

**COMMITTEE OF EXPERTS ON THE
TRANSPORT OF DANGEROUS GOODS**

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

(Twenty-first session,
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agenda item 2(b))

WORK OF THE SUB-COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Development of Provisions for the Transport of Gases

**Comments on the work of the Working Group on Gas Receptacles and Multiple-Element Gas Containers
(MEGCs)**

Transmitted by the expert from the United States of America

The expert from the United States submits the following comments for consideration with regard to the development of provisions for the transport of gases. Specific comments are given with reference to the proposed text contained in the ST/SG/AC.10/2000/22, as well as documents ST/SG/AC.10/2000/30 transmitted by the Compressed Gas Association, ST/SG/AC.10/2000/38 transmitted by France and the recent INF paper from EIGA. The following comments are provided:

-50 °C Reference Temperature for Defining Gases

The United States does not object to adoption of -50 °C as the reference temperature for defining compressed and liquefied gases.

Filling

(a) The criteria for filling in P200(3) should always take precedence over any values provided in the table. This is not clearly indicated in the text. It is proposed that a sentence be added indicating that the filling requirements in paragraphs 1 and 2 take precedent over any values provided in the P200 Table. On this basis it is proposed to add the following sentence after paragraph 2 in P200(3):

“The requirements specified in paragraphs 1 and 2 shall be met for each pressure receptacle or MEGC filled for transport. The filling values provided in the P200 tables are for the benefit of the filler, but in no case shall the cylinder be filled to a filling limit in excess of that permitted according to the requirements of paragraphs 1 and 2. The use of test pressures and filling ratios other than those in the P200 tables is permitted provided that the criteria in paragraphs 1 and 2 are met.”

(b) At the last meeting of the working group it was agreed in principle that additional safety factors should be applied for some toxic gases. This issue was given to the representatives from CGA and Germany to address. To ensure that this is not overlooked the expert from the United States proposes that the following text be added in 200(c):

200 (c) (3) The gauge pressure in a pressure receptacle containing a compressed or liquefied gas at 65 °C shall not exceed:

For gases with an LC50 < 200 ppm the marked test pressure multiplied by 0.90;

For gases with an LC50 > 200 ppm and <1000 ppm >200 ppm the marked test pressure multiplied by 0.95.

Paragraphs 3-5 should be subsequently renumbered.

(c) The graph in P200 relevant to test pressures and filling ratios for UN 1075 and UN 1965 was never agreed to by the working group and seems to have crept into the document without any discussion. The US agrees with Canada that the labels for “Commercial propane” and “Commercial butane” should only be indicated if they are representative of world-wide values. In North America, commercial propane has a specific gravity of 0.504 to 0.510 at 15°C. We also agree that the labels on each column, A, A01, A02, etc. should be deleted, since they are not international designations and have no meaning in the Model Regulations.

(d) If the filling limit values can not be agreed upon during the course of the upcoming working group meeting then they should be removed from the P200 table.

Comments on ST/SG/AC.10/2000/30 – Cryogenic cylinders

P203 and 6.2.1.3.5 are currently reserved for cryogenic receptacles (see ST/SG/AC.10/2000/22, Proposal 3, page 21 and Proposal 4, page 23). The Working Group has highlighted the need for including standards and requirements for cryogenic receptacles in the Model Regulations in the future (see ST/SG/AC.10/C.3/36, Annex 1, paragraph 5). The expert from the

United States does not believe that the proposed text in ST/SG/AC.10/2000/30 adequately addresses the safety issues and considering that design standards for cryogenic cylinders will be considered in the next biennium we would prefer not to adopt the proposed text in ST/SG/AC.10/2000/30.

Filling of MEGCs

Paragraph 6.7.5.2.2 indicates that “All of the elements in a MEGC shall be of the same design type.” This does not prohibit elements of different working pressures to be assembled into MEGCs which may result in safety concerns relative to filling. It is not an uncommon practice to have elements within MEGCs that have different working pressures. The expert from the United States of America believes that the requirements in 4.2.4.7.2 concerning the filling requirements for MEGCs should be revised to indicate that:

“Elements of MEGCs shall be filled according to the filling ratios and filling provisions specified in packing instruction P200 for the specific gas being filled into each element. In no case shall a MEGC or group of elements be filled as a unit in excess of the lowest working pressure of any given element in the MEGC or group of elements being filled.”

