous classification in physical hazards and  
possible combination of hazards**

**Sub-Committee of Experts on the Globally Harmonized  
System of Classification and Labelling of Chemicals**

**Forty-fifth session**

Geneva, 6-8 December 2023

Item 2 (b) of the provisional agenda

**Work on the Globally Harmonized System of  
Classification and Labelling of Chemicals:  
Simultaneous classification in physical hazards and  
precedence of hazards**

**Aerosols – Alignment of special provision 63 with special  
provision 362**

**Submitted by the European Aerosol Federation (FEA)**

**Introduction**

1. At its sixty-first session, the Sub-Committee of Experts on the Transport of Dangerous Goods discussed some issues arising from the GHS work on combinations of physical hazards from document ST/SG/AC.10/C.3/2022/48-ST/SG/AC.10/C.4/2022/9 (Germany).
2. The Sub-Committee of Experts on the Transport of Dangerous Goods recommended that special provision 63 be aligned with the text of special provision 362.
3. As a follow-up to this recommendation, FEA circulated a discussion paper with a proposal for the informal working group on combinations of physical hazards. The proposal could facilitate discussions within this informal working group over certain notes in the GHS. However, it is not in the terms of reference of this informal working group to consider proposals to amend the Model Regulations.
4. Consequently, FEA decided to submit a proposal to the Sub-Committee of Experts on the Transport of Dangerous Goods and to inform the GHS Sub-Committee accordingly. The proposal has been prepared in cooperation with the Household and Commercial Products Association (HCPA).

**Discussion**

5. Although ‘Aerosol dispensers’ and ‘Chemicals under pressure’ are covered under the same chapter 2.3 of the GHS, and often have similar contents, they are distinct products that serve different markets. About 80 % of the aerosol dispensers sold annually are consumer products which is reflected by distinct approaches to their definition, classification schemes and container construction standards. In particular there are constraints on aerosol dispensers which means that they must not be refilled, are restricted to a maximum total capacity of 1 litre and a maximum internal pressure at 50 °C of 12 bar, 13.2 bar or 15 bar depending on the propellant gas which is used to dispense the product.
6. There are some substances classified as explosive and solid desensitized explosives used as minor components in aerosol dispensers (e.g. nitroglycerin spray for medical use or industrial nitrocellulose as binder in spray lacquers). FEA proposes that this is formally

managed by requiring that the classification as aerosol dispenser (contents as a whole) must not additionally meet the criteria for classification as an explosive or desensitized explosive.

7. Some oxidizing substances from Division 5.1 Oxidizing substances are used in aerosol dispensers. FEA proposes that flammable gases must not be used in combination with oxidising gases (mixtures of flammable gases and oxidizing gases – meeting the criteria of the respective hazard classes) as these could behave as chemically unstable gases.

8. Substances with hazard classifications other than explosive, desensitized explosive and oxidizing substances, i.e.: self-reactive substances; substances liable to spontaneous combustion; substances which, in contact with water, emit flammable gases; organic peroxides; infectious substances; and radioactive material (restricted for chemicals under pressure under special provision 362), have not been identified as ‘components’ of aerosol dispensers. However, FEA proposes aligning the requirements for aerosol dispensers with chemicals under pressure and that an aerosol dispenser (contents as a whole) must not additionally meet the classification criteria for these other hazard classes.

9. FEA wishes to highlight this main difference in approach with special provision 362 for chemicals under pressure, which currently prohibits the use of certain ‘components’ (substances) for transport, which is not appropriate for aerosol dispensers.

## Proposal

10. FEA proposes to amend special provision 63 in the Model Regulations as follows (new text is shown **bold, underlined**, deleted text is marked as ~~striketrough~~):

"The division of Class 2 and the subsidiary hazards depend on the nature of the contents of the aerosol dispenser. The following provisions shall apply:

(a) Division 2.1 applies if the contents include 85 % by mass or more flammable components and the chemical heat of combustion is 30 kJ/g or more;

(b) Division 2.2 applies if the contents contain 1 % by mass or less flammable components and the heat of combustion is less than 20 kJ/g;

(c) Otherwise the product shall be classified as tested by the tests described in the *Manual of Tests and Criteria*, part III, section 31. Extremely flammable and flammable aerosols shall be classified in Division 2.1; non-flammable in Division 2.2;

(d) Gases of Division 2.3 shall not be used as a propellant in an aerosol dispenser;

(e) Where the contents other than the propellant of aerosol dispensers to be ejected are classified as Division 6.1 packing groups II or III or Class 8 packing groups II or III, the aerosol shall have a subsidiary hazard of Division 6.1 or Class 8;

(f) Aerosols ~~with contents~~ **additionally** meeting the **assignment** criteria for **Division 6.1**, packing group I for toxicity or **Class 8, packing group I** for corrosivity shall be prohibited from transport;

(g) **Aerosols additionally meeting the classification criteria of Class 1, explosives; Class 3, liquid desensitized explosives; Division 4.1, self-reactive substances and solid desensitized explosives; Division 4.2, substances liable to spontaneous combustion; Division 4.3, substances which, in contact with water, emit flammable gases; Division 5.2, organic peroxides; Division 6.2, infectious substances; or Class 7, radioactive material, shall be prohibited from transports**

(h) **Aerosols with a mixture of propellant gases simultaneously meeting the classification criteria of Division 2.1, flammable gases and Division 2.2, oxidizing gases, shall be prohibited from transport;**

(i) Subsidiary hazard labels may be required for air transport.

Flammable components are flammable liquids, flammable solids or flammable gases and gas mixtures as defined in notes 1 to 3 of sub-section 31.1.3 of part III of the *Manual of Tests and Criteria*. This designation does not cover pyrophoric, self-

heating or water-reactive substances. The chemical heat of combustion shall be determined by one of the following methods ASTM D 240, ISO/FDIS 13943: 1999 (E/F) 86.1 to 86.3 or NFPA 30B."

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

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

**9 October 2023**

**Sixty-third session**

Geneva, 27 November-6 December 2023

Item 5 (c) of the provisional agenda

**Transport of gases:**

**Miscellaneous**

### **Comment on document ST/SG/AC.10/C.3/2023/34 – Additional consequential amendment on the pV-product**

**Transmitted by the expert from Belgium**

#### **I. Introduction**

1. The discussions held in the working group on the pV-product have led to an acceptable upper limit for pressure receptacles, which takes into account the maximum acceptable societal consequence in a worst-case scenario. Belgium supports in principle the amendments that have already been adopted in square brackets during the sixty-second session of the Sub-Committee of Experts on the Transport of Dangerous Goods.

2. The additional amendments proposed by Germany in document ST/SG/AC.10/C.3/2023/34 aim to include the maximum pressure-volume (pV) product for salvage pressure receptacles and also foresee prescriptions for the proper communication of the pressure-volume product for salvage pressure receptacles. Belgium fully supports these proposals.

3. In addition, in proposal 4 of document ST/SG/AC.10/C.3/2023/34 it is suggested to include a definition for the pV-product in the Model Regulations. Belgium supports this since by including a definition, it is clarified what is intended by the pV-product and as such precludes any possible liberal interpretation of this term.

4. However, since the pV-product would thus become a defined term, the definition should be used where appropriate to make the regulations as clear and concise as possible. As such, it should also be used in the amendment to the definition of bundle of cylinders that was adopted in square brackets during the last session of the Sub-Committee on the basis of document ST/SG/AC.10/C.3/2023/1.

5. This amendment is as follows (see ST/SG/AC.10/AC.3/124/Add.1):

In the definition of “Bundle of cylinders”, at the end, add: “The product of test pressure and total water capacity shall not exceed 1.5 million bar litres”.

