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(Bern, 28 May – 1 June 2001)

**AMENDMENTS TO CHAPTER 6.2 TO ACCOMMODATE THE PROVISIONS ADOPTED FOR
CLASS 2 RECEPTACLES IN THE UN MODEL REGULATIONS**

Transmitted by the European Industrial Gases Association (EIGA) */

SUMMARY

<i>Executive summary:</i>	The proposal provides text which updates the general requirements for Class 2 receptacles and inserts the provisions for UN certified receptacle, in accordance with the text adopted by the UN Experts Committee for the 12 th Revision of the Model Regulations.
<i>Action to be taken:</i>	Amend Chapter 6.2 as indicated below.
<i>Relevant documents:</i>	ST/SG/AC.10/27/Add.1.

Introduction

Much of the text adopted in the 12th Revision of the UN Model Regulations for Class 2 receptacles is based upon the RID/ADR. Some changes were made, however, to the general requirements and consequential amendments are proposed below to sub chapter 6.2.1 of the RID/ADR. UN certified receptacles, on the other hand, are designed, constructed and tested using a philosophy which is different from that in the RID/ADR. Use of the listed ISO standards is mandatory, and the conformity assessment system is different from the standard EU models.

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Accordingly, the UN text of sub-chapter 6.2.2. is transcribed in its entirety into a new RID/ADR sub-chapter 6.2.5. entitled 'Requirements for UN certified pressure receptacles'.

Proposal

Amend Chapter 6.2 as follows:

(Explanatory comments appear in parentheses in this format)

Insert "pressure" before the word "receptacle" throughout the existing text of the Chapter to account for the new terminology in the definitions of 1.2.1.

6.2.1 General requirements

6.2.1.1 Design and construction

Insert the following text in 6.2.1.1.1 after the fifth paragraph which ends " properties of the material."

Any additional thickness used for the purpose of providing a corrosion allowance shall not be taken into consideration in calculating the thickness of the walls.

For welded pressure receptacles, only metals of weldable quality whose adequate impact strength at an ambient temperature of - 20° C can be guaranteed shall be used.

(Above text transferred from ADR 6.3.2.1 to cover UN 6.2.1.1.3)

Insert at the end of 6.2.1.1.2

The above requirements, excluding those for the solvent, apply equally to receptacles for UN No. 3374 acetylene, solvent free.

(Above new text proposed by EIGA to cover UN text on acetylene, solvent free)

6.2.1.1.3 The following requirements apply to the construction of closed cryogenic pressure receptacles for refrigerated liquefied gases:

- (a) The mechanical properties of the metal used shall be established for each pressure receptacle at the initial inspection, including the impact strength and the bending coefficient; with regard to the impact strength see 6.8.5.3:
- (b) The pressure receptacles shall be thermally insulated. The thermal insulation shall be protected against impact by means of continuous sheathing. If the space between the pressure receptacle and the sheathing is evacuated of air (vacuum-insulation), the protective sheathing shall be designed to withstand without permanent deformation an external pressure of at least 100 kPa (1 bar). If the sheathing is so closed as to be gas-tight (e.g. in the case of vacuum-insulation), a device shall be provided to prevent any dangerous pressure from developing in the insulating layer in the event of inadequate gas-tightness of the pressure receptacle or its fittings. The device shall prevent moisture from penetrating into the insulation.

(Above text moved from ADR 6.2.3.4 to cover UN 6.2.1.1.5)

6.2.1.1.4 Pressure receptacles assembled in bundles shall be structurally supported and held together as a unit. Pressure receptacles shall be secured in a manner that prevents movement in relation to the structural assembly and movement that would result in the concentration of

harmful local stresses. Manifolds shall be designed such that they are protected from impact. For gases with a classification code of 2T, 2TF, 2TC, 2TO, 2TFC or 2TOC, means shall be provided to ensure that each pressure receptacle can be separately charged and that no interchange of pressure receptacle contents can occur during transport.

(New UN text)

6.2.1.3 Service equipment

Insert in 6.2.1.3.2 Fittings

- (e) Pressure receptacles whose filling is measured by volume shall be provided with a level indicator.

