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**INLAND TRANSPORT COMMITTEE**

**Working Party on the Transport of Dangerous Goods**

**Joint Meeting of the RID Safety Committee and  
the Working Party on the Transport of  
Dangerous Goods**

**REPORT OF THE SESSION\***  
**Held in Geneva from 10 to 14 September 2001**

**Addendum 3**

**Draft amendments to Part 6 of the restructured RID/ADR**

**Texts adopted by the Joint Meeting**

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## Chapter 6.1

- 6.1.1.1 (c) Replace "Receptacles" with "Pressure receptacles".
- 6.1.1.4 Add ",reconditioned" after "manufactured" and delete "manufactured" after "each".
- 6.1.1.5 Add the following new paragraph:
- "6.1.1.5 Manufacturers and subsequent distributors of packagings shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that packages as presented for carriage are capable of passing the applicable performance tests of this Chapter."
- 6.1.2.3 Delete "and infectious substances packagings marked in accordance with 6.3.1.1".
- 6.1.3 Under Note 3, replace three times "Group" with "packing group".
- 6.1.3.2 Renumber this paragraph as "6.1.3.3" and amend to read as follows:
- "6.1.3.3 Every packaging other than those referred to in 6.1.3.2 liable to undergo a reconditioning process shall bear the marks indicated in 6.1.3.1 (a) to (e) in a permanent form. Marks are permanent if they are able to withstand the reconditioning process (e.g. embossed). For packagings other than metal drums of a capacity greater than 100 litres, these permanent marks may replace the corresponding durable markings prescribed in 6.1.3.1. "
- 6.1.3.2.1, 6.1.3.2.2, 6.1.3.2.3  
and 6.1.3.2.4 Renumber these paragraphs as 6.1.3.2, 6.1.3.4, 6.1.3.5 and 6.1.3.6 respectively. Renumber subsequent paragraphs accordingly.
- 6.1.3.7 (Former 6.1.3.3) Amend this paragraph to read as follows:
- "6.1.3.7 Marking shall be applied in the sequence of the sub-paragraphs in 6.1.3.1; each element of the marking required in these sub-paragraphs and when appropriate sub-paragraphs (h) to (j) of 6.1.3.8 shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable. For examples, see 6.1.3.11.
- Any additional markings authorized by a competent authority shall still enable the parts of the mark to be correctly identified with reference to 6.1.3.1."
- 6.1.3.8 (i) (Former 6.1.3.4 (i)) Amend to read as follows:
- "(i) the name of the reconditioner or other identification of the packaging specified by the competent authority."
- 6.1.4.18.1 Amend the first sentence to read as follows:
- "Bags shall be made of a suitable kraft paper or of an equivalent paper with at least three plies, the middle ply of which may be net-cloth and adhesive bonding to the outer paper plies."

- 6.1.5.5.4 Replace "substance" with "liquid" (three times).
- 6.1.5.5.5 Replace "substances" with "liquids".
- 6.1.5.6.2 Delete "non-dangerous" before "liquids" in the first sentence.  
The amendment concerning the second sentence does not apply to the English version.

## Chapter 6.2

Replace "receptacles for gases" with "pressure receptacles" in the title and throughout the existing text of the Chapter to account for the new terminology in the definitions of 1.2.1.

6.2.1 In the title, delete "for receptacles for gases".

6.2.1.1.1 Insert the following text before the paragraph beginning with "The test pressure of receptacles...":

"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."

6.2.1.1.2 Add at the end:

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

6.2.1.1.3 and  
6.2.1.1.4

Add the following two new paragraphs:

"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.

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 filled and that no interchange of pressure receptacle contents can occur during carriage."

6.2.1.2 a)  
and b)

Add at the end "as well as for substances not in Class 2 listed in Table 3 of packing instruction P200 in 4.1.4.1;"

6.2.1.3.1

Replace the existing text with the following:

"Pressure drums may be provided with openings for filling and discharge and with other openings intended for level gauges, pressure gauges or relief devices. The number of openings shall be kept to a minimum consistent with safe operations. Pressure drums may also be provided with an inspection opening, which shall be closed by an effective closure."