Acetylene cylinders

We find it awkward that ISO 3807-1 and -2 are referenced in 6.2.2.1 since these standards only refer to the porous mass not the cylinder. We propose that acetylene cylinder requirements be deferred to the 2001-2002 biennium and that references to 3807-1 and -2 be removed from 6.2.2.1 until corresponding cylinder designs for acetylene cylinders and the revised ISO welded cylinder standard are also adopted.

Quality Assurance

EIGA has submitted comments on the quality assurance provisions that include the deletion of some text. The expert from the United States also has editorial comments and proposes that time be allotted to review these changes and to address other relative editorial issues.

Pressure Receptacle Markings

The expert from the United States generally agrees with the marks agreed to by the working group at its previous session. In ST/SG/AC.10/2000/38, the expert from France has proposed that, for marking requirements only a reference to the ISO standard on cylinder stamp marking be included. However, this is not an option because ISO 13769 is still a draft document that will not be published by the end of 2000 and because there are fundamental flaws in the sequence that is indicated and with some of the marks specified. However, we believe that in order to facilitate international acceptance of UN marked pressure receptacles the location and size of the markings need to be consistently indicated on each and every UN pressure receptacle. On this basis, the Model Regulations should indicate the exact location and size of the markings. The expert from the United States does not support the agreements reached by the technical committee responsible for developing ISO 13769 at its recent meeting in Tampa Florida and believes that the technical committee should not have advanced the standard to the FDIS stage since there was a lack of consensus on many of the marking issues. There are several countries that have expressed dissatisfaction with the progress and direction of the ISO 13769 development. Japan, Canada and the United States which comprise a large portion of pressure receptacle users and manufacturers have expressed major reservations regarding the stamp markings proposed in the ISO draft standard. The expert from the United States believes that the marks agreed to by the working group are more acceptable and should be maintained. While, the United States can agree to presenting the marks in a format more consistent with that presented in ISO/DIS 13769, it does not agree that the order of information indicated in the ISO/DIS is in the most logical sequence and that it is in the best interest of safety especially with respect to users and fillers. Furthermore, on the basis that we are proposing that acetylene cylinders not be addressed during this biennium, the United States is proposing to defer adoption of acetylene cylinder marks to provide more time to consider them and to address the wide divergence of opinions. The proposed acetylene markings also do not correspond with those specified in ISO 3807. The text provided below is the revised text for section 6.2.2.6 including revised marking examples for refillable and non-refillable cylinders:

Proposed Marking Text:

6.2.2.6 *Marking of refillable pressure receptacles*

UN certified refillable pressure receptacles shall be marked clearly and legibly with certification and gas or pressure receptacle specific markings. These markings shall be permanently affixed (e.g. stamped, engraved, or etched) on the pressure receptacle. The markings shall be on the shoulder, top end or neck of the pressure receptacle or on a permanently affixed component of the pressure receptacle (e.g. welded collar). ***Except for the UN mark, the minimum size of the markings shall be 6mm for pressure receptacles with a diameter greater than 100 mm and 3mm for pressure receptacles with a diameter less than or equal to 100 mm. The minimum size of the UN mark shall be 12mm for pressure receptacles with a diameter greater than 100 mm and 6mm for pressure receptacles with a diameter less than or equal to 100 mm.***

The following markings shall appear in the sequence as listed below from (a) to (r):

- (a) The UN packaging symbol



*This symbol shall only be marked on pressure receptacles which conform to the requirements of these model regulations for UN certified pressure receptacles.

- (b) The technical standard (e.g. ISO 9809-1) used for design, manufacture and testing;
- (c) The test pressure in bar, preceded by the letters “TP” and followed by the letters “BAR”.
- (d) The date of the initial inspection, the year (four digits) ~~followed~~ **preceded** by the month (two digits);
- (e) The alphabetic characters identifying the country authorising the UN marking as specified as indicated by the distinguishing sign for motor vehicles in international traffic;
- (f) The identity mark or stamp of the inspection body that is registered with the competent authority of the country authorizing the marking;
- (g) The manufacturer’s mark specified by the competent authority. When the country of manufacture is not the same as the country authorising the mark, then the manufacturer’s mark shall be preceded by the characters identifying the country of manufacture as indicated by the distinguishing sign for motor vehicles in international traffic;
- (h) The serial number assigned by the manufacturer.