(New UN text, except that this requirement appears in ADR for closed cryogenic receptacles)

6.2.1.5 Initial inspection and test

Replace existing 6.2.1.5.1 by;

6.2.1.5.1 New pressure receptacles shall be subjected to testing and inspection during and after manufacture in accordance with the following:

On an adequate sample of pressure receptacles:

- (a) Testing of the mechanical characteristics of the material of construction;
- (b) Verification of the minimum wall thickness;
- (c) Verification of the homogeneity of the material for each manufacturing batch, and inspection of the external and internal conditions of the pressure receptacles;
- (d) Inspection of the neck threads; *(New UN requirement)*
- (e) Verification of the conformance with the design standard;

For all pressure receptacles:

- (f) A hydraulic pressure test. Pressure receptacles shall withstand the test pressure without undergoing permanent deformation or exhibiting cracks;

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

- (g) Inspection and assessment of manufacturing defects and either repairing them or rendering the pressure receptacles unserviceable;
- (h) An inspection of the markings on the pressure receptacles;
- (i) In addition, pressure receptacles intended for the transport of UN 1001 acetylene, dissolved, and UN 3374 acetylene, solvent free, shall be inspected to ensure proper installation and condition of the porous material and the quantity of solvent.

6.2.1.6 Periodic inspection and test

Insert in 6.2.1.6.1

- (c) Checking of the neck threads; ***(New UN requirement)***

Renumber existing (c) as (d)

Replace existing 6.2.1.6.2 and 6.2.1.6.3 by

6.2.1.6.2 For pressure receptacles intended for the transport of UN 1001 acetylene, dissolved, and UN 3374 acetylene, solvent free, only the external condition (corrosion, deformation) and the condition of the porous mass (loosening, settlement) shall be required to be examined.

6.2.1.6.3 By derogation from 6.2.1.6.1 (c) closed cryogenic pressure receptacles shall be inspected to verify external conditions, condition and operation of pressure relief devices and subjected to a leakproofness test. The leakproofness test shall be carried out with the gas contained in the receptacle or with an inert gas. Checking shall be performed by means of a pressure gauge or by vacuum measurement. The thermal insulation need not be removed.

(A combination of UN text on PRDs and ADR on leakproofness testing)

6.2.3.1 Metal cylinders, tubes, pressure drums and bundles of cylinders

Delete the following text which is now covered by 6.2.1.1.1

~~For welded receptacles only materials of faultless weldability whose adequate impact strength at an ambient temperature of -20°C can be guaranteed, particularly in the weld seams and the zones adjacent thereto, shall be used.~~

~~Any additional thickness to allow for corrosion shall not be taken into consideration in calculating the thickness of the walls.~~

6.2.3.4 Closed cryogenic receptacles

Delete 6.2.3.4.1 which now appears in 6.2.1.1.3 (a).

Replace 6.2.3.4.2 by

6.2.3.4.1 If non-metals are used, they shall resist brittle fracture at the lowest working temperature of the receptacle and its fittings.

Renumber 6.2.3.4.3 and 6.2.3.4.4 as 6.2.3.4.2 and 6.2.3.4.3 respectively.

Delete 6.2.3.4.5 which now appears in 6.2.1.3.2 (e)

Delete 6.2.3.4.6 which now appears as 6.2.1.1.3 (b)

Insert a new section 6.2.5 as follows:

6.2.5 Requirements for UN certified pressure receptacles

In addition to the general requirements of 6.2.1, UN certified pressure receptacles shall comply with the requirements of this section, including the standards, as applicable.

NOTE: With the agreement of the competent authority, more recently published versions of the standards, if available, may be used.

6.2.5.1 General requirements

6.2.5.1.1 Service equipment

Except for pressure relief devices, valves, piping, fittings and other equipment subjected to pressure, shall be designed and constructed to withstand at least 1.5 times the test pressure of the pressure receptacles.

Service equipment shall be configured or designed to prevent damage that could result in the release of the pressure receptacle contents during normal conditions of handling and transport. Manifold piping leading to shut-off valves shall be sufficiently flexible to protect the valves and the piping from shearing or releasing the pressure receptacle contents. The filling and discharge valves and any protective caps shall be capable of being secured against unintended opening. Valves shall be protected as specified in 4.1.6.1.4 (a) to (e) or pressure receptacles are transported in an outer packaging, which as prepared for transport shall be capable of meeting the drop test specified in 6.1.5.3 at the PG I performance level.