#### **II. Proposal**

6. Replace the amendment for the definition of “Bundle of cylinders” adopted in square brackets during the sixty-second session of the Sub-Committee with one of the following options.

**1. Option 1**

7. In the definition of “Bundle of cylinders”, at the end, add: “The sum of the test pressure volume products of the individual cylinders or cylinder shells in the bundle shall not exceed 1.5 million bar litres.”.

**2. Option 2**

8. In the definition of “Bundle of cylinders”, at the end, add: “The test pressure volume product taking into account the total water capacity of all receptacles in the bundle shall not exceed 1.5 million bar litres.”.

**3. Option 3**

9. In the definition of “Bundle of cylinders”, at the end, add: “. The total test pressure volume product shall not exceed 1.5 million bar litres.”.

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

Sub-Committee of Experts on the Transport of Dangerous Goods

10 October 2023

### Sixty-third session

Geneva, 27 November-6 December 2023

Item 6 (b) of the provisional agenda

### Miscellaneous proposals for amendments to the Model Regulations on the Transport of Dangerous Goods: Packagings, including the use of recycled plastics material

## Performance and frequency of tests

### Transmitted by the expert from Germany

## I. Introduction

1. During the sixty-first session of this Sub-Committee the definition of recycled plastics material in 1.2.1 was amended (see ST/SG/AC.10/C.3/122/Add.1). Part of this definition is a regulation on repeating the testing of packagings and IBCs produced from recycled plastics material which reads *“In addition, the packaging or IBC manufacturer's quality assurance programme under 6.1.1.4 or 6.5.4.1 shall include performance of the appropriate mechanical design type tests in 6.1.5 or 6.5.6 on packagings or IBCs, manufactured from each batch of recycled plastics material.”*

## II. Discussion

2. For packagings a comparable regulation is included in 6.1.5.1.3.

3. In the English language version, 6.1.5.1.3 reads *“Tests shall be repeated on production samples at intervals established by the competent authority.”*, which leaves room for interpretation whether all tests or only some tests shall be repeated.

4. In the French language version, 6.1.5.1.3 reads *“Les épreuves doivent être répétées sur des échantillons de production à des intervalles fixés par l'autorité compétente.”* and in the Spanish language version, 6.1.5.1.3 reads *“Los ensayos se repetirán con muestras de producción a intervalos fijados por la autoridad competente.”*. Both linguistic versions could be interpreted in such a way that all tests have to be repeated because a specific article is used (“les” and “los” respectively).

5. Due to the differences between the current wording in 1.2.1 (“Recycled plastics material”) and 6.1.5.1.3 on one hand and the different options for interpretation in the different linguistic versions on the other hand, we propose a clarification in 6.1.5.1.3 that only appropriate mechanical design type tests need to be repeated (see paragraph 10 below). An alternative is presented in paragraph 13 hereafter.

6. An example of a test which might be considered by the competent authority as not being appropriate, i.e. not necessary as a repeated test on production samples, is the stacking test on metal packagings.

7. Identical regulations on repeated testing exist in 6.3.5.1.3 for Class 6.2 packagings and in 6.6.5.1.3 for large packagings. Hence, if the proposal given in paragraph 10 below should be adopted it would be consequential to adopt the proposals for Class 6.2 packagings (paragraph 11) and for large packagings (paragraph 12) as well.

8. IBC regulations comparable to 6.1.5.1.3, 6.3.5.1.3 and 6.6.5.1.3 are not included in chapter 6.5. Therefore, no proposal is presented for IBCs.

9. This document supports Sustainable Development Goal 16.6 – Develop effective, accountable and transparent institutions at all levels of the UN Agenda 2030 by avoiding different requirements within the Model Regulations as well as its linguistic versions.

### III. Proposals

10. Amend the first sentence of 6.1.5.1.3 as follows (new text is underlined, deleted text is stricken-through):

*“Appropriate mechanical design type tests~~Tests~~ shall be repeated on production samples at intervals established by the competent authority.”*

11. Amend 6.3.5.1.3 as follows (new text is underlined, deleted text is stricken-through):

*“Appropriate mechanical design type tests~~Tests~~ shall be repeated on production samples at intervals established by the competent authority.”*

12. Amend the first sentence of 6.6.5.1.3 as follows (new text is underlined, deleted text is stricken-through):

*“Appropriate mechanical design type tests~~Tests~~ shall be repeated on production samples at intervals established by the competent authority.”*

13. Alternatively, the French and Spanish language versions of 6.1.5.1.3, 6.3.5.1.3 and 6.6.5.1.3 could be amended by replacing the specific article (“les” and “los” respectively) by the corresponding indefinite article. In this case it might be beneficial to include a clarification on the scope of the affected paragraphs into the report, i.e. that the current wording in the English language version already gives the competent authority the right to waive some of the tests.

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

12 October 2023

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

**Sixty-third session**

Geneva, 27 November- 6 December 2023

Item 10 (b) of the provisional agenda

**Issues relating to the Globally Harmonized System  
of Classification and Labelling of Chemicals:  
Simultaneous classification in physical hazards and  
possible combination of hazards**

**Sub-Committee of Experts on the Globally Harmonized  
System of Classification and Labelling of Chemicals**

**Forty-fifth session**

Geneva, 6-8 December 2023

Item 2 (b) of the provisional agenda

**Work on the Globally Harmonized System of  
Classification and Labelling of Chemicals:  
Simultaneous classification in physical hazards and  
precedence of hazards**

**Informal working group on combinations of physical  
hazards: Notes for aerosols and chemicals under pressure**

**Transmitted by the expert from Germany on behalf of the informal  
working group**

**I. Introduction**

1. The group has finalized its considerations on the combinations of aerosols and chemicals under pressure with the other physical hazard classes.
2. As stated in the GHS in Note 3 in 2.3.1.2.1 and in Note 2 in 2.3.2.2.2 neither aerosols nor chemicals under pressure should be additionally classified as flammable gases, gases under pressure, flammable liquids or flammable solids. Moreover, aerosols should not be classified as chemicals under pressure and vice versa, chemicals under pressure should not be classified as aerosols.
3. On the combinations of aerosols and chemicals under pressure with the other physical hazards, the group concluded that they all could be possible, even though practical cases have not been identified for some of the combinations. Consequently, none of the other combinations should be excluded.
4. To avoid any ambiguity, the group suggests some amendments to the existing Notes.

**II. Justification**

5. The main issue is that Note 1 below Table 2.3.1 for aerosols is worded such that different interpretations would be possible whether the mentioned combinations are just never used or whether they are to be excluded by definition – which then would contradict the conclusion in paragraph 3. In a similar way Note 1 below Table 2.3.3 for chemicals under pressure might be interpreted differently whether the combinations that are not allowed for transport are then also supposed to be excluded under the GHS or not.
6. Furthermore, the exclusion of the combinations in line with paragraph 2 above are deemed to be normative and thus should be in the main text rather than in a Note. The other information such as the explanations for the specific regulations for the purposes of transport is informative and thus should be kept in Notes.
7. Further explanations for the amendments are given in paragraphs 9 and 15 below. The proposal for chemicals under pressure is presented first because the respective special provision 362 in the UN Model Regulations is more recent than the corresponding special

provision 63 for aerosols, and document UN/SCETDG/63/INF.4-UN/SCEGHS/45/INF.4 by FEA already proposes to align these two special provisions. Similarly, the group seeks to align the notes for chemicals under pressure and aerosols in the GHS.