6.2.2.6.2 The following essential markings shall be applied as applicable according to the characteristics of the gas or the pressure receptacle:

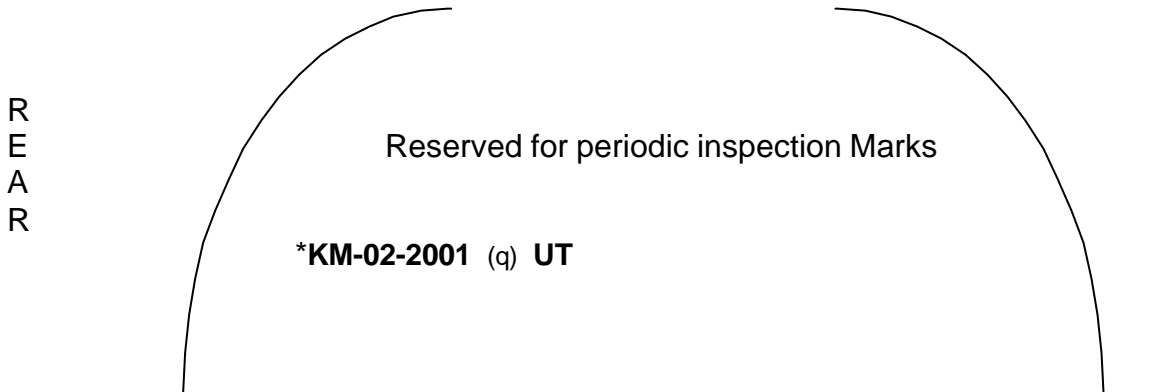
- (i) The empty mass of the pressure receptacle including all permanently attached *integral* parts (e.g. *neck ring, foot ring, etc.*) in kilograms, followed by the letters “KG. ***This weight shall not include the mass of valve, valve cap or valve guard, any coating, or porous mass for acetylene. The empty weight shall be expressed to three significant figures rounded up to the last digit. For cylinders of less than 1 kg, the weight shall be expressed to two significant figures rounded up to the last digit;***
- (j) In the case of pressure receptacles with a water capacity greater than 1 litre, the minimum guaranteed wall thickness of the pressure receptacle in millimetres followed by the letters “MM”. ***This marking is not required for composite cylinders or pressure receptacles with a water capacity less than 1 litre;***
- (k) In the case of pressure receptacles intended for the transport of compressed gases, acetylene, dissolved, UN 1001, and acetylene, solvent free, UN 3374, the working pressure in bar, ***preceded by the letters “WP” and*** followed by the letters “BAR”;
- (l) In the case of liquefied gases, the water capacity in litres ***expressed*** to three significant digits ***rounded down to the last digit***, followed by the letter “L” ***If the value of the minimum or nominal water capacity is an integer, the digits after the decimal point may be neglected;***
- ~~(m) ***Reserved*** In the case of acetylene, dissolved, UN 1001, the total of the mass of the empty receptacle, the fittings and accessories, the porous material, the solvent and the saturation gas~~

~~followed by the letters "KG" expressed to 2 significant figures rounded down to the last digit;~~

- (n) ~~Reserved~~ In the case of acetylene, solvent free, UN 3374, the total of the mass of the empty receptacle, the fittings and accessories and the porous ~~material followed by the letters "KG" expressed to 2 significant figures rounded down to the last digit;~~
- (o) In the case of *steel cylinders and composite cylinders with steel liners* pressure receptacles intended for the transport of gases with a risk of hydrogen embrittlement, the letter "H" showing compatibility of the steel (see ISO 11114-1:1997 *for details on the application of this mark*) shall be marked;
- (p) In the case of pressure receptacles made of aluminium alloy, the aluminium alloy preceded by the letters "AA";
- (q) The mark for non-destructive testing if used according to the periodic test requirements in 6.2.1.5 shall be marked *on the rear of the pressure receptacle in the place reserved for periodic inspection marks* (e.g. UT, MT, PT, see EN 1089-1: 1996). [Note: ISO considered this an optional mark. The working group should consider not including this in the Model Regulations]
- (r) *Identification of the cylinder thread (e.g. 25E in accordance with ISO 10920)*