(New UN text)

6.2.5.1.2 Pressure relief devices

Individual pressure receptacles used for the transport of UN No. 1013 carbon dioxide and UN No. 1070 nitrous oxide shall be equipped with approved pressure relief devices or, for other gases, as specified by the competent authority of the country of use, except when forbidden by P 200. The type of pressure relief device, the set to discharge pressure and relief capacity of pressure relief devices, if required, shall be specified by the competent authority of the country of use.

When fitted, pressure relief devices on manifolded horizontal pressure receptacles filled with flammable gas shall be arranged to discharge freely to the open air in such a manner as to prevent any impingement of escaping gas upon the pressure receptacles under normal conditions of transport.

(The above is a mixture of text from UN P200 and UN 6.2.1.3.4)

(The remainder of the text is verbatim from the UN with only the section numbering changed.)

6.2.5.2 Design, construction and initial inspection and test

6.2.5.2.1 The following standards apply for the design, construction, and initial inspection and test of UN certified cylinders:

ISO 9809-1:1999	Gas cylinders – Refillable seamless steel gas cylinders - Design, construction and testing - Part 1: Quenched and tempered steel cylinders with tensile strength less than 1100 MPa <i>NOTE: The note concerning the F factor in section 7.3 of this standard shall not be applied for UN certified cylinders.</i>
ISO 9809-2:2000	Gas cylinders – Refillable seamless steel gas cylinders - Design, construction and testing - Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1100 MPa
ISO 9809-3:2000	Gas cylinders – Refillable seamless steel gas cylinders - Design, construction and testing - Part 3: Normalized steel cylinders
ISO 7866:1999	Gas cylinders – Refillable seamless aluminium alloy gas cylinders – Design, construction and testing <i>NOTE: The note concerning the F factor in section 7.2 of this standard shall not be applied for UN certified cylinders. Aluminium alloy 6351A – T6 or equivalent is shall not be authorized.</i>
ISO 11118:1999	Gas cylinders – Non-refillable metallic gas cylinders - Specification and test methods

6.2.5.2.2 The following standards apply for the design, construction, and initial inspection and test of UN certified tubes:

ISO 11120:1999	Gas cylinders – Refillable seamless steel tubes for compressed gas transport, of water capacity between 150 l and 3000 l – Design, construction and testing <i>NOTE: The note concerning the F factor in section 7.1 of this standard shall not be applied for UN certified tubes</i>
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6.2.5.2.3 The following standards apply for the design, construction and initial inspection and test of UN certified acetylene cylinders:

For the cylinder shell:

ISO 9809-1:1999	Gas cylinders – Refillable seamless steel gas cylinders - Design, construction and testing – Part 1: Quenched and tempered steel cylinders with tensile strength less than 1100 MPa <i>NOTE: The note concerning the F factor in section 7.3 of this standard shall not be applied for UN certified cylinders.</i>
ISO 9809-3:2000	Gas cylinders – Refillable seamless steel gas cylinders - Design, construction and testing – Part 3: Normalized steel cylinders
ISO 7866:1999	Gas cylinders – Refillable seamless aluminium alloy gas cylinders – Design, construction and testing <i>NOTE: The note concerning the F factor in section 7.2 of this standard shall not be applied for UN certified cylinders. Aluminium alloy 6351A – T6 or equivalent is shall not be authorized.</i>
ISO 11118:1999	Gas cylinders – Non-refillable metallic gas cylinders - Specification and test methods

For the porous mass in the cylinder:

ISO 3807-1:2000	Cylinders for acetylene – Basic requirements - Part 1: Cylinders without fusible plugs
ISO 3807-2:2000	Cylinders for acetylene – Basic requirements - Part 2: Cylinders with fusible plugs

6.2.5.3 *Materials*

In addition to the material requirements specified in the pressure receptacle design and construction standards, and any restrictions specified in the applicable packing instruction for the gas(es) to be transported (e.g. packing instruction P200), the following standards apply to material compatibility:

ISO 11114-1:1997	Transportable gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 1: Metallic materials
ISO 11114-2:2000	Transportable gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 2: Non-metallic materials

6.2.5.4 *Service equipment*

The following standards apply to closures and their protection:

ISO 11117:1998	Gas cylinders - Valve protection caps and valve guards for industrial and medical gas cylinders- Design, construction and tests
ISO 10297:1999	Gas cylinders –Refillable gas cylinder valves - Specification and type testing.