6.2.1.3.2

Add the following new subparagraphs e) and f):

"e) If level gauges, pressure gauges or relief devices are installed, they shall be protected in the same way as is required for valves in 4.1.6.4.

f) Pressure receptacles whose filling is measured by volume shall be provided with a level indicator."

6.2.1.5

In the title, add "and test".

6.2.1.5.1

Replace the existing text with the following:

"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;

(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 carriage 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 In the title, add: "*and test*"

6.2.1.6.1 Renumber existing (c) as (d) and insert a new c) as follows:

"(c) Checking of the neck threads if the fittings are removed;"

6.2.1.6.2 and  
6.2.1.6.3

Replace the existing text with the following:

"6.2.1.6.2 For pressure receptacles intended for the carriage 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."

6.2.1.7 Amend as follows:

**"6.2.1.7 *Marking of refillable pressure receptacles***

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).

The minimum size of the marks shall be 5 mm 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.

6.2.1.7.1 The following certification marks shall be applied:

- (a) The technical standard used for design, construction and testing, as listed in the table under 6.2.2 or the approval number;
- (b) The character(s) identifying the country of approval as indicated by the distinguishing signs of motor vehicles in international traffic;

- (c) The identity mark or stamp of the inspection body that is registered with the competent authority of the country authorizing the marking;
- (d) The date of the initial inspection, the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/" ).

6.2.1.7.2 The following operational marks shall be applied:

- (e) The test pressure in bar, preceded by the letters "PH" and followed by the letters "BAR";
- (f) 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". With the exception of pressure receptacles of UN 1965 Hydrocarbon gas mixture, liquefied, n.o.s., 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;
- (g) The minimum guaranteed wall thickness of the pressure receptacle in millimetres followed by the letters "MM". This mark is not required for pressure receptacles of UN 1965 Hydrocarbon gas mixture, liquefied, n.o.s., nor for pressure receptacles with a water capacity less than or equal to 1 l or for composite cylinders;
- (h) In the case of pressure receptacles intended for the carriage of compressed gases, UN 1001 acetylene, dissolved, and UN 3374 acetylene, solvent free, the working pressure in bar, preceded by the letters "PW";
- (i) 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;
- (j) 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";
- (k) 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".

6.2.1.7.3 The following manufacturing marks shall be applied:

- (l) Identification of the cylinder thread (e.g. 25E). This mark is not required for pressure receptacles of UN 1965 Hydrocarbon gas mixture, liquefied, n.o.s.;

- (m) 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;
- (n) The serial number assigned by the manufacturer;
- (o) In the case of steel pressure receptacles and composite pressure receptacles with steel liner intended for the carriage of gases with a risk of hydrogen embrittlement, the letter "H" showing compatibility of the steel (see ISO 11114-1:1997).

6.2.1.7.4 The above marks shall be placed in three groups.

- Manufacturing marks shall be the top grouping and shall appear consecutively in the sequence given in 6.2.1.7.3.
- The middle grouping shall include the test pressure (e) which shall be immediately preceded by the working pressure (h) when the latter is required.
- Certification marks shall be the bottom grouping and shall appear in the sequence given in 6.2.1.7.1.

6.2.1.7.5 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.

6.2.1.7.6 In addition to the preceding marks, each refillable pressure receptacle shall be marked indicating the date (year (two digits) followed by the month (two digits) separated by a slash (i.e. "/")) of the last periodic inspection and the registered mark of the inspection body authorized by the competent authority of the country of use.

6.2.1.7.7 For acetylene cylinders, with the agreement of the competent authority, the date of the most recent periodic inspection and the stamp of the expert may be engraved on a ring affixed to the cylinder when the valve is installed and which is removable only by disconnecting the valve from the cylinder."

6.2.1.8 Add a new section as follows:

**6.2.1.8 *Marking of non-refillable pressure receptacles***

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 "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 "DO NOT REFILL" mark shall be 5 mm.

6.2.1.8.1 The marks listed in 6.2.1.7.1 to 6.2.1.7.3 shall be applied with the exception of (f), (g), and (l). The serial number (n) 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.

6.2.1.8.2 The requirements of 6.2.1.7.4 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).*

6.2.1.8.3 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."