### III. Proposals

#### Chemicals under pressure

8. The current notes below Table 2.3.3 read as follows:

“NOTE 1: The flammable components in a chemical under pressure do not include pyrophoric, self-heating or water-reactive, substances and mixtures because such components are not allowed in chemicals under pressure in accordance with the UN Model Regulations.

NOTE 2: Chemicals under pressure do not fall additionally within the scope of section 2.3.1 (aerosols), chapters 2.2 (flammable gases), 2.5 (gases under pressure), 2.6 (flammable liquids) and 2.7 (flammable solids). Depending on their contents, chemicals under pressure may however fall within the scope of other hazard classes, including their labelling elements.”

#### Option 1 for chemicals under pressure

9. In addition to the justification above, some further considerations were taken into account:

- (a) The order of the Notes is changed. The revised text starts with current Note 2 because it refers to the GHS itself.
- (b) In the proposed revision the text of current Note 2 is divided because the first sentence is related to the exclusion of certain specific combinations whereas the second sentence is related to the possible additional application of other hazard classes.
- (c) Furthermore, the first part on the exclusion of certain combinations is proposed to become main text (as a new paragraph 2.3.2.1.2) because it deviates from the principle of the GHS that all combinations are generally possible.
- (d) The second part on the possible application of other hazard classes only highlights a principle that already applies and as such is informative and should be in the form of a Note.
- (e) In the proposed revision, the text of current Note 1 is put at the end of the notes because it contains informative text about (deviating) principles in other sectors – specifically transport (currently in Note 1). The wording is amended such that it reflects more closely special provision 362 and adds an according reference.

10. The resulting text reads as follows:

“2.3.2.1 Definition and general considerations

2.3.2.1.1 [definition as currently given in 2.3.2.1]

2.3.2.1.2 Chemicals under pressure do not fall additionally within the scope of section 2.3.1 (aerosols), chapters 2.2 (flammable gases), 2.5 (gases under pressure), 2.6 (flammable liquids) and 2.7 (flammable solids).”

The following Notes remain below Table 2.3.3:

“NOTE 1: Depending on their contents, chemicals under pressure may fall within the scope of other hazard classes than those mentioned in 2.3.2.1.2, including their labelling elements.

NOTE 2: Some sectors, e.g. transport, may have other specific regulations regarding the applicability of other hazard classes. For example, chemicals under pressure may

not contain components meeting the properties of: Class 1, explosives; Class 3, liquid desensitized explosives; Division 4.1, self-reactive substances and solid desensitized explosives; Division 4.2, substances liable to spontaneous combustion; Division 4.3, substances which, in contact with water, emit flammable gases; Division 5.1 oxidizing substances; Division 5.2, organic peroxides in order to be transported as chemicals under pressure (see special provision 362 of the Model Regulations)."

#### **Option 2 for Notes 1 and 2 for chemicals under pressure**

11. Are the last four words "including their labelling elements" in Note 1 needed?
- (a) There might be a historical background for their addition because the approach under the GHS is different from that for transport and these words were meant to ensure that all information is on the label.
- (b) On the other hand, it is a general principle of the GHS that classification always includes the requirement for all appropriate labelling. Stating it here, might raise the question why it is mentioned explicitly here but not at all other places.
12. In the new Note 2, should the respective content of special provision 362 be repeated or should only a reference be given?
- (a) Repeating the contents has the advantage that it might be helpful for those who are not so familiar with the Model Regulations and would spare the reader to actually look it up.
- (b) On the other hand, it might be a drawback because it would have to be amended again, should transport amend the according text. Experience shows that consequential amendments are sometimes overlooked.
13. Notes 1 and 2 would then read as follows:
- "NOTE 1: Depending on their contents, chemicals under pressure may fall within the scope of other hazard classes than those mentioned in 2.3.2.1.2.
- NOTE 2: Some sectors, e.g. transport, may have other specific regulations regarding the applicability of other hazard classes. For chemicals under pressure, see special provision 362 of the Model Regulations."

#### **Aerosols**

14. The current Notes below Table 2.3.1 read as follows:
- "NOTE 1: Flammable components do not cover pyrophoric, self-heating or water-reactive substances and mixtures because such components are never used as aerosol contents.
- NOTE 2: Aerosols containing more than 1 % flammable components or with a heat of combustion of at least 20 kJ/g, which are not submitted to the flammability classification procedures in this chapter should be classified as aerosols, Category 1.
- NOTE 3: Aerosols do not fall additionally within the scope of chapter 2.2 (flammable gases), section 2.3.2 (chemicals under pressure), chapters 2.5 (gases under pressure), 2.6 (flammable liquids) and 2.7 (flammable solids). Depending on their contents, aerosols may however fall within the scope of other hazard classes, including their labelling elements."

#### **Option 1 for aerosols**

15. In addition to the justifications given in paragraphs 5 and 6 above, equivalent considerations as mentioned above in paragraph 9 for chemicals under pressure were taken into account. The text for the resulting Note 3 is worded in line with the proposal in UN/SCETDG/63/INF.4-UN/SCEGHS/45/INF.4 by FEA and of course is supposed to be amended in line with any decision the Sub-Committee TDG might take.

16. With these amendments the resulting text would be as follows:

“2.3.1.1 Definition and general considerations

2.3.1.1.1 [definition as currently given in 2.3.1.1]

2.3.1.1.2. Aerosols do not fall additionally within the scope of section 2.3.2 (chemicals under pressure), chapters 2.2 (flammable gases), 2.5 (gases under pressure), 2.6 (flammable liquids) and 2.7 (flammable solids).

The following Notes remain below Table 2.3.1:

NOTE 1: [text of current Note 2. This note is not in the scope of this working group – however, the group identified some potential for improvement: 1. make it main text as it is normative and 2. reword it slightly to become more unambiguous. The group seeks advice of the Sub-Committees whether this might be proposed by the group as well or whether this should be done separately.]

NOTE 2: Depending on their contents, aerosols may fall within the scope of other hazard classes than those mentioned in 2.3.1.1.2, including their labelling elements.

NOTE 3: Some sectors, e.g. transport, may have other specific regulations regarding the applicability of other hazard classes. For example, aerosols may not meet the classification criteria of Class 1, explosives; Class 3, liquid desensitized explosives; Division 4.1, self-reactive substances and solid desensitized explosives; Division 4.2, substances liable to spontaneous combustion; Division 4.3, substances which, in contact with water, emit flammable gases; Division 5.2, organic peroxides in order to be transported as aerosols (see special provision 63 (g) of the Model Regulations). Additionally, their propellant may not be a mixture of gases meeting the classification criteria of Division 2.1, flammable gases and Division 2.2, oxidizing gases (see special provision 63 (h) of the Model Regulations).”

#### **Option 2 for Notes 1 and 2 for aerosols**

17. In addition to the questions as posed in paragraphs 11 and 12 above, the following additional question arises for aerosols: Would an amendment as shown underlined in the box below be deemed useful – because the container plays a role for the classification in the hazard class “Aerosols” as opposed to most other hazard classes?

18. Notes 1 and 2 would then read as follows:

“NOTE 1: Depending on their contents, aerosols may fall within the scope of other hazard classes than those mentioned in 2.3.1.1.2. The applicability of other physical hazard classes is established by classification of the contents as a whole.

NOTE 2: Some sectors, e.g. transport, may have other specific regulations regarding the applicability of other hazard classes. For aerosols, see special provision 63 of the Model Regulations.”