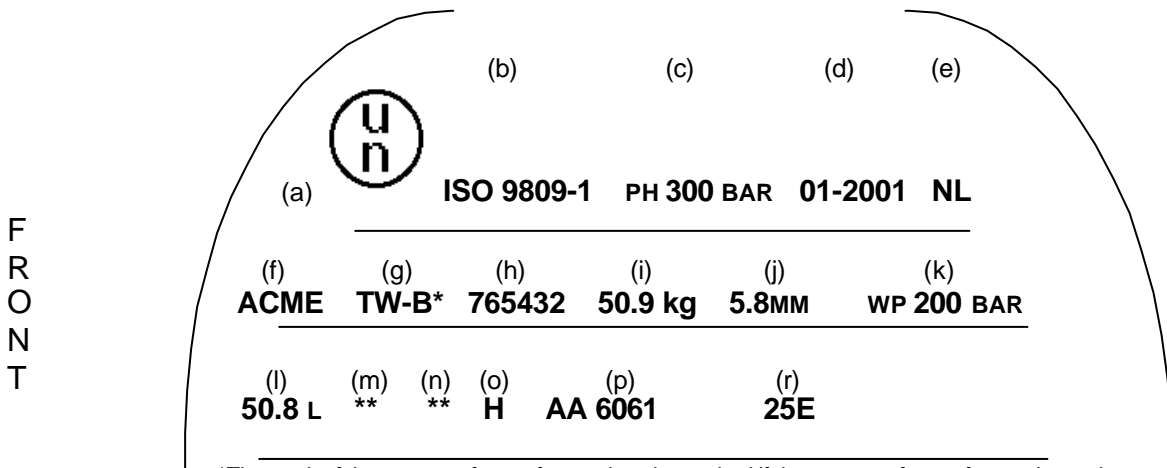
Note: Full definitions of the above markings are given in EN 1089-1: 1996.

The refillable pressure receptacle markings shall be applied as shown in the following examples:



R
E
A
R

*Inspection authority mark indicating the month (two figures) and year (four figures) of retest shall be marked at the time when periodic inspection is carried out. Enough space shall be provided, on the cylinder, for more than one reinspection. For acetylene cylinders these stamp marks shall be marked either on the cylinder or on the ring fixed on the top of the cylinder by the valve fitting.



F
R
O
N
T

*The mark of the country of manufacture is only required if the country of manufacture is not the same as the country authorizing the mark.

*** (m) and (n) are reserved for acetylene cylinder marks.*

6.2.2.6.3 Other markings are allowed provided they are made in low stress areas other than the side wall and are not of a size and depth that will create harmful stress concentrations. Such marks shall not conflict with required markings.

6.2.2.6.4 In addition to the preceding markings, each refillable pressure receptacle shall be marked indicating the date (year and month) of the last periodic inspection and the registered mark of the inspection body authorized by the competent authority of the country of use.

6.2.2.7 Marking of non-refillable pressure receptacles

UN certified non-refillable pressure receptacles shall be marked clearly and legibly with certification and gas or pressure receptacle specific markings. These markings shall be permanently affixed (e.g. stencilled, stamped, engraved, or etched) on the pressure receptacle. Except when stencilled, the markings shall be on the shoulder, top end or neck of the pressure receptacle or on a permanently affixed component of the pressure receptacle (e.g. welded collar). ***Except for the “UN mark” and the “DO NOT REFILL” mark, the minimum size of the markings shall be 6mm for pressure receptacles with a diameter greater than 100 mm and 3mm for pressure receptacles with a diameter less than or equal to 100 mm. The minimum size of the UN mark shall be 12mm for pressure receptacles with a diameter greater than 100 mm and 6mm for pressure receptacles with a diameter less than or equal to 100 mm. The minimum size of the “DO NOT REFILL” mark shall be 6mm.***

6.2.2.6.1 The following markings shall appear as close as practicable to the UN packaging symbol and in the sequence as listed below from (a) to (k):

- (a) The UN packaging symbol



**This symbol shall only be marked on pressure receptacles which conform to the requirements of these model regulations for UN certified pressure receptacles.*