6.2.2 Under the heading "for materials", delete the last row (beginning with EN 1252-1:1998) and amend the first row to read as follows:

EN 1797:2001	Cryogenic vessels-Gas/material compatibility	6.2.1.2
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Delete the last row.

Under the heading "for closures", in the first row amend the first column to read as follows: "EN849:1996/A2:2001".

6.2.3.1 Delete the last but one paragraph ("For welded receptacles only...") and the last sentence of the last paragraph ("Any additional thickness...").

6.2.3.4.1 Delete this paragraph and renumber subsequent paragraphs accordingly.

6.2.3.4.2 (New 6.2.3.4.1) Amend as follows:

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

6.2.3.4.5 and

6.2.3.4.6 (New 6.2.3.4.4 and 6.2.3.4.5 respectively). Delete these paragraphs.

6.2.5 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 carriage. 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 4.1.6.4 (a) to (e) or pressure receptacles are carried in an outer packaging, which as prepared for carriage shall be capable of meeting the drop test specified in 6.1.5.3 for the packing group I performance level.

6.2.5.1.2 *Pressure relief devices*

Each pressure receptacle used for the carriage 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 packing instruction P200 in 4.1.4.1. 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 carriage.

**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 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 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 carried (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 sub-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 RID/ADR. 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 for the inspection 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 in the RID/ADR 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 meet 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 with the RID/ADR 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 certificate 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 meet 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 approval, 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 RID/ADR. 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 RID/ADR. 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 and 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 5 mm 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 RID/ADR 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 l or for composite cylinders;
- (i) In the case of pressure receptacles intended for the carriage 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

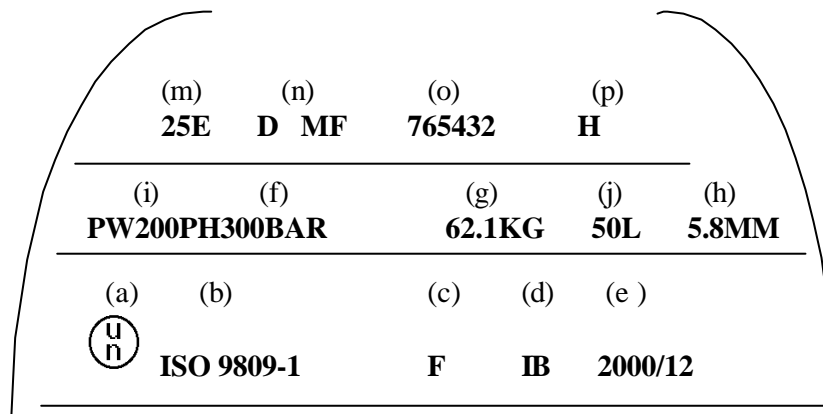
- (m) Identification of the cylinder thread (e.g. 25E);
- (n) The manufacturer's mark registered by the competent authority. When the country of manufacture is not the same as the country of approval, then the manufacturer's mark shall be preceded by the character(s) identifying the country of manufacture 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 carriage 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 5 mm 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."

## Chapter 6.3

6.3.1.1 In the first sentence, replace "may, after decision by the competent authority" with "shall".

Add the following sentence at the end:

"Each element of the marking applied in accordance with (a) to (g) shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable."

6.3.1.3 Add the following new paragraph:

"6.3.1.3 Manufacturers and subsequent distributors of packagings shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that packages as presented for carriage are capable of passing the applicable performance tests of this Chapter."

6.3.3 Add a new paragraph at the end of Chapter 6.3 as follows:

### **"6.3.3 Test report**

6.3.3.1 A test report containing at least the following particulars shall be drawn up and shall be available to the users of the packaging:

1. Name and address of the test facility;
2. Name and address of applicant (where appropriate);
3. A unique test report identification;
4. Date of the test report;

5. Manufacturer of the packaging;
6. Description of the packaging design type (e.g. dimensions, materials, closures, thickness, etc.), including method of manufacture (e.g. blow moulding) and which may include drawing(s) and/or photograph(s);
7. Maximum capacity;
8. Characteristics of test contents, e.g. viscosity and relative density for liquids and particle size for solids;
9. Test descriptions and results;
10. The test report shall be signed with the name and status of the signatory.