## **IV. Possible consequential amendments**

19. When going through the equivalent Notes in the excluded hazard classes, which are Note 2 below Table 2.2.1 (Chapter 2.2), Note below Table 2.5.1 (Chapter 2.5), Note 4 below Table 2.6.1 (Chapter 2.6) and Note 2 below Table 2.7.1. (Chapter 2.7), we found that only the Note below Table 2.5.1 (Chapter 2.5) has been amended to include the exclusion relating to chemicals under pressure. However, the other Notes were not amended to reflect the according exclusions for chemicals under pressure. For consistency, we propose to amend these other existing Notes as follows:

- (a) Amend Note 2 below Table 2.2.1 in chapter 2.2 as follows:  
“Note 2: Aerosols and chemicals under pressure should not be classified as flammable gases. See chapter 2.3.”



(b) Amend Note 4 below Table 2.6.1 in chapter 2.6 as follows:  
“Note 4: Aerosols and chemicals under pressure should not be classified as flammable liquids. See chapter 2.3.”

(c) Amend Note 2 below Table 2.7.1 in chapter 2.7 as follows:  
“Note 2: Aerosols and chemicals under pressure should not be classified as flammable solids. See chapter 2.3.”

## V. Requests to the Sub-Committees

20. The Sub-Committees TDG and GHS are invited to consider the above proposals in paragraphs 10 and 16. Additionally, we would appreciate comments on the alternative options as presented in paragraphs 13 and 18. Moreover, we seek the views of the Sub-Committees on the amendments as proposed in paragraph 19.

21. The working group wants to point out that in a later stage of its work, it might reconsider where to put information on possible or impossible combinations. For the time being, we therefore would appreciate the Sub-Committee’s feedback rather on the proposed text itself than on its proposed location.

22. Additionally, we would like to point out that the above proposals do not include amendments to the transport regulations but that we rather seek the advice of the Sub-Committee TDG as the focal point for physical hazards.

23. The working group aims at preparing an official document in 2024 taking into account the comments received by the Sub-Committees.

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

17 October 2023

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

#### Sixty-third session

Geneva, 27 November – 6 December 2023

Item 11 of the provisional agenda

#### Unified interpretations of the Model Regulations

## Approval of modified intermediate bulk containers

### Submitted by the expert from the Netherlands

## I. Introduction

1. In the Netherlands inspections have indicated that modified Intermediate Bulk Containers (IBCs) are in use. These modifications do not conform to the design type, on which the approval of the original IBCs is based. It was questioned if additional (design type) tests are required for these modified IBCs for approval and certification and if these modified IBCs should be subject to initial and periodic inspection and tests.
2. An example of a modification that was made to IBCs is that couplings have been fitted to the top of the IBC in the manhole cover to connect a pressure hose for a pump or generator. These connections were not on the drawings of the original design type and were fitted afterwards by the user.
3. The manufacturer of these IBCs indicated that they never install such couplings in the manhole cover of these IBCs. It appears that these IBCs were not reassessed after having been modified and that no (supplementary or initial) inspections were performed. In these specific cases no approval was given on the materials used or the welding programme and no hydraulic pressure test was carried out. It seems that the IBCs were subsequently tested several times periodically after the modification under 6.5.4.4 of the *Model Regulations*.
4. Our understanding is that these modified IBCs do not meet the definition of repaired IBC (6.5.4.5) nor the definition of routine maintenance of rigid IBC (1.2.1), but it does meet the definition of remanufactured IBC (1.2.1).
5. According to 1.2.1 remanufactured IBCs are subject to the same requirements of the *Model Regulations* that apply to new IBCs of the same type (see also design type definition in 6.5.6.1.1).
6. In our view a modified IBC is in fact a remanufactured IBC and should be subjected to a full test according to 6.5.6.3.5 that apply to new IBCs of the same type to get a new approval, certification and mark.

## II. Conclusions of the Joint Meeting

7. Since 1.2.1 and 6.5.6.3.5 of the *Model Regulations* are harmonized with 1.2.1 and 6.5.6.3.7 of RID/ADR, this was discussed in the autumn 2023 session of the RID/ADR/ADN Joint Meeting (see the Joint Meeting's report ECE/TRANS/WP.15/AC.1/170, paragraph 53 and document ECE/TRANS/WP.15/AC.1/2023/31 of that session).
8. The Joint Meeting endorsed the interpretation by the Netherlands of modified intermediate bulk containers. The representative of the Netherlands offered to share the

outcome of the discussion with the Sub-Committee of Experts on the Transport of Dangerous Goods.

### **III. Request**

9. The Sub-Committee of Experts on the Transport of Dangerous Goods is invited to confirm this interpretation and to act, as it deems appropriate.

### **IV. Justification**

10. The aim of this document is to facilitate the clarification in the *Model Regulations* on the use of modified IBCs and to prevent unsafe situations during the transport of dangerous goods in such IBCs.

11. Ensuring a more systematic approach and a better rationale in the *Model Regulations* helps to develop clearer legal texts and avoid different criteria among different countries and inspection services, and thus helps to implement the United Nations Sustainable Development Goal number 16: Peace, justice and strong institutions.

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

17 October 2023

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

**Sixty-third session**

Geneva, 27 November – 6 December 2023

Item 3 of the provisional agenda

**Listing, classification and packing**

## **Hermetically sealed packaging**

### **Submitted by the expert from the Netherlands**

#### **I. Introduction**

1. At the sixty-second session of the Sub-Committee, the expert from the Netherlands submitted informal document INF.6 on identified safety problems concerning hermetically sealed packagings where dangerous goods were found to have egressed from approved intact packagings. The expert from the Netherlands is grateful for all the valuable comments received.

2. As discussed at the sixty-second session, the *Model Regulations* do not provide a definition of the term “hermetically sealed”. Furthermore, the various packing instructions which require hermetically sealed packaging for certain dangerous goods do not include any specific requirements nor criteria to unambiguously determine whether a packaging is hermetically sealed or not.

3. From the report of the sixty-second session (document ST/SG/AC.10/C.3/124, paragraph 45), it was noted that:

“The Sub-Committee agreed on the need to clarify in the *Model Regulations* the term “hermetically sealed”. Most of the experts who spoke were of the opinion that it should be defined as “air or gas tight”, but in addition to such a definition, an appropriate test method could be considered including a proof that the dangerous goods packagings remain sealed during transport. The expert from the Netherlands invited all experts to send him further written comments and volunteered to work on a more detailed proposal for consideration at the next session.”

#### **II. Approach**

4. The interpretation of “hermetically sealed packaging” includes on one hand side the unintended egress of dangerous goods from the packaging and on the other, the entry of water, moisture or air into the packaging that may react dangerously with its contents. To solve the current problems, it is proposed to follow a two-step approach. The first step is to come up with a (preliminary) definition of “hermetically sealed” for packaging. This definition will set the base for step 2: developing the necessary associated criteria and tests on how to achieve hermetically sealed packaging. To develop such criteria and tests it is essential to have a common view on what is meant by hermetically sealed packaging. If new insights gained in step 2 require the preliminary definition determined in step 1 to be altered, then this will be done accordingly.

5. The aim of this document is to initiate the discussion on the definition of hermetically sealed packaging. Based on the input received, the expert from the Netherlands will submit an official document for the next session of the Sub-Committee.

### III. Definition of hermetically sealed packaging

6. Besides the *Model Regulations*, other regulations such as RID, ADR, ADN and ICAO TI, do neither provide a definition for “hermetically sealed”. The IMDG Code however does provide a brief definition in paragraph 4.1.0 as follows:

“Hermetically sealed: vapour-tight closure.”

7. The wording “vapour tight” as used in the IMDG Code, is only used once in the *Model Regulations*, in packing instruction P301 which is assigned to UN No. 3165 AIRCRAFT HYDRAULIC POWER UNIT FUEL TANK, and is therefore not a commonly used term in the Regulations.