- (b) The technical standard (e.g. ISO 11118) used for design, manufacture and testing;
- (c) The test pressure in bar, preceded by the letters “TP” and followed by the letters “BAR”;
- (d) The date of the initial inspection, the year (four digits) ~~followed~~ ***preceded*** by the month (two digits);
- (e) The alphabetic characters identifying the country authorising the UN marking as specified as indicated by the distinguishing sign for motor vehicles in international traffic;
- (f) The identity mark or stamp of the inspection body that is registered with the competent authority of the country authorizing the marking;
- (g) The manufacturer’s mark specified by the competent authority. When the country of manufacture is not the same as the country authorising the mark, then the manufacturer’s mark shall be preceded by the characters identifying the country of manufacture as indicated by the distinguishing sign for motor vehicles in international traffic;
- (h) The serial or batch number assigned by the manufacturer.

6.2.2.7.2 The following essential markings shall be applied as applicable according to the characteristics of the gas or the pressure receptacle:

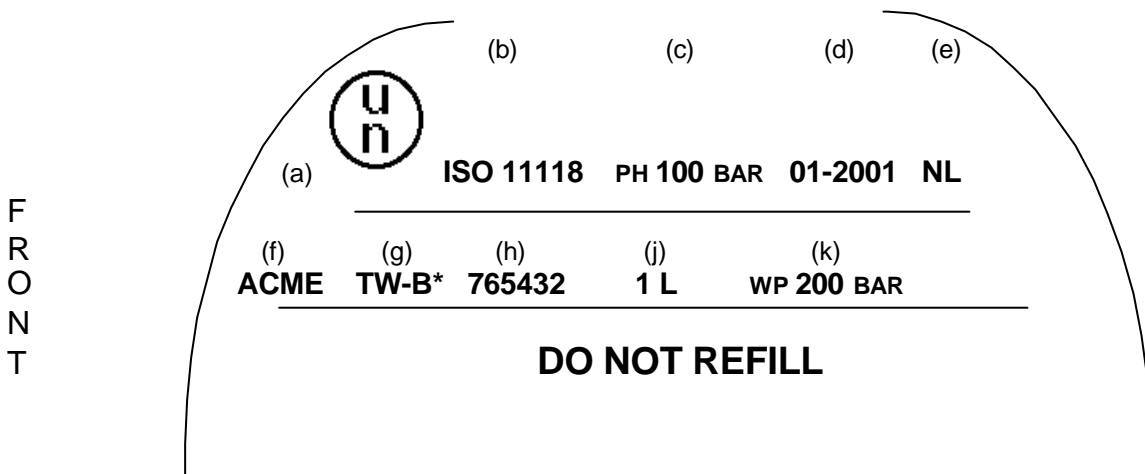
- (i) In the case of pressure receptacles intended for the transport of liquefied gases, the water capacity in litres to three significant digits, followed by the letter “L”;
- (j) In the case of pressure receptacles intended for the transport of compressed gases, the working pressure in bar and followed by the letters “BAR”;
- (k) The words “DO NOT REFILL” in letters of at least 6 mm in height;

Note: Non-refillable pressure receptacles may, on account of their size, substitute this marking by a label (see 5.2.2.2.1.2).

~~*Note: Full definitions of the above markings are given in EN 1089 1:1996.*~~

6.2.2.7.3 Other markings are allowed provided they are made in low stress areas other than the side wall and are not of a size and depth that will create harmful stress concentrations. Such marks shall not conflict with required markings.

6.2.2.7.4 The non-refillable pressure receptacle markings shall be applied as shown in the following example:



Filename: inf-46.doc
Directory: C:\MyFiles\INTERNET\TRANS\DANGER\MEETINGS\ECOSO
C\2000_12
Template: C:\Program Files\Microsoft Office\Templates\Normal.dot
Title: INF Paper on Cylinder requirements
Subject:
Author: RICHARDB
Keywords:
Comments:
Creation Date: 01/12/00 08.43
Change Number: 3
Last Saved On: 01/12/00 08.49
Last Saved By: UN/ECE
Total Editing Time: 6 Minutes
Last Printed On: 06/12/00 16.39
As of Last Complete Printing
Number of Pages: 6
Number of Words: 2,775 (approx.)
Number of Characters: 15,821 (approx.)