6.3.3.2 The test report shall contain statements that the packaging prepared as for carriage was tested in accordance with the appropriate requirements of this Chapter and that the use of other packaging methods or components may render it invalid. A copy of the test report shall be available to the competent authority. "

## Chapter 6.4

6.4.2.12 Add the following new paragraph:

"6.4.2.12 Manufacturers and subsequent distributors of packagings shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that packages as presented for carriage are capable of passing the applicable performance tests of this Chapter."

6.4.10 Replace "(Reserved)" with following text:

### **"6.4.10 Requirements for Type C packages**

6.4.10.1 Type C packages shall be designed to meet the requirements specified in 6.4.2 and of 6.4.7.2 to 6.4.7.15, except as specified in 6.4.7.14 (a), and of the requirements specified in 6.4.8.2 to 6.4.8.5, 6.4.8.9 to 6.4.8.15, and, in addition, of 6.4.10.2 to 6.4.10.4.

6.4.10.2 A package shall be capable of meeting the assessment criteria prescribed for tests in 6.4.8.7 (b) and 6.4.8.11 after burial in an environment defined by a thermal conductivity of 0.33 W/m.K and a temperature of 38 °C in the steady state. Initial conditions for the assessment shall assume that any thermal insulation of the package remains intact, the package is at the maximum normal operating pressure and the ambient temperature is 38 °C.

6.4.10.3 A package shall be so designed that, if it were at the maximum normal operating pressure and subjected to:

- (a) The tests specified in 6.4.15, it would restrict the loss of radioactive contents to not more than  $10^{-6}$  A<sub>2</sub> per hour; and
- (b) The test sequences in 6.4.20.1, it would meet the following requirements:
  - (i) retain sufficient shielding to ensure that the radiation level at 1 m from the surface of the package would not exceed 10 mSv/h with

the maximum radioactive contents which the package is designed to contain; and

- (ii) restrict the accumulated loss of radioactive contents in a period of 1 week to not more than  $10 A_2$  for krypton-85 and not more than  $A_2$  for all other radionuclides.

Where mixtures of different radionuclides are present, the provisions of 2.2.7.7.2.4 to 2.2.7.7.2.6 shall apply except that for krypton-85 an effective  $A_2(i)$  value equal to  $10 A_2$  may be used. For case (a) above, the assessment shall take into account the external contamination limits of 4.1.9.1.2.

6.4.10.4 A package shall be so designed that there will be no rupture of the containment system following performance of the enhanced water immersion test specified in 6.4.18."

6.4.18 In the title, add at the end: **“and type C packages”**

6.4.20 Replace "(Reserved)" with following text:

**"6.4.20 Tests for Type C packages**

6.4.20.1 Specimens shall be subjected to the effects of each of the following test sequences in the orders specified:

- (a) The tests specified in 6.4.17.2 (a), 6.4.17.2 (c), 6.4.20.2 and 6.4.20.3; and
- (b) The test specified in 6.4.20.4.

Separate specimens are allowed to be used for each of the sequences (a) and (b).

6.4.20.2 Puncture/tearing test: The specimen shall be subjected to the damaging effects of a solid probe made of mild steel. The orientation of the probe to the surface of the specimen shall be as to cause maximum damage at the conclusion of the test sequence specified in 6.4.20.1 (a).

- (a) The specimen, representing a package having a mass less than 250 kg, shall be placed on a target and subjected to a probe having a mass of 250 kg falling from a height of 3 m above the intended impact point. For this test the probe shall be a 20 cm diameter cylindrical bar with the striking end forming a frustum of a right circular cone with the following dimensions: 30 cm height and 2.5 cm in diameter at the top. The target on which the specimen is placed shall be as specified in 6.4.14;
- (b) For packages having a mass of 250 kg or more, the base of the probe shall be placed on a target and the specimen dropped onto the probe. The height of the drop, measured from the point of impact with the specimen to the upper surface of the probe shall be 3 m. For this test the probe shall have the same properties and dimensions as specified in (a) above, except that the length and mass of the probe shall be such as to incur maximum damage to the specimen. The target on which the base of the probe is placed shall be as specified in 6.4.14.

