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Economic Commission for Europe**Inland Transport Committee****Working Party on the Transport of Dangerous Goods****Joint Meeting of the RID Committee of Experts and the
Working Party on the Transport of Dangerous Goods**

Geneva, 15–25 September 2015

Item 4 of the provisional agenda

Reports of informal working groups**Report of the informal working group on “Provisions on
equipment for tanks and pressure receptacles” including
proposals for revising the text of RID/ADR/ADN concerning
pressure receptacles****Transmitted by the European Industrial Gases Association (EIGA)^{1, 2}***Summary*

- Executive summary:** The working group is nearing the end of its work concerning proposals for text changes which make a consistent distinction between pressure receptacles with valves and without. The proposals additionally establish when and how closures and the porous material of acetylene cylinders can be assessed for conformity separately from the receptacles.
- Action to be taken:** Agree the submission of the proposals concerning the UN Model Regulations to the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods. Agree the continuation of the work on tanks.
- Related documents:** Terms of reference of the working group – informal document INF.22 of the spring 2014 session Joint Meeting (17 - 21 March 2014).

¹ In accordance with the programme of work of the Inland Transport Committee for 2014–2015 (ECE/TRANS/240, para. 100, ECE/TRANS/2014/23, cluster 9, para.9.2).

² Circulated by the Intergovernmental Organisation for International Carriage by Rail (OTIF) under the symbol OTIF/RID/RC/2015/38.

Introduction

1. The working group met in four occasions and participated in one teleconference up to the end of June. Representatives of France, Germany, Switzerland, AEGPL, ECMA and EIGA participated. The work is incomplete but this document gives the results of the work on pressure receptacles so far. It is expected that the remainder of the proposals can be made available by means of an informal document in time for the Joint Meeting session in September.

2. When the work on pressure receptacles is complete there will be four proposals:

Proposal 1: New and amended definitions in 1.2.1; (UN Model Regulations and ADR text)

Proposal 2: New text and amendments Parts 4 and 5; (UN Model Regulations and ADR text)

Proposal 3: New text and amendments to UN Model Regulations in 6.2.1 and 6.2.2;

Proposal 4: New text and amendments in RID/ADR 6.2.3, 6.2.4 and 6.2.5.

Proposal 4 is not included in this document and Proposal 3 is only completed up to 6.2.2.7.2.

3. Although incomplete, the document gives a clear impression of the nature and scale of the work. The working group asks the Joint Meeting to consider the submission of the proposals concerning the UN Model Regulation to the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods. Also, it would like guidance on starting the work on tanks.

Definitions

3. The approach adopted was to define all pressure receptacles to include their closure(s). This aligns pressure receptacles with all other receptacles. Some members of the working group opposed this because the design and construction standards describe cylinder, tube and pressure drum without closures. After a detailed study of the RID/ADR, it was concluded that the requirements for pressure receptacles in parts 4 and 5 related to them in a state when ready to fill or full, i.e. with closures and only in Chapter 6.2 were pressure receptacles considered without closures. Adopting a definition without closures would mean adding 'and its closures' in many places in parts 4 and 5, so on balance including closures in the definition of pressure receptacles was deemed to be optimum. The term 'pressure receptacle shell' is defined to mean a pressure receptacle without its closure(s). This too was opposed since 'shell' is defined for tanks as including closures; however 'cylinder shell' already appears in 6.2.2.1.3 of RID/ADR and consensus was reached to use the term shell.

4. Definitions were also created for the service equipment of a pressure receptacle and for the working pressure of an acetylene cylinder. The current definition of "cryogenic receptacle" describes a closed cryogenic receptacle so the defined phrase was corrected accordingly and consequential amendments made in parts 4 and 5 where the phrase cryogenic receptacle is used. The inconsistent use of the word 'transportable' in the pressure receptacle definitions was rationalised.