8. In the report of the last session it was noted that hermetically sealed should be defined as “air or gas tight”. The term “gas-tight” is used at multiple locations in the *Model Regulations*, sometimes in the same packing instruction as “hermetically sealed”, such as in packing instructions P601 (4b) and P602 (4b). The term “air tight” is however not yet mentioned in the *Model Regulations*, although “air tightness” is used in paragraph 6.5.6.7.3 related to the leakproofness test.

9. In other parts of the *Model Regulations* (special provisions 342, packing instruction P200 and paragraph 5.2.1.7.2) “leak-tight” is used to ensure that there is no egress of dangerous goods from the packaging. Although in paragraph 5.2.1.7.2 both “leak-tight” and “hermetically sealed” are used in different indents which seems to indicate a different meaning. “Leaktight” is mentioned in paragraph 6.4.11.8, while “watertight” is used in paragraphs 4.3.2.6 and 6.4.11.8. Therefore, it seems that different terms are used throughout the *Model Regulations* to indicate that there shall be no leakage whatsoever from a packaging.

10. The difference between some of these terms seems to relate to the physical state of a substance (i.e. liquid, vapour or gas). The expert from the Netherlands is of the opinion that the definition should refer to an air-tight or leak-tight packaging, instead of gas-, water- or vapour-tight, in order to ensure that a hermetically sealed packaging encompasses all type of substances.

11. Furthermore, it needs to be considered whether air- or leak-tight means from the inside out (e.g. for substances with inhalation toxicity), from the outside in (e.g. no air or moisture should enter the packaging to prevent contamination of the contents), or both.

12. When it comes to the type of closures used, in P403 the requirement “hermetically sealed” is accompanied by an example of how to achieve that: “Inner packagings shall be hermetically sealed (e.g. by taping or by threaded closures).”. Additionally, the definition should also make clear that the packaging functions adequately during transport. Although the latter may depend on the duration of the transport and thus on the transport mode.

13. To summarize, a definition should refer to an air-tight or leak-tight closure that functions adequately under normal transport conditions.

### IV. Proposal

14. Two options are proposed to add a definition for “hermetically sealed” in section 1.2.1 of the *Model Regulations*, as follows:

#### 1. Option 1

15. *Hermetically sealed* means an air-tight closure for packaging that is designed and constructed in such a way that there is no egress from or ingress into the package under normal conditions of transport;

## 2. Option 2

16. *Hermetically sealed* means a leak-tight closure for packaging that is designed and constructed in such a way that there is no egress from or ingress into the package under normal conditions of transport;

17. The expert from the Netherlands is interested in hearing the views of the Sub-Committee on the proposed definition.

## V. Sustainable Development Goals

18. By formulating a definition for hermetically sealed, the Sub-Committee helps to implement the United Nations Sustainable Development Goal 3: Ensure healthy lives and promote well-being for all at all ages and its target to substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination, and Sustainable Development Goal 12: Ensure sustainable consumption and production patterns and its target to achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

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

17 October 2023

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

#### Sixty-third session

Geneva, 27 November – 6 December 2023

Item 6 (c) of the provisional agenda

#### Miscellaneous proposals for amendments to the Model Regulations on the Transport of Dangerous Goods: Portable tanks

### Clarification of the provisions on the holding time for the transport of portable tanks with refrigerated liquefied gases, especially when these are empty, not cleaned

Submitted by the International Union of Railways (UIC)

## I. Introduction

1. This proposal concerns tank wagons used in rail transport and tank containers and portable tanks used in combined transport with rail.
2. At its autumn 2023 session, the RID/ADR/ADN Joint Meeting discussed the proposal submitted by UIC: “Clarification of the provisions on the holding time for the carriage of tanks with refrigerated liquefied gases” (ECE/TRANS/WP.15/AC.1/2023/26).
3. In this document, UIC proposed:
  - (a) To add clarifications for tanks/tank-containers to RID/ADR/ADN 4.3.3.6;
  - (b) To submit corresponding clarifications for portable tanks in the *Model Regulations* 4.2.3.8; and
  - (c) To make explicit what is regarded as the responsibility of the consignor namely, to determine the holding time and to dispatch portable tanks which are empty not cleaned with the pressure lowered to such an extent that the pressure limiting device(s) will not activate during transport by rail.
4. Based on the proposal and the expert discussion, the Informal Working Group on Tanks of the Joint Meeting concluded the following<sup>1</sup>:

**“Item 3: Clarification of the provisions on the holding time for the carriage of tanks with refrigerated liquefied gases.”**

Document: ECE/TRANS/WP.15/AC.1/2023/26 (UIC)
5. There was general support for the principle. It was agreed that the consignor is responsible for offering the empty uncleaned tank-wagons and tank-containers in a condition that the pressure relief devices are not activated during carriage.
6. It was discussed that wording along the same lines as reproduced below could be used to amend chapter 4.2.
7. The following proposal was adopted after a modification of the proposed wording and it was agreed that wording along these lines could be used in RID/ADR/ADN for portable tanks:

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<sup>1</sup> Quoted from item3 of INF.46 on the [report of the Working Group on Tanks](#).

## Proposal 4

Amend 4.3.3.5 by adding a new sentence at the end to read:

*“The requirements of 4.3.3.5 need not be complied with for empty, uncleaned tanks/tank-containers.”*

## Proposal 5

Amend 4.3.3.6 to read (new wording underlined):

4.3.3.6 Tanks/Tank-containers shall not be offered for carriage:

- (a) In an ullage condition liable to produce an unacceptable hydraulic force due to surge within the shell;
- (b) When leaking;
- (c) When damaged to such an extent that the integrity of the tank-container or its lifting or securing arrangements may be affected;
- (d) Unless the service equipment has been examined and found to be in good working order;

and for refrigerated liquefied gases:

- (e) Unless the actual holding time for the refrigerated liquefied gas being carried has been determined;
- (f) Unless the duration of carriage, after taking into consideration any delays which might be encountered, does not exceed the actual holding time;
- (g) Unless the pressure is steady and has been lowered to a level such that the actual holding time may be achieved<sup>4</sup>;

(h) When empty, uncleaned, unless the pressure has been reduced to a level that ensures that the pressure relief devices will not activate during carriage<sup>4</sup>.

Footnote “4” in 4.3.3.6 refers to “Guidance is provided in the European Industrial Gases Association (EIGA) document “Methods to prevent the premature activation of relief devices on tanks” available at <https://www.eiga.eu/>.” This document is also referenced in RID/ADR 4.2.3.8 concerning portable tanks, but not in the *Model Regulations*.

8. The above amendments to RID/ADR/ADN 4.3.3.5 and 4.3.3.6 were approved by the Joint Meeting. They will be submitted for formal approval for the 2025 edition of RID/ADR/ADN to the OTIF RID Committee of Experts and to the UNECE Working Party on the Transport of Dangerous Goods (WP.15) respectively.

## II. Proposal

9. To obtain a simultaneous amendment of the corresponding provisions in the *Model Regulations* applicable to portable tanks, UIC submits to the Sub-Committee of Experts on the Transport of Dangerous Goods the following proposal (new text in italics, underscored, and text to be deleted in ~~strike through~~):

4.2.3.7.1 The actual holding time shall be calculated for each journey in accordance with a procedure recognized by the competent authority, on the basis of the following:

- (a) The reference holding time for the refrigerated liquefied gas to be transported (see 6.7.4.2.8.1) (as indicated on the plate referred to in 6.7.4.15.1);
- (b) The actual filling density;
- (c) The actual filling pressure;
- (d) The lowest set pressure of the pressure limiting device(s).