- 6.4.20.3 Enhanced thermal test: The conditions for this test shall be as specified in 6.4.17.3, except that the exposure to the thermal environment shall be for a period of 60 minutes.
- 6.4.20.4 Impact test: The specimen shall be subject to an impact on a target at a velocity of not less than 90 m/s, at such an orientation as to suffer maximum damage. The target shall be as defined in 6.4.14. "

6.4.23.4 Do not apply to the English version.

## **Chapter 6.5**

6.5.1.1.4 Add a new paragraph to read:

"6.5.1.1.4 Manufacturers and subsequent distributors of IBCs shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that IBCs as presented for carriage are capable of passing the applicable performance tests of this Chapter."

6.5.1.4.1 (a) Amend the top line centre column in the table to read "For solids, filled or discharged".

6.5.1.4.3 Change "loaded" to "filled" in the table 18 times.

6.5.1.6.4 Amend last sentence to read:

"A report of each inspection shall be kept by the owner of the IBC at least until the next inspection. The report shall include the results of the inspection and shall identify the party performing the inspection (see also the marking requirements in 6.5.2.2.1)."

6.5.1.6.5 Amend to read:

"When an IBC is impaired as a result of impact (e.g. accident) or any other cause, it shall be repaired or otherwise maintained (see definition of "*Routine maintenance of IBCs*" in 1.2.1), so as to conform to the design type. The bodies of rigid plastics IBCs and the inner receptacles of composite IBCs that are impaired shall be replaced."

6.5.1.6.6 Add a new 6.5.1.6.6 to read:

"6.5.1.6.6 Repaired IBCs

6.5.1.6.6.1 In addition to any other testing and inspection requirements in RID/ADR, an IBC shall be subjected to the full testing and inspection requirements set out in 6.5.4.14.3 and 6.5.1.6.4 (a), and the required reports shall be prepared, whenever it is repaired.

6.5.1.6.6.2 The Party performing the tests and inspections after the repair shall durably mark the IBC near the manufacturer's UN design type marking to show:

- (a) the State in which the tests and inspections were carried out;
- (b) the name or authorized symbol of the party performing the tests and inspections; and
- (c) the date (month, year) of the tests and inspections.

6.5.1.6.6.3 Test and inspections performed in accordance with 6.5.1.6.6.1 may be considered to satisfy the requirements for the two and a half and five year periodic tests and inspections."

Renumber existing 6.5.1.6.6 as 6.5.1.6.7.

6.5.2.1.1 (h) Amend to read: "(h) The maximum permissible gross mass in kg."

6.5.2.1.1 Add the following sentence at the end:

"Each element of the marking applied in accordance with (a) to (h) and with 6.5.2.2 shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable."

6.5.2.2.1 Change "Maximum loading/discharge pressure" to "Maximum filling/discharge pressure".

6.5.3.1.1 Change "loaded" to "filled" twice.

6.5.3.3.1 Change "loaded" to "filled" 4 times.

6.5.3.3.6 Delete.

6.5.3.4.1 Change "loaded" to "filled" 4 times.

6.5.3.4.10 Delete this paragraph and renumber subsequent paragraphs accordingly.

6.5.3.5.1 and  
6.5.3.6.1 Change "loaded" to "filled".

6.5.4.4.2 Amend to read as follows:

"The IBC shall be filled. A load shall be added and evenly distributed. The mass of the filled IBC and the load shall be 1.25 times the maximum permissible gross mass."

6.5.4.4.2, 6.5.4.5.2, 6.5.4.6.2,  
6.5.4.7.2, 6.5.4.8.2, 6.5.4.9.2,  
6.5.4.10.2, 6.5.4.11.2  
and 6.5.4.12.2 Amend the heading of these paragraphs to read "Preparation of the IBC for test".

6.5.4.5.2 Amend to read as follows:

"Metal, rigid plastics and composite IBCs shall be filled. A load shall be added and evenly distributed. The mass of the filled IBC and the load shall be twice the maximum permissible gross mass. Flexible IBCs shall be filled to six times their maximum permissible load, the load being evenly distributed."

6.5.4.6.2 Amend to read as follows:

"The IBC shall be filled to its maximum permissible gross mass. If the specific gravity of the product being used for testing makes this impracticable, the IBC shall additionally be loaded so that it is tested at its maximum permissible gross mass the load being evenly distributed."