Text changes in Sections 6.2.1 and 6.2.2

5. As well as implementing the new definitions, the proposals for these sections establish the following:

- (i) The pressure receptacles for which separate conformity assessment of shell and closure is permitted and the pressure receptacles for which a final conformity assessment is required even when the closures or, in the case of bundles of cylinders, cylinder shells have been previously conformity assessed.
- (ii) The procedures for conformity assessment of completed acetylene cylinders when the cylinder shell has been previously conformity assessed either by the same inspection body or by a different inspection body.
- (iii) The initial inspections and tests for closures;
- (iv) The requirements for marking closures;
- (v) Miscellaneous changes to make the requirements more accurate and modify requirements that are inappropriate.

Requirements still to be decided are:

- (i) Minimum requirements for pressure relief devices;
- (ii) Additional marks on acetylene cylinders;
- (iii) Amendments consistent with those presented in this paper.

Text changes in Sections 6.2.3, 6.2.4 and 6.2.5

6. These proposals cover the changes necessary to implement the definitions and align the text with the preceding sections. They require a final read through and confirmation by the working group.

7. Although the proposals are shown as four parts to ease reference to them, they are all interrelated and cannot be adopted independently.

Proposal 1 – Definitions in 1.2.1

In this proposal new text is shown underlined and deleted text is shown with a strikethrough.

"Bundle of cylinders" means a pressure receptacle comprising an assembly of cylinders or cylinder shells that are fastened together and which are interconnected by a manifold and carried as a unit. The total water capacity shall not exceed 3 000 litres except that bundles intended for the carriage of toxic gases of Class 2 (groups starting with letter T according to 2.2.2.1.3) shall be limited to 1 000 litres water capacity;

"Closure" means a device which closes an opening in a receptacle;

NOTE: For pressure receptacles, closures are e.g. valves, pressure relief devices, pressure gauges, level indicators.

"Closed cryogenic receptacle" means a ~~transportable~~ thermally insulated pressure receptacle for refrigerated liquefied gases of a water capacity of not more than 1 000 litres (see also *"Open cryogenic receptacle"*);

"Cylinder" means a ~~transportable~~ pressure receptacle of a water capacity not exceeding 150 litres (see also *"Bundle of cylinders"*);

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

"*Pressure drum*" means a welded ~~transportable~~-pressure receptacle of a water capacity exceeding 150 litres and of not more than 1 000 litres, (e.g. cylindrical receptacles equipped with rolling hoops, spheres on skids);"

"*Pressure receptacle*" means a transportable receptacle intended for holding substances under pressure including its closure(s) and other service equipment and is a collective term that includes cylinders, tubes, pressure drums, closed cryogenic receptacles, metal hydride storage systems, bundles of cylinders and salvage pressure receptacles;

"*Pressure receptacle shell*" means a cylinder, a tube a pressure drum or a salvage pressure receptacle without its closures or other service equipment, but including any permanently attached device(s) (e.g. neck ring, foot ring, etc.);

NOTE: The terms "cylinder shell", "pressure drum shell" and "tube shell" are also used.

"*Tube*" (Class 2) means a seamless ~~transportable~~-pressure receptacle of a water capacity exceeding 150 litres and of not more than 3 000 litres;

"*Service equipment*"

(a) Of the tank means filling and discharge, breather, safety heating, heat insulating and additive devices and measuring instruments;

(b) Of the elements of a battery-vehicle or of a MEGC means filling and discharge devices, including the manifold, safety devices and measuring instruments;

(c) Of an IBC means the filling and discharge devices and any pressure-relief or venting, safety, heating and heat insulating devices and measuring instruments;

(d) Of a pressure receptacle means closure(s), manifold(s), piping, porous, absorbent or adsorbent material and any structural devices, e.g. for handling

"*Shell*" (for pressure receptacles), see "*Pressure receptacle shell*";

"*Working pressure*"

(a) For a compressed gas means the settled pressure of a compressed gas at a reference temperature of 15 °C in a full pressure receptacle;

(b) For acetylene means the calculated settled pressure at a uniform reference temperature of 15 °C in an acetylene cylinder containing the specified solvent content and the maximum acetylene content;

Proposal 2 – Amendments to the UN Model Regulations in 4.1.6, 5.2.1.9 and 5.4.1.2.2 (b)

In this and the following proposals, only the amendments are shown, not the consolidated text. Sentences shown in a box give an explanation for the amendment which precedes it.