These requirements need not be complied with for empty portable tanks not uncleaned.

4.2.3.8 Portable tanks shall not be offered for transport:

- (a) In an ullage condition liable to produce an unacceptable hydraulic force due to surge within the shell;
- (b) When leaking;
- (c) When damaged to such an extent that the integrity of the portable tank or its lifting or securing arrangements may be affected;
- (d) Unless the service equipment has been examined and found to be in good working order;
- (e) Unless the actual holding time for the refrigerated liquefied gas being transported has been determined in accordance with 4.2.3.7 and the portable tank is marked in accordance with 6.7.4.15.2; ~~and~~
- (f) Unless the duration of transport, after taking into consideration any delays which might be encountered, does not exceed the actual holding time; and

(g) When empty not cleaned, unless the pressure has been reduced to a level that guarantees that the pressure limiting device(s) will not activate during transport.

10. The addition "and for refrigerated liquefied gases:" as done in RID/ADR 4.3.3.6 is not necessary for 4.2.3.8, because this paragraph falls under 4.2.3, which is exclusively for refrigerated liquefied gases. Therefore, only the addition of (g) is required for the paragraph to be aligned with RID/ADR 4.3.3.5 and 4.3.3.6.

### III. Justification

11. In transport of tanks, tank-containers or portable tanks for refrigerated liquefied gases that are empty not cleaned, it occurs on a regular basis that during transport the pressure relieve device(s) are activated.

12. Although experts are well aware that the activation of pressure limiting device(s) by residual refrigerated liquefied gases does not pose a hazard, transport is not accompanied by these experts. It therefore occurs that vigilant non-experts (for example railway personnel or citizens near the track side, such as in railway stations) notice the activated pressure limiting device(s) and sound the alarm. As a consequence, railway operations are usually severely affected due to track closures and fire brigade deployments.

13. UIC and the European Industrial Gases Association (EIGA) are in agreement that this is a problem, especially with the transport of refrigerated liquefied gas residues and that this is mostly due to residual pressure in tanks not being sufficiently lowered for empty runs.

14. In railway transport, the following refrigerated liquefied gases are the most affected by the problem: UN 1951 ARGON, REFRIGERATED, LIQUID, UN 1977 NITROGEN, REFRIGERATED, LIQUID and UN 2187 CARBON DIOXIDE, REFRIGERATED, LIQUID.

15. In road transport (or during the road-based part of a combined rail-road transport) this problem does not occur, as the driver can take the necessary measures to reduce the pressure.

16. To reduce these occurrences, additional provisions have been included in the EIGA guidance document "Methods to prevent the premature activation of relief devices on transport tanks". For example, Appendix A "Example of a Tank Wagon/Portable Tank/Tank Container inspection sheet" was introduced, which lists, among other items, product-related residual pressures for the transport of empty tanks.

17. In addition to the problem of premature activation of pressure relive device(s), it is not always clear either to competent authorities or employees that return the empty refrigerated liquefied gases tanks/tank-containers/portable tanks from the unloading site, that

the holding time only has to be determined when these are filled<sup>2</sup>. With the amendment of RID/ADR 4.3.3.5, the Joint Meeting has clarified that for tanks/tank-containers.

18. With the amendments to RID/ADR 4.3.3.6, UIC sought to clarify what action shall be taken before transport of tanks/tank-containers that are empty not cleaned, to prevent the premature activation of the pressure limiting device(s).

19. As the described problems also apply to portable tanks for refrigerated liquefied gases used in multi-modal transport, UIC proposes the above corresponding amendments to the *Model Regulations*.

20. The requested amendments to the *Model Regulations*:

- (a) Will minimise the risk of the undesirable opening of pressure limiting devices during transport of empty not cleaned portable tanks;
- (b) Clarify when the holding time shall be determined and when not, while keeping the changes simple and to a minimum.

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<sup>2</sup> See paragraph 12 in the report of the working group on tanks ECE/TRANS/WP.15/AC.1/164/Add.1.

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

24 October 2023

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

**Sixty-third session**

Geneva, 27 November – 6 December 2023

Item 3 of the provisional agenda

**Listing, classification and packing**

**Present and future products in the LPG industry - proposal  
for a new UN number**

**Correction to document ST/SG/AC.10/C.3/2023/32**

**Transmitted by the World LPG Association - WLPGA**

**I. Introduction**

1. Document ST/SG/AC.10/C.3/2023/32 set out the proposal for a new UN number for mixtures of Dimethyl Ether and LPG. Unfortunately, during editing, the proposed new entries for 3.2.2, 4.1.4.1 P200 and 4.3.5.2.6 T50 had become inadvertently transposed.

**II. Proposal**

2. Replace in ST/SG/AC.10/C.3/2023/32 II the proposals in 11, 12 and 13 as follows:

11. Add a new entry to the Dangerous Goods List in 3.2.2 as follows:

(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
XXXX	HYDROCARBON GASES, UN NUMBERS 1075, 1965, 1011, 1012, 1055, 1969, OR 1978 , AND DIMETHYL ETHER UN1033, MIXTURES, LIQUEFIED	2.1			274, 392	0	E0	P200		T50	

12. In 4.1.4.1 packing instruction P200, Table 2, add new entry as follows:

UN No.	Name and description	Class or Division	Subsidiary Hazard	LC <sub>50</sub> (ml/m <sup>3</sup> )	Cylinders	Tubes	Pressure Drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special paking provisions
XXXX	HYDROCARBON GASES, UN NUMBERS 1075 1965, 1011, 1012, 1055, 1969, OR 1978 , AND DIMETHYL ETHER UN 1033, MIXTURES, LIQUEFIED	2.1			X	X	X			10			z

13. In 4.2.5.2.6 portable tank instruction T50, add a new entry as follows:

UN No.	Non-refrigerated liquefied gases	Max.allowable working pressure (bar) Small: Bare; Sunshield; Insulated: respectively <sup>a</sup>	Openings below liquid level	Pressure-relief requirements <sup>b</sup> (see 6.7.3.7)	Maximum filling ratio
XXXX	Hydrocarbon gases, UN numbers 1075 1965, 1011, 1012, 1055, 1969, or 1978 , and dimethyl ether UN 1033, mixtures, liquefied	See MAWP definition in 6.7.3.1	Allowed	Normal	See 4.2.2.7

**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****26 October 2023****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 7 of the provisional agenda

**Global harmonization of transport of dangerous  
goods regulations with the Model Regulations****Amendments to the Model Regulations proposed by the Joint  
Meeting of the RID Committee of Experts and the Working  
Party on the Transport of Dangerous Goods****Note by the secretariat****I. Introduction**

During its autumn 2023 session, the *Joint Meeting of the RID Committee of Experts and the Working Party on the Transport of Dangerous Goods* reviewed the recommendations made by the *Ad hoc Working Group on the Harmonization of RID/ADR/ADN with the United Nations Recommendations on the Transport of Dangerous Goods*. In the course of this review, the *Joint Meeting* identified some editorial modifications that would also be applicable to the text of the *Model Regulations*. They are all limited to grammatical improvements, and they are included below for consideration of the *Sub-Committee*.

**II. Proposals****A. English***Chapter 3.3*

SP 400 In (a), replace “shall be” by “is”. In (c), replace “shall be” by “is”. In (d), replace “shall be” by “is”. In (e), first sentence, replace “shall be” by “are”. In (e), second sentence, replace “shall be” by “is”. In (f), replace “shall only contain” by “only contains”.

SP 406 Replace “This entry” by “Substances under this entry”.