6.5.4.6.3(b)(i) Amend to read:

"(i) one or more IBCs of the same type filled to the maximum permissible gross mass stacked on the test IBC;"

6.5.4.7.1 and  
6.5.4.8.1 Change "loaded" to "filled".

6.5.4.9.2 (b) Amend to read:

"(b) Flexible IBCs: the IBC shall be filled to not less than 95% of its capacity and to its maximum permissible gross mass, the contents being evenly distributed."

6.5.4.10.2, 6.5.4.11.2  
and 6.5.4.12.2 Amend these paragraphs to read as follows:

"The IBC shall be filled to not less than 95% of its capacity and to its maximum permissible gross mass, the contents being evenly distributed."

6.5.4.10.3 Amend the second sentence to read: "The IBC shall then be subjected to a uniformly distributed superimposed load equivalent to twice the maximum permissible gross mass."

6.5.4.14 Amend the heading to read: "Testing of individual metal, rigid plastics and composite IBCs".

6.5.4.14.3 Amend to read as follows:

"Each metal, rigid plastics and composite IBC for liquids, or for solids which are filled or discharged under pressure, shall be subjected to the leakproofness test, as an initial test (i.e. before the IBC is first used for carriage), after repair, and at intervals of not more than two and a half years."

6.5.4.14.4 Delete this paragraph and renumber the following paragraph accordingly.

6.5.4.14.5 (new 6.5.4.14.4) Amend to read as follows:

"6.5.4.14.4 The results of tests and the identity of the party performing the tests shall be recorded in test reports to be kept by the owner of the IBC at least until the date of the next test."

## **Chapter 6.6**

6.6.1.3 Add the following new paragraph:

"6.6.1.3 The specific requirements for large packagings in 6.6.4 are based on large packagings currently used. In order to take into account progress in science and technology, there is no objection to the use of large packagings having specifications different from those in 6.6.4 provided they are equally effective, acceptable to the competent authority and able successfully to withstand the tests described in 6.6.5. Methods of testing other than those described in RID/ADR are acceptable provided they are equivalent and are recognized by the competent authority."

6.6.1.4 Add the following new paragraph:

"6.6.1.4 Manufacturers and subsequent distributors of packagings shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that packages as presented for carriage are capable of passing the applicable performance tests of this Chapter."

6.6.2 Insert the number 6.6.2.1 before the existing text ("The code used...") and add the following new paragraph:

"6.6.2.2 The letter "W" may follow the Large Packaging code. The letter "W" signifies that the large packaging, although of the same type indicated by the code, is manufactured to a specification different from those in 6.6.4 and is considered equivalent in accordance with the requirements in 6.6.1.3."

6.6.3.1 Add the following sentence at the end:

"Each element of the marking applied in accordance with (a) to (h) shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable."

6.6.5.3.1.2, 6.6.5.3.1.3, 6.6.5.3.1.4, 6.6.5.3.2.2, 6.6.5.3.2.3, 6.6.5.3.3.2, 6.6.5.3.3.3, 6.6.5.3.3.4, 6.6.5.3.3.5, 6.6.5.3.4.2, 6.6.5.3.4.3, and

6.6.5.3.4.5.1 Replace the word "packagings" with "packaging".

6.6.5.3.2.2 Replace the existing paragraph with the following text:

"6.6.5.3.2.2 Preparation of large packaging for test

The large packaging shall be loaded to twice its maximum permissible gross mass. A flexible large packaging shall be loaded to six times its maximum permissible gross mass, the load being evenly distributed. "

6.6.5.3.3.3 Replace "plastic" with "plastics".

6.6.5.3.3.4 Replace "must" with "may".

6.6.5.3.4.5.3 Insert a comma after "drop test".

6.6.5.4.1, 6.6.5.4.2 and

6.6.5.4.3 Delete "s" from "packagings", where appropriate.

## **Chapter 6.7**

In the title, add at the end: "AND UN CERTIFIED MULTIPLE-ELEMENT GAS CONTAINERS (MEGCs)".

6.7.1.1 Amend the first sentence to read:

"The requirements of this Chapter apply to portable tanks intended for the carriage of substances/dangerous goods of Classes 2, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 6.2, 7, 8 and 9, and to MEGCs intended for the carriage of non-refrigerated gases of Class 2, by all modes of carriage."