4.1.6.6 Add to the end of the first sentence "and taking into account the lowest pressure rating of any component".

Insert a new second sentence. "Service equipment having a pressure rating lower than other components shall nevertheless comply with 6.2.1.3.1."

Delete the final sentence “Bundles of cylinders shall not be filled in excess of the lowest working pressure of any given cylinder in the bundle.”

The addition to the first sentence makes the principle of taking into account the lowest pressure rating of a cylinder in a bundle when filling, a general requirement applicable to all components in all pressure receptacles, such as a 200 bar valve fitted to a 300 bar cylinder. The final deleted sentence then becomes redundant.

4.1.6.10 In the first sentence, insert “closed” before “cryogenic receptacle”.

5.2.1.9.1 At the third indent, replace “Cryogenic receptacles” by “Closed and open cryogenic receptacles”.

5.2.1.9.2 (a) Replace “cryogenic receptacles” by “closed and open cryogenic receptacles”.

5.4.1.2.2 (b) Replace “cryogenic receptacles” by “closed cryogenic receptacles”.

These four amendments result from the change of the definition for cryogenic receptacles.

Proposal 3 – Amendments to the UN Model Regulations text in 6.2.1 and 6.2.2

6.2.1.1.1 After “Pressure receptacles” delete “and their closures”.

6.2.1.1.4 At the end of the sentence replace “used” by “welded”.

Service equipment may not need welding so non-weldable metals should not be forbidden.

6.2.1.1.5 In the first sentence replace “cylinders, tubes, pressure drums” by “pressure receptacle shells”.

In the final sentence after “The test pressure of a cylinder” insert “shell”.

6.2.1.1.6 At the beginning of the first and the second sentences replace “Pressure receptacle” by “Cylinders”.

In the final sentence replace “pressure receptacle” by “cylinder” three times and replace “an isolation valve” by “a valve”.

6.2.1.1.8.2 In the second and the third sentences replace “pressure receptacle” by “inner vessel”.

At the end of the third sentence replace “fittings” by service equipment.

6.2.1.1.9 At the end of the heading replace “*pressure receptacles for acetylene*” by “*acetylene cylinders*”.

In the first sentence replace “Pressure receptacles” by “Cylinder shells”.

In (a) replace “pressure receptacle” by “cylinder shell”.

In the final sentence replace “compatible with the pressure receptacle” by “compatible with those parts of the cylinder that are in contact with it”.

6.2.1.2.1 After “Construction materials of pressure receptacles” delete “and their closures”.

6.2.1.2.2 At the beginning of the first sentence, after “Pressure receptacles”, delete “and their closures”.

6.2.1.3.1 Replace “Valves, piping and other fittings” by “Service equipment” and replace “excluding pressure relief devices” by “excluding porous, absorbent or adsorbent material, pressure relief devices, pressure gauges or indicators”.

6.2.1.3.2 Replace the entire paragraph by the following:

“6.2.1.3.2 Service equipment shall be configured or designed to prevent damage and unintended opening that could result in the release of the pressure receptacle contents during normal conditions of handling and carriage. Closures shall be protected in the same manner as is required for valves in 4.1.6.8. Manifold piping leading to shut-off valves shall be sufficiently flexible to protect the shut-off valves and the piping from shearing or releasing the pressure receptacle contents.”

The final sentence requiring valves to be capable of being secured against unintended opening was unrealistic and is replaced by the more general requirement “configured or designed to prevent ... unintended opening”.

6.2.1.3.3 Replace “shall be fitted with devices” by “shall be fitted with handling devices”.

6.2.1.4.2 At the end, insert a new provision 6.2.1.4.3 as follows:

6.2.1.4.3 For refillable cylinders, pressure drums and tubes the conformity assessment of the shell and the closure(s) may be carried out separately. In these cases an additional assessment of the final assembly is not required.