6.2.5.5 *Periodic inspection and test*

The following standards apply to the periodic inspection and testing of UN certified cylinders:

ISO 6406:1992	Periodic inspection and testing of seamless steel gas cylinders
ISO 10461:1993	Seamless aluminium - alloy gas cylinders - Periodic inspection and testing
ISO 10462:1994	Cylinders for dissolved acetylene – Periodic inspection and maintenance

6.2.5.6 *Conformity assessment system and approval of pressure receptacles*

6.2.5.6.1 *Definitions*

For the purposes of this section:

Conformity assessment system means a system for competent authority approval of a manufacturer, by pressure receptacle design type approval, approval of manufacturer's quality system and approval of inspection bodies;

Design type means a pressure receptacle design as specified by a particular pressure receptacle standard;

Verify means confirm by examination or provision of objective evidence that specified requirements have been fulfilled.

6.2.5.6.2 *General requirements*

Competent Authority

6.2.5.6.2.1 The competent authority that approves the pressure receptacle shall approve the conformity assessment system for the purpose of ensuring that pressure receptacles conform to the requirements of these model regulations. In instances where the competent authority that approves a pressure receptacle is not the competent authority in the country of manufacture, the marks of the approval country and the country of manufacture shall be indicated in the pressure receptacle marking (see 6.2.5.7 and 6.2.5.8).

The competent authority of the country of approval shall supply, upon request, evidence demonstrating compliance to this conformity assessment system to its counterpart in a country of use.

6.2.5.6.2.2 The competent authority may delegate its functions in this conformity assessment system in whole or in part.

6.2.5.6.2.3 The competent authority shall ensure that a current list of approved inspection bodies and their identity marks and approved manufacturers and their identity marks is available.

Inspection body

6.2.5.6.2.4 The inspection body shall be approved by the competent authority as an inspector of pressure receptacles and shall:

- (a) have a staff with an organisational structure, capable, trained, competent, and skilled, to satisfactorily perform its technical functions;
- (b) have access to suitable and adequate facilities and equipment;
- (c) operate in an impartial manner and be free from any influence which could prevent it from doing so;
- (d) ensure confidentiality of the commercial and proprietary activities of the manufacturer and other bodies;
- (e) maintain clear demarcation between actual inspection body functions and unrelated functions;
- (f) operate a documented quality system;
- (g) ensure that the tests and inspections specified in the relevant pressure receptacle standard and these model regulations are performed; and
- (h) maintain an effective and appropriate report and record system in accordance with 6.2.5.6.6.

6.2.5.6.2.5 The inspection body shall perform design type approval, pressure receptacle production testing and inspection, and certification to verify conformity with the relevant pressure receptacle standard (see 6.2.5.6.4 and 6.2.5.6.5).

Manufacturer

6.2.5.6.2.6 The manufacturer shall

- (a) operate a documented quality system in accordance with 6.2.5.6.3;
- (b) apply for design type approvals in accordance with 6.2.5.6.4;
- (c) select an inspection body from the list of approved inspection bodies maintained by the competent authority in the country of approval; and
- (d) maintain records in accordance with 6.2.5.6.6.

Testing laboratory

6.2.5.6.2.7 The testing laboratory shall have:

- (a) staff with an organisational structure, sufficient in number, competence, and skill; and
- (b) suitable and adequate facilities and equipment to perform the tests required by the manufacturing standard to the satisfaction of the inspection body.

6.2.5.6.3 *Manufacturer's quality system*

6.2.5.6.3.1 The quality system shall contain all the elements, requirements, and provisions adopted by the manufacturer. It shall be documented in a systematic and orderly manner in the form of written policies, procedures and instructions.

The contents shall in particular include adequate descriptions of:

- (a) the organisational structure, responsibilities, and power of the management with regard to design and product quality;
- (b) the design control and design verification techniques, processes, and systematic actions that will be used when designing the pressure receptacles;
- (c) the relevant pressure receptacle manufacturing, quality control, quality assurance, and process operation instructions that will be used;
- (d) quality records, such as inspection reports, test data, and calibration data;

- (e) management reviews to ensure the effective operation of the quality system arising from the audits in accordance with 6.2.5.6.3.2 ;
- (f) the process describing how customer requirements are met;
- (g) the process for control of documents and their revision;
- (h) the means for control of non-conforming pressure receptacles, purchased components, in-process and final materials; and
- (i) training programmes for relevant personnel.

6.2.5.6.3.2 Audit of the quality system

The quality system shall be initially assessed to determine whether it meets the requirements in 6.2.5.6.3.1 to the satisfaction of the competent authority.