6.7.1.1 and  
6.7.1.2 Insert "or MEGC" after "portable tank" in the second sentence and "or MEGCs" after "portable tanks" in the third.

6.7.2.1, 6.7.3.1 and  
6.7.4.1 Add the following definition:

*"Alternative arrangement* means an approval granted by the competent authority for a portable tank or MEGC that has been designed, constructed or tested to technical requirements or testing methods other than those specified in RID/ADR;"

6.7.5 Add a new section to read:

**"6.7.5 Requirements for the design, construction, inspection and testing of multiple-element gas containers (MEGCs) intended for the carriage of non-refrigerated gases**

**6.7.5.1 Definitions**

For the purposes of this section:

*Alternative arrangement* means an approval granted by the competent authority for a portable tank or MEGC that has been designed, constructed or tested to technical requirements or testing methods other than those specified in RID/ADR;

*Elements* are cylinders, tubes or bundles of cylinders;

*Leakproofness test* means a test using gas subjecting the elements and the service equipment of the MEGC to an effective internal pressure of not less than 20% of the test pressure;

*Manifold* means an assembly of piping and valves connecting the filling and/or discharge openings of the elements;

*Maximum permissible gross mass (MPGM)* means the sum of the tare mass of the MEGC and the heaviest load authorized for carriage;

*Multiple-element gas containers (MEGCs)* are multimodal assemblies of cylinders, tubes and bundles of cylinders which are interconnected by a manifold and which are assembled within a framework. The MEGC includes service equipment and structural equipment necessary for the carriage of gases;

*Service equipment* means measuring instruments and filling, discharge, venting and safety devices;

*Structural equipment* means the reinforcing, fastening, protective and stabilizing members external to the elements.

**6.7.5.2 General design and construction requirements**

6.7.5.2.1 The MEGC shall be capable of being filled and discharged without the removal of its structural equipment. It shall possess stabilizing members external to the elements to provide structural integrity for handling and carriage. MEGCs shall be designed and constructed with supports to provide a secure base during

carriage and with lifting and tie-down attachments which are adequate for lifting the MEGC including when loaded to its maximum permissible gross mass. The MEGC shall be designed to be loaded onto a transport unit or ship and shall be equipped with skids, mountings or accessories to facilitate mechanical handling.

- 6.7.5.2.2 MEGCs shall be designed, manufactured and equipped in such a way as to withstand all conditions to which they will be subjected during normal conditions of handling and carriage. The design shall take into account the effects of dynamic loading and fatigue.
- 6.7.5.2.3 Elements of an MEGC shall be made of seamless steel and be constructed and tested according to 6.2.5. All of the elements in an MEGC shall be of the same design type.
- 6.7.5.2.4 Elements of MEGCs, fittings and pipework shall be:
- (a) compatible with the gas intended to be carried (see ISO 11114-1:1997 and ISO 11114-2:2000); or
  - (b) properly passivated or neutralized by chemical reaction.
- 6.7.5.2.5 Contact between dissimilar metals which could result in damage by galvanic action shall be avoided.
- 6.7.5.2.6 The materials of the MEGC, including any devices, gaskets, and accessories, shall not adversely affect the gases intended for carriage in the MEGC.
- 6.7.5.2.7 MEGCs shall be designed to withstand, without loss of contents, at least the internal pressure due to the contents, and the static, dynamic and thermal loads during normal conditions of handling and carriage. The design shall demonstrate that the effects of fatigue, caused by repeated application of these loads through the expected life of the multiple-element gas container, have been taken into account.
- 6.7.5.2.8 MEGCs and their fastenings shall, under the maximum permissible load, be capable of withstanding the following separately applied static forces:
- (a) in the direction of travel: twice the MPGM multiplied by the acceleration due to gravity ( $g$ )\*;
  - (b) horizontally at right angles to the direction of travel: the MPGM (when the direction of travel is not clearly determined, the forces shall be equal to twice the MPGM) multiplied by the acceleration due to gravity ( $g$ )\*;
  - (c) vertically upwards: the MPGM multiplied by the acceleration due to gravity ( $g$ )\*; and
  - (d) vertically downwards: twice the MPGM (total loading including the effect of gravity) multiplied by the acceleration due to gravity ( $g$ )\*.