SP 407 In (b), replace “shall be” by “is”. In (c), replace “shall be” by “is” and “shall not” by “do not”. In (d), replace “shall be” by “is”.

*Chapter 4.1*

4.1.4.1, P006 In the first sentence of the new (5), replace “have not met” by “has not met”.

**B. French***Chapitre 3.3*

DS 400 À l’alinéa a), remplacer « doit être » par « est ». À l’alinéa d), remplacer « doit pouvoir résister » par « peut résister ». À l’alinéa e), première phrase, remplacer « doivent être protégées » par « sont protégées ». À l’alinéa e),

deuxième phrase, remplacer « doit être » par « est ». À l'alinéa f), remplacer « doit contenir » par « contient ».

DS 406 Remplacer « Cette rubrique peut être transportée » par « Les matières de cette rubrique peuvent être transportées ».

DS 407 À l'alinéa c), remplacer « doit être » par « est ». À l'alinéa d), remplacer « ne sera » par « n'est ».

*Chapitre 4.1*

4.1.4.1, P006 La modification dans la version anglaise ne s'applique pas au texte français.

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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****30 October 2023****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 4 (e) of the provisional agenda

**Electric storage systems:****Sodium-ion batteries****Transport of sodium ion batteries with organic electrolyte  
installed in cargo transport unit****Transmitted by the expert from China****I. Background**

1. Sodium ion batteries with organic electrolyte have the advantages of strong low temperature performance, low price and abundant mineral resources, which have been used in many fields, especially in the energy storage industry. The Sub-Committee approved to include two entries of sodium ion batteries with organic electrolyte in the UN *Model Regulations* at its fifty-ninth session: *UN 3551 SODIUM ION BATTERIES with organic electrolyte* and *UN 3552 SODIUM ION BATTERIES with organic electrolyte CONTAINED IN EQUIPMENT or SODIUM ION BATTERIES with organic electrolyte PACKED WITH EQUIPMENT*.

2. In the twenty-second revised edition of the UN *Model Regulations*, UN 3536 applies to lithium batteries installed in a cargo transport unit. While the transport demand of energy storage systems made of sodium ion batteries in cargo transport unit is increasing, there is not any entry which applies to this product. Considering the similar structure and transport risk of energy storage systems in cargo transport unit made of lithium ion batteries and sodium ion batteries, China suggests establishing a new entry for sodium ion batteries with organic electrolyte installed in cargo transport unit, referring to the transport requirements of UN 3536.

**II. Proposals**

3. Based on the above discussion, China suggests the following amendments to the UN *Model Regulations* (new text is underlined):

- (a) Add "UN XXXX SODIUM ION BATTERIES INSTALLED IN CARGO TRANSPORT UNIT with organic electrolyte" in chapter 2.9.2;
- (b) Add a new entry in chapter 3.2:

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instructions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
XXXX	SODIUM ION BATTERIES INSTALLED IN CARGO TRANSPORT UNIT with organic electrolyte	2			YYY	0	E0				

- (c) At the end of special provision 360, insert “Sodium ion batteries installed in cargo transport units with organic electrolyte, designed only to provide power external to the transport unit shall be assigned to entry UN XXXX SODIUM ION BATTERIES INSTALLED IN CARGO TRANSPORT UNIT with organic electrolyte.”;
- (d) In special provision 388, at the end of the seventh paragraph, insert “Sodium ion batteries installed in a cargo transport unit with organic electrolyte and designed only to provide power external to the cargo transport unit shall be assigned to the entry UN XXXX SODIUM ION BATTERIES INSTALLED IN CARGO TRANSPORT UNIT with organic electrolyte.”;
- (e) Add a new special provision in chapter 3.3:
- “YYY This entry only applies to sodium ion batteries installed in a cargo transport unit with organic electrolyte and designed only to provide power external to the cargo transport unit. The sodium ion batteries with organic electrolyte shall meet the requirements of 2.9.5 (a) to (f), and contain the necessary systems to prevent overcharge and over discharge between the batteries.
- The batteries shall be securely attached to the interior structure of the cargo transport unit (e.g., by means of placement in racks, cabinets, etc.) in such a manner as to prevent short circuits, accidental operation, and significant movement relative to the cargo transport unit under the shocks, loadings and vibrations normally incident to transport. Dangerous goods necessary for the safe and proper operation of the cargo transport unit (e.g. fire extinguishing systems and air conditioning systems), shall be properly secured to or installed in the cargo transport unit and are not otherwise subject to these Regulations. Dangerous goods not necessary for the safe and proper operation of the cargo transport unit shall not be transported within the cargo transport unit.
- The batteries inside the cargo transport unit are not subject to marking or labelling requirements. The cargo transport unit shall display the UN number in accordance with 5.3.2.1.2 and be placarded on two opposing sides in accordance with 5.3.1.1.2.”
- (f) In ALPHABETICAL INDEX OF SUBSTANCES AND ARTICLES, add “SODIUM ION BATTERIES INSTALLED IN CARGO TRANSPORT UNIT with organic electrolyte 9 XXXX” in alphabetical order.



**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****31 October 2023****Sixty-third session**

Geneva, 27 November-6 December 2023

Item 3 of the provisional agenda

**Listing, classification and packing****Transport provisions for small quantities of environmentally  
hazardous paints and printing inks (and related materials) –  
Feedback from the informal lunchtime working group  
meeting and next steps****Transmitted by the World Coatings Council (WCC)****I. Introduction**

1. The World Coatings Council (WCC) would like to express its sincere gratitude to those representatives who attended the informal lunchtime working group meeting on this topic at the 62<sup>nd</sup> session of this Sub-Committee. This informal document provides a brief overview of the outcome of that discussion, as well as ideas for how WCC intends to proceed on this important matter.
2. This document is the fourth in a sequence of papers from WCC that have been presented to the Sub-Committee for consideration.<sup>1</sup>

**II. Overview of the lunchtime working group meeting**

3. WCC welcomed the comments and support provided by members of the Sub-Committee during the lunchtime working group meeting, as well as their considerable interest in resolving this issue. Comments by several non-EU representatives during the meeting clearly demonstrated that the Class 9 environmentally hazardous classification is an issue affecting industry on a global scale. As such, WCC believes the appropriate forum for this issue to be addressed and resolved is at the UN Sub-Committee of Experts on the Transport of Dangerous Goods.
4. During the informal working group meeting, WCC representatives assured delegates that the Class 9 (for environmentally hazardous mixtures) requirements relating to classification, marking/labeling, and documentation were not being questioned or challenged by industry. Rather, the focus is solely on the packaging requirements for these classified mixtures, including the need for UN-approved packaging. Delegates sought assurances that non-UN-approved packaged products, including those that are now reclassified as Class 9 environmentally hazardous, are currently being safely transported in such small quantities and indicated that further details from industry on current practices would be appreciated, as well as any information on incidents/spillages involving these package sizes. WCC is in the process of collating such information from its members and intends to share any relevant details on this in due course.

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<sup>1</sup> References to previous documents are ST/SG/AC.10/C.3/2022/22, ST/SG/AC.10/C.3/2022/56, and UN/SCETDG/62/INF.11.

5. WCC presented a more detailed explanation of the current situation with respect to the lack of UN-approved plastic packaging for products packaged between 5 and 30 litres. The conflict between proposed future European Union (EU) legislation relating to packaging (e.g., the draft Packaging and Packaging Waste Regulation, especially obligations relating to recycled plastic content) and the need for packaging to resist key tests in order to receive UN-approval (e.g., a drop test at -30 °C) was also highlighted. Following discussions with packaging suppliers, the use of recycled plastic in UN-approved packaging appears to be difficult to resolve technically. Therefore, more recycled plastic could be incorporated into paint and printing ink packaging if there was no UN-approved packaging requirement for these products.