For bundles of cylinders, the cylinder shells and the valve(s) may be assessed separately, but an additional assessment of the complete assembly is required.

For cryogenic receptacles, the closures may be assessed separately, but an additional assessment of the complete assembly is required.

For acetylene cylinders, conformity assessment shall comprise either:

- (a) one assessment of conformity covering both the cylinder shell and the contained porous material; or
- (b) a separate assessment of conformity for the empty cylinder shell and an additional assessment of conformity for the cylinder shell with the contained porous material.

These provisions clarify separate assessment and make redundant the requirements for separate conformity assessment in 6.2.3.6.1.

6.2.1.5.1 In the first sentence replace “closed cryogenic receptacles and metal hydride storage systems,” by “closed cryogenic receptacles, metal hydride storage systems and bundles of cylinders,” and after “the applicable standards” insert “or recognised technical codes”.

In the line before (a), replace “pressure receptacles” by “pressure receptacle shells”.

- (d) At the end delete “of the pressure receptacles”.
- (e) Replace “neck threads” by “threads used to fit closures”.

In the line after (f), replace “pressure receptacles” by “pressure receptacle shells”.

- (g) Replace “pressure receptacles” by “pressure receptacle shells”.
- (h) In both sentences replace “pressure receptacles” by “pressure receptacle shells”.
- (i) Replace “pressure receptacles” by “pressure receptacle shells”.
- (j) Replace “pressure receptacles” by “cylinder shells”.

After (j) insert the following new provisions.

“On an adequate sample of closures:

- (k) Verification of metallic and non-metallic materials;
- (l) Verification of dimensions;
- (m) Verification of cleanliness;
- (n) Inspection of completed assembly;
- (o) Verification of conformity of marks

For all closures:

- (p) Testing for leakproofness;
- (q) Verification of the presence of marks.”

6.2.1.5.2 Replace the first sentence by “For closed cryogenic receptacles, the inspections and tests specified in 6.2.1.5.1 (a), (b), (d), (f), (k), (l), (m), (n) and (o) shall be performed on an adequate number of samples.”

At the end of the second paragraph insert the sentence “All closures shall undergo testing for leakproofness.”.

6.2.1.5.3 In the first sentence replace “receptacles” by “pressure receptacle shells”.

6.2.1.5.3 At the end, insert the following new paragraph 6.2.1.5.4 including a new Note.

“6.2.1.5.4 For bundles of cylinders all cylinder shells and closures shall be subjected to the initial inspection and tests specified in 6.2.1.5.1. An adequate sample of frames shall be proof load tested to two times the maximum gross weight of the bundles of cylinders.

Additionally, all manifolds of bundle of cylinders shall undergo a hydraulic pressure test and all the completed bundles of cylinders shall undergo a leakproofness test. The closures shall be tested in accordance with 6.2.1.5.1.

NOTE: *With the agreement of the competent authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.”*

6.2.1.6.1 Replace (c), (d) and (e) by the following.

- “(c) Checking of the threads either:
 - (i) if there is evidence of corrosion; or
 - (ii) if the closures or other service equipment are removed;
- (d) A hydraulic pressure test of the pressure receptacle shell and, if necessary, verification of the characteristics of the material by suitable tests;
- (e) Check of service equipment, if to be reintroduced into service.
- (f) A leakproofness test of bundles of cylinders after reassembly.”

NOTE 2: Replace “*pressure test of cylinders or tubes*” by “*pressure test of cylinder shells or tube shells*”

NOTE 3: Replace “*aluminium alloy gas cylinders*” by “*aluminium alloy cylinder shells*” and replace “*steel gas cylinders*” by “*steel cylinder shells*”.

After **NOTE 4:** Insert a new **NOTE 5.**

NOTE 5: For bundles of cylinders the hydraulic test specified in (d) above shall be carried out on the cylinder shells and on the manifold.