The manufacturer shall be notified of the results of the audit. The notification shall contain the conclusions of the audit and any corrective actions required.

Periodic audits shall be carried out, to the satisfaction of the competent authority, to ensure that the manufacturer maintains and applies the quality system. Reports of the periodic audits shall be provided to the manufacturer.

6.2.5.6.3.3 Maintenance of the quality system

The manufacturer shall maintain the quality system as approved in order that it remains adequate and efficient.

The manufacturer shall notify the competent authority that approved the quality system, of any intended changes. The proposed changes shall be evaluated in order to determine whether the amended quality system will still satisfy the requirements in 6.2.5.6.3.1.

6.2.5.6.4 *Approval process*

Initial design type approval

6.2.5.6.4.1 The initial design type approval shall consist of approval of the manufacturer's quality system and approval of the pressure receptacle design to be produced. An application for an initial design type approval shall encompass the requirements of 6.2.5.6.3, 6.2.5.6.4.2 to 6.2.5.6.4.6 and 6.2.5.6.4.9.

6.2.5.6.4.2 A manufacturer desiring to produce pressure receptacles in accordance with a pressure receptacle standard and these model regulations shall apply for, obtain, and retain a Design Type Approval Certificate issued by the competent authority in the country of approval for at least one pressure receptacle design type in accordance with the procedure given in 6.2.5.6.4.9. This written approval shall, on request, be submitted to the competent authority of the country of use.

6.2.5.6.4.3 An application shall be made for each manufacturing facility and shall include:

- (a) the name and registered address of the manufacturer and in addition, if the application is submitted by an authorised representative, its name and address;
- (b) the address of the manufacturing facility (if different from the above);
- (c) the name and title of the person(s) responsible for the quality system;
- (d) the designation of the pressure receptacle and the relevant pressure receptacle standard;
- (e) details of any refusal of approval of a similar application by any other competent authority;
- (f) the identity of the inspection body for design type approval;
- (g) documentation on the manufacturing facility as specified under 6.2.5.6.3.1 and
- (h) the technical documentation required for design type approval, which shall enable verification of the conformity of the pressure receptacles with the requirements of the relevant pressure receptacle design standard. The technical documentation shall cover the design and method of manufacture and shall contain, as far as is relevant for assessment, at least the following:
 - (i) pressure receptacle design standard, design and manufacturing drawings, showing components and subassemblies, if any;
 - (ii) descriptions and explanations necessary for the understanding of the drawings and intended use of the pressure receptacles;
 - (iii) a list of the standards necessary to fully define the manufacturing process;
 - (iv) design calculations and material specifications; and
 - (v) design type approval test reports, describing the results of examinations and tests carried out in accordance with 6.2.5.6.4.9.

6.2.5.6.4.4 An initial audit in accordance with 6.2.5.6.3.2 shall be performed to the satisfaction of the competent authority.

6.2.5.6.4.5 If the manufacturer is denied approval, the competent authority shall provide written detailed reasons for such denial.

6.2.5.6.4.6 Following approval, changes to the information submitted under 6.2.5.6.4.2 relating to the initial approval shall be provided to the competent authority.

Subsequent design type approvals

6.2.5.6.4.7 An application for a subsequent design type approval shall encompass the requirements of 6.2.5.6.4.8 and 6.2.5.6.4.9, provided a manufacturer is in the possession of an initial design type approval. In such a case, the manufacturer's quality system according to 6.2.5.6.3 shall have been approved during the initial design type approval and shall be applicable for the new design.

6.2.5.6.4.8 The application shall include:

- (a) the name and address of the manufacturer and in addition, if the application is submitted by an authorised representative, its name and address;
- (b) details of any refusal of approval of a similar application by any other competent authority;
- (c) evidence that initial design type approval has been granted; and
- (d) the technical documentation, as described in 6.2.5.6.4.3 (h).

Procedure for design type approval

6.2.5.6.4.9 The inspection body shall:

- (a) examine the technical documentation to verify that:
 - (i) the design is in accordance with the relevant provisions of the standard, and
 - (ii) the prototype lot has been manufactured in conformity with the technical documentation and is representative of the design;
- (b) verify that the production inspections have been carried out as required in accordance with 6.2.5.6.5;
- (c) select pressure receptacles from a prototype production lot and supervise the tests of these pressure receptacles as required for design type approval;
- (d) perform or have performed the examinations and tests specified in the pressure receptacle standard to determine that:
 - (i) the standard has been applied and fulfilled, and
 - (ii) the procedures adopted by the manufacturer meet the requirements of the standard; and
- (e) ensure that the various type approval examinations and tests are correctly and competently carried out.