6. WCC also provided insight on the transportation process for certain paints that require particular packaging. Specifically, the council emphasized the need for packagings that can be opened for tinting and then re-closed for further transport to the final end-user. The working group participants appeared to understand that this packaging issue is unique to the paint and coatings industry. As such, a more tailored solution for paint and printing ink classified as environmentally hazardous may be more favorable than one that applies to *all* environmentally hazardous mixtures in UN 3082.

7. It was also emphasized that additional Class 9 environmentally hazardous mixture classifications are expected in the future in the EU, as more substances are assigned high M-factors when reviewed through the CLP classification procedure. Some delegates requested further details on this subject.

### III. Discussion and next steps

8. Several options were briefly explored during the informal working group meeting, including the possibility of using overpacks, the introduction of a new UN number or special provision (specifically for paints and printing inks), and an amendment to the current Packaging Provision PP1 in P001. The last of these appeared to be the most widely-supported by the delegates, with the condition that WCC can clearly demonstrate that these pack quantities can be transported safely and securely in non-UN-approved packaging.

9. WCC continues to welcome any input or proposals on how to resolve this matter in a pragmatic way in preparation for future consideration during this biennium. To that end, any interested delegates are invited to contact WCC representatives to participate in its ongoing discussions. WCC intends to prepare and submit a working document for the 64<sup>th</sup> session of the Sub-Committee in July 2024.

10. WCC welcomes any comments from members of the Sub-Committee, especially from those who attended the lunchtime informal working group meeting, on the above summary and intentions. WCC may be contacted on this topic by email at [rcash@paint.org](mailto:rcash@paint.org) or [t.fielding@cepe.org](mailto:t.fielding@cepe.org).

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

1 November 2023

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

**Sixty-third session**

Geneva, 27 November- 6 December 2023

Item 2 (c) of the provisional agenda

**Explosives and related matters:**

**Review of tests in parts I, II and III  
of the Manual of Tests and Criteria**

**Sub-Committee of Experts on the Globally Harmonized  
System of Classification and Labelling of Chemicals**

**Forty-fifth session**

Geneva, 6-8 December 2023

Item 2 (a) of the provisional agenda

**Work on the Globally Harmonized System**

**of Classification and Labelling of Chemicals:**

**Work of the Sub-Committee of Experts on the  
Transport of Dangerous Goods on matters of interest to  
the Sub-Committee of Experts on the Globally  
Harmonized System of Classification and Labelling of  
Chemicals**

**Bursting pressure test method for Koenen steel tubes**

**Transmitted by the expert from Germany**

**I. Introduction**

1. In the Koenen test (see *Manual of Tests and Criteria*), so-called Koenen steel tubes are used. For the manufactured steel tubes to be suitable within the meaning of the test method, it must be ensured that the manufactured steel tubes are of consistent quality. This is done by subjecting every production lot of steel tubes to quality control to verify compliance with various parameters specified in the test method.

2. An important quality control parameter is the bursting pressure of the steel tubes. A characteristic feature of the method for testing the bursting pressure developed by the Federal Institute for Materials Research and Testing (BAM) is that a continuous, rapidly rising pressure is built up in the steel tubes by means of a special hydraulic pump (electrically powered oil compressor (BAM pump)). The pressure at which the dynamically loaded steel tube ultimately bursts is called quasi-static bursting pressure. This pressure is then compared with the permissible parameter mentioned in the test method.

**II. Background**

3. The Koenen test was developed by BAM approximately 70 years ago. Since then, quality control and acceptance of steel tubes manufactured in Germany have been effected by means of the bursting pressure tests carried out at BAM, which are essentially still carried out with the same apparatuses. Over the years, it has thereby been possible to ensure that the steel tubes are of sufficiently high, consistent quality.

4. The quality test method used by BAM since then for the bursting pressure is currently to be classified as a reference method. In the case of changes to or modernizations of this quality test method, appropriate proof of equivalency must be furnished.

5. In the opinion of some countries, there seems to be the need to change the design of the steel tubes. Here, reference is made to informal document INF.15 submitted by the United Kingdom and the United States of America for consideration by the TDG Sub-Committee at its 60<sup>th</sup> session in 2022, to the presentation given and the comprehensive discussions at the IGUS EPP/CIE session in April 2022. Practical measures to that effect have also already been

initiated (round robin test in 2023). This initiative is based in particular on the results of the bursting pressure tests carried out by Safety Management Services, Inc. (SMS) (see INF.15, TDG 60<sup>th</sup> session).

6. However, it is to be noted that the bursting pressure test method used by SMS differs from the one used at BAM. In the SMS method, the pressure rise is not effected by means of a continuous, rapid increase in pressure, but the pressure is increased incrementally until the steel tube bursts. SMS refers to this method as “static incompressible bursting pressure tests on SMS”. Until then, results of equivalency tests of the BAM method and the method used by the company SMS had not been available.

### III. Exploratory examination as regards the equivalency of the different bursting pressure test methods

7. Due to the lack of an equivalency test, BAM conducted in the summer of 2023, an exploratory examination comparing the two different bursting pressure test methods (BAM vs. SMS bursting pressure test method). The examinations were carried out with five steel tubes each from three different production lots. The “static incompressible bursting pressure test” SMS method was simulated at BAM with the help of a manual hand pump in a way that the bursting pressure was achieved by means of manually effected strokes via several pressure stages.

8. The results of the comparison of the two bursting pressure test methods are shown in the following table:

Production lot of the steel tubes	Bursting pressure in acc. with the BAM method*	Bursting pressure in acc. with the SMS method**
	Mean value (standard deviation) [MPa]	Mean value (standard deviation) [MPa]
2019 lot	29.5 (0.3)	23.6 (0.8)
2018 lot***	25.5 (0.3)	22.7 (0.5)
2016 lot	28.3 (0.2)	26.1 (0.2)

\* dynamic-continuous rapid pressure rise

\*\* manually simulated discontinuous incremental pressure rise

\*\*\* 2018 lot was not accepted by BAM for UN Koenen test purposes

9. The results show significant differences between the two bursting pressure test methods. At a tolerated deviation of e.g. 10 %, it cannot generally be assumed that the bursting pressure test methods used by BAM and SMS are equivalent. Accordingly, the conclusions set out in INF.15 (TDG 60<sup>th</sup> session) cannot be confirmed in every case.

### IV. Proposal

10. The BAM bursting pressure test method, which has been used successfully and essentially without technical changes as part of quality control for more than 70 years, was the basis for determining the bursting pressure for quality control and thus the basis for a reliable classification of substances or mixtures in accordance with the Koenen test. Based on current knowledge, the results of the different methods to determine the bursting pressure are not equivalent.

11. The test carried out by SMS (see INF.15, TDG 60<sup>th</sup> session) shows that apparently there is now also a need in other countries to carry out their own bursting pressure tests of the steel tubes.

12. There have been no major changes so far to the method used by BAM. However, the ‘old’ test apparatuses used are no longer available on the market in their original form.

13. Germany asks that the following questions be discussed:
- (a) Is there a need for an additional description of the bursting pressure test method that has been used for quality control of the steel tubes since the 1950s until today?
  - (b) Is there a need to identify (and validate by means of equivalency tests) alternatives for the quality test for the bursting pressure test method that can be implemented using apparatuses available on the market today?
14. In the case that one or both of the above questions is/are answered in the affirmative, Germany is willing to assume the lead responsibility for further work.
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