6.2.1.6.2 Replace “Pressure receptacles” by “Cylinders”.

6.2.2.1.1 In the first sentence replace “UN cylinders” by UN cylinder shells”.

In the table delete the entire row beginning ISO 11118:1999

The standard is proposed to be listed in a new paragraph 6.2.2.1.8 along with the relevant valve standard ISO 13340:2001

NOTE 1 Replace “composite cylinders” by “composite cylinder shells”.

NOTE 2 Replace “composite cylinders” by “composite cylinder shells” twice.

6.2.2.1.2 In the first sentence replace “UN tubes” by “UN tube shells”.

6.2.2.1.3 In the line before the second table replace “For the porous material in the cylinder:” by “For acetylene cylinders”.

6.2.2.1.4 Replace “UN cryogenic receptacles” by “UN closed cryogenic receptacles”.

6.2.2.1.6 In the first sentence, replace “The standard shown below” by “The following standard”.

In the second sentence replace “UN cylinder by “UN cylinder or UN cylinder shell”.

NOTE Replace the Note by

“NOTE: Changing one or more cylinders or cylinder shells of the same design type, including the same test pressure, in an existing UN bundle of cylinders does not require a new conformity assessment of the existing bundle. Service equipment of the bundle of cylinders can also be replaced without requiring a new conformity assessment if it complies with the design type approval.”

6.2.2.1.7 At the end, insert a new paragraph and table 6.2.2.1.8 as follows.

“6.2.2.1.8 The following standards apply to the design, construction and initial inspection and test of non-refillable UN cylinders except that the inspection requirements related to the conformity assessment system and approval shall be in accordance with 6.2.2.5.

“Reference	Title	Applicable for manufacture
ISO 11118:1999	Gas cylinders – Non-refillable metallic gas cylinders – Specification and test methods	Until further notice
ISO 13340:2001	Transportable gas cylinders – Cylinder valves for non-refillable cylinders – Specification and prototype testing	Until further notice”

6.2.2.2 In the first line delete “pressure receptacle”.

6.2.2.3 Replace the first sentence by “The following standards apply to the design, construction, and initial inspection and test of closures and their protection:”

Delete the entire last row of the first table starting “ISO 13340:2001”.

Delete the complete sentence starting “For UN metal hydride storage ...” and the entire table containing the reference to “ISO 16111:2008”

The requirements for the closures of metal hydride storage systems are already included in 6.2.2.1.5 and do not need to be included here.

6.2.2.4 Amend the first sentence to read “The following standards apply to periodic inspection and testing:”

6.2.2.5.1 At the end, after the definition of “Verify”, insert a new Note.

“NOTE: When separate conformity assessment is used (see 6.2.1.4.3) references to pressure receptacle in 6.2.2.5 shall mean either pressure receptacle shell or closure as appropriate.”

6.2.2.7 Amend the Note by replacing “6.2.2.9 and marking” by “6.2.2.9, marking” and inserting at the end “and marking requirements for closures are given in 6.2.2.11”.

6.2.2.7.1 In the first sentence replace “pressure receptacles” by “pressure receptacle shells and closed cryogenic receptacles”.

At the end of the second sentence, delete “on the pressure receptacle”.

In the third sentence, after “neck of the pressure receptacle” insert “shell”.

6.2.2.7.2 At the end of (b) insert the following new Note.

“NOTE: For acetylene cylinders the standards for the manufacture of the cylinder shell (e.g. ISO 9809-1) and acetylene cylinder (e.g. ISO 3807) shall be marked.”

At the end of 6.2.2.7.2 insert the following new Note.

NOTE: When an acetylene cylinder is conformity assessed in accordance with 6.2.1.4.3 (b) and the inspection bodies for the cylinder shell and the acetylene cylinder are different, their respective marks (d) and initial inspection dates (e) shall be applied, and a second mark (c) if the countries of approval of the inspection bodies are different.

6.2.2.7.3 In (g), in the second sentence, replace “mass of valve, valve cap” by “mass of closure(s), valve cap”.

This concludes the amendments agreed by the informal working group at the time of preparing this paper.