After prototype testing has been carried out with satisfactory results and all applicable requirements of 6.2.5.6.4 have been satisfied, a Design Type Approval Certificate shall be issued which shall include the name and address of the manufacturer, results

and conclusions of the examination, and the necessary data for identification of the design type.

If the manufacturer is denied a design type certification, the competent authority shall provide written detailed reasons for such denial.

6.2.5.6.4.10 Modifications to approved design types

The manufacturer shall inform the issuing competent authority of modifications to the approved design type as specified in the pressure receptacle standard. A subsequent design type approval shall be requested where such modifications constitute a new design according to the relevant pressure receptacle standard. This additional approval shall be given in the form of an amendment to the original Design Type Approval Certificate.

6.2.5.6.4.11 Upon request, the competent authority shall communicate to any other competent authority, information concerning design type approval, modifications of approvals, and withdrawn approvals.

6.2.5.6.5 *Production inspection and certification*

An inspection body, or its delegate, shall carry out the inspection and certification of each pressure receptacle. The inspection body selected by the manufacturer for inspection and testing during production may be different from the inspection body used for the design type approval testing.

Where it can be demonstrated to the satisfaction of the inspection body that the manufacturer has trained and competent inspectors, independent of the manufacturing operations, inspection may be performed by those inspectors. In such a case, the manufacturer shall maintain training records of the inspectors.

The inspection body shall verify that the inspections by the manufacturer and tests performed on those pressure receptacles, fully conform to the standard and the requirements of these Model Regulations. Should non-conformance in conjunction with this inspection and testing be determined, the permission to have inspection performed by the manufacturer's inspectors may be withdrawn.

The manufacturer shall, after approval by the inspection body, make a declaration of conformity with the certified design type. The application of the pressure receptacle certification marking shall be considered a declaration that the pressure receptacle complies with the applicable pressure receptacle standards and the requirements of this conformity assessment system and these model regulations. The inspection body shall affix or delegate the manufacturer to affix the pressure receptacle certification marking and the registered mark of the inspection body to each approved pressure receptacle.

A certificate of compliance, signed by the inspection body and the manufacturer, shall be issued before the pressure receptacles are filled.

6.2.5.6.6 *Records*

Design type approval and certificate of compliance records shall be retained by the manufacturer and the inspection body for not less than 20 years.

6.2.5.7 Marking of UN certified refillable pressure receptacles

UN certified refillable pressure receptacles shall be marked clearly and legibly with certification and gas or pressure receptacle specific marks. These marks shall be permanently affixed (e.g. stamped, engraved, or etched) on the pressure receptacle. The marks 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 marks shall be 5mm for pressure receptacles with a diameter greater than or equal to 140 mm and 2.5 mm for pressure receptacles with a diameter less than 140 mm. The minimum size of the "UN" mark shall be 10 mm for pressure receptacles with a diameter greater than or equal to 140 mm and 5 mm for pressure receptacles with a diameter less than 140 mm.

6.2.5.7.1 The following certification marks shall be applied:

- (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, construction and testing;
- (c) The character(s) identifying the country of approval as indicated by the distinguishing signs of motor vehicles in international traffic;
- (d) The identity mark or stamp of the inspection body that is registered with the competent authority of the country authorizing the marking;
- (e) The date of the initial inspection, the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/").

6.2.5.7.2 The following operational marks shall be applied:

- (f) The test pressure in bar, preceded by the letters "PH" and followed by the letters "BAR";
- (g) 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 mass shall not include the mass of valve, valve cap or valve guard, any coating, or porous mass for acetylene. The empty mass shall be expressed to three significant figures rounded up to the last digit. For cylinders of less than 1 kg, the mass shall be expressed to two significant figures rounded up to the last digit;
- (h) The minimum guaranteed wall thickness of the pressure receptacle in millimetres followed by the letters "MM". This mark is not

required for pressure receptacles with a water capacity less than or equal to 1 litre or for composite cylinders;

- (i) In the case of pressure receptacles intended for the transport of compressed gases, UN 1001 acetylene, dissolved, and UN 3374 acetylene, solvent free, the working pressure in bar, preceded by the letters "PW";
- (j) 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;
- (k) In the case of UN 1001 acetylene, dissolved, the total of the mass of the empty receptacle, the fittings and accessories not removed during filling, the porous material, the solvent and the saturation gas expressed to two significant figures rounded down to the last digit followed by the letters "KG";
- (l) In the case of UN 3374 acetylene, solvent free, the total of the mass of the empty receptacle, the fittings and accessories not removed during filling and the porous material expressed to two significant figures rounded down to the last digit followed by the letters "KG".

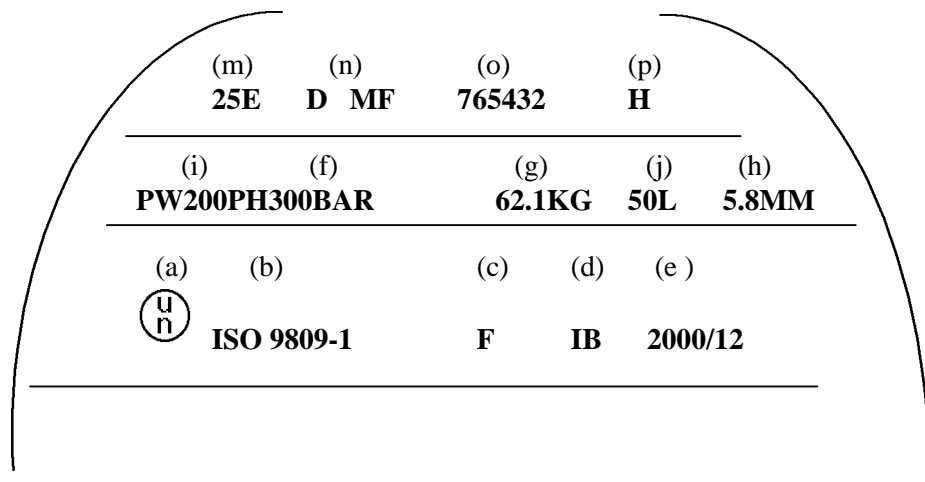
6.2.5.7.3 The following manufacturing marks shall be applied

- (m) Identification of the cylinder thread (e.g. 25E);
- (n) The manufacturer's mark registered by the competent authority. When the country of manufacture is not the same as the country of approval, then the manufacturer's mark shall be preceded by the character(s) identifying the country of manufacture as indicated by the distinguishing signs of motor vehicles in international traffic. The country mark and the manufacturer's mark shall be separated by a space or slash;
- (o) The serial number assigned by the manufacturer;
- (p) In the case of steel pressure receptacles and composite pressure receptacles with steel liner 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).

6.2.5.7.4 The above marks shall be placed in three groups as shown in the example below.

- Manufacturing marks shall be the top grouping and shall appear consecutively in the sequence given in 6.2.5.7.3.
- The middle grouping shall include the test pressure (f) which shall be immediately preceded by the working pressure (i) when the latter is required.

- Certification marks shall be the bottom grouping and shall appear in the sequence given in 6.2.5.7.1.



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

6.2.5.7.6 In addition to the preceding marks, 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.

6.2.5.8 Marking of UN certified non-refillable pressure receptacles

UN certified non-refillable pressure receptacles shall be marked clearly and legibly with certification and gas or pressure receptacle specific marks. These marks shall be permanently affixed (e.g. stencilled, stamped, engraved, or etched) on the pressure receptacle. Except when stencilled, the marks 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 marks shall be 5mm for pressure receptacles with a diameter greater than or equal to 140 mm and 2.5 mm for pressure receptacles with a diameter less than 140 mm. The minimum size of the "UN" mark shall be 10mm for pressure receptacles with a diameter greater than or equal to 140 mm and 5mm for pressure receptacles with a diameter less than 140 mm. The minimum size of the "DO NOT REFILL" mark shall be 5 mm.

6.2.5.8.1 The marks listed in 6.2.5.7.1 to 6.2.5.7.3 shall be applied with the exception of (g), (h), and (m). The serial number (o) may be replaced by the batch number. In addition, the words "DO NOT REFILL" in letters of at least 5 mm in height are required.

6.2.5.8.2 The requirements of 6.2.5.7.4 shall apply.

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

6.2.5.8.3 Other marks 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 marks.