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\* For calculation purposes  $g = 9.81 \text{ m/s}^2$ .

- 6.7.5.2.9 Under the forces defined in 6.7.5.2.8, the stress at the most severely stressed point of the elements shall not exceed the values given in either the relevant standards of 6.2.5.2 or, if the elements are not designed, constructed and tested according to those standards, in the technical code or standard recognised or approved by the competent authority of the country of use (see 6.2.3).
- 6.7.5.2.10 Under each of the forces in 6.7.5.2.8, the safety factor for the framework and fastenings to be observed shall be as follows:
- (a) for steels having a clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed yield strength; or
  - (b) for steels with no clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed 0.2% proof strength and, for austenitic steels, the 1% proof strength.
- 6.7.5.2.11 MEGCs intended for the carriage of flammable gases shall be capable of being electrically earthed.
- 6.7.5.2.12 The elements shall be secured in a manner that prevents undesired movement in relation to the structure and the concentration of harmful localized stresses.

### **6.7.5.3 *Service equipment***

- 6.7.5.3.1 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 carriage. When the connection between the frame and the elements allows relative movement between the sub-assemblies, the equipment shall be so fastened as to permit such movement without damage to working parts. The manifolds, the discharge fittings (pipe sockets, shut-off devices), and the stop-valves shall be protected from being wrenched off by external forces. 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 devices (including flanges or threaded plugs) and any protective caps shall be capable of being secured against unintended opening.
- 6.7.5.3.2 Each element intended for the carriage of toxic gases (gases of groups T, TF, TC, TO, TFC and TOC) shall be fitted with a valve. The manifold for liquefied toxic gases (gases of classification codes 2T, 2TF, 2TC, 2TO, 2TFC and 2TOC) shall be so designed that the elements can be filled separately and be kept isolated by a valve capable of being sealed. For the transport of flammable gases (gases of groups F, TF and TFC), the elements shall be isolated by a valve into assemblies of not more than 3000 litres.
- 6.7.5.3.3 For filling and discharge openings of the MEGC, two valves in series shall be placed in an accessible position on each discharge and filling pipe. One of the valves may be a non-return valve. The filling and discharge devices may be fitted to a manifold. For sections of piping which can be closed at both ends and where a liquid product can be trapped, a pressure-relief valve shall be provided to prevent excessive pressure build-up. The main isolation valves on an MEGC shall be clearly marked to indicate their directions of closure. Each stop-valve or other means of closure shall be designed and constructed to

withstand a pressure equal to or greater than 1.5 times the test pressure of the MEGC. All stop-valves with screwed spindles shall close by a clockwise motion of the handwheel. For other stop-valves, the position (open and closed) and direction of closure shall be clearly indicated. All stop-valves shall be designed and positioned to prevent unintentional opening. Ductile metals shall be used in the construction of valves or accessories.

- 6.7.5.3.4 Piping shall be designed, constructed and installed so as to avoid damage due to expansion and contraction, mechanical shock and vibration. Joints in tubing shall be brazed or have an equally strong metal union. The melting point of brazing materials shall be no lower than 525 °C. The rated pressure of the service equipment and of the manifold shall be not less than two thirds of the test pressure of the elements.

#### **6.7.5.4 *Pressure-relief devices***

- 6.7.5.4.1 One or more pressure relief devices shall be fitted on MEGCs used for the carriage of UN 1013 carbon dioxide and UN 1070 nitrous oxide. MEGCs for other gases shall be fitted with pressure relief devices as specified by the competent authority for the country of use.
- 6.7.5.4.2 When pressure relief devices are fitted, every element or group of elements of an MEGC that can be isolated shall then be fitted with one or more pressure relief devices. Pressure relief devices shall be of a type that will resist dynamic forces including liquid surge and shall be designed to prevent the entry of foreign matter, the leakage of gas and the development of any dangerous excess pressure.
- 6.7.5.4.3 MEGCs used for the carriage of certain non-refrigerated gases identified in portable tank instruction T50 in 4.2.5.2.6 may have a pressure-relief device as required by the competent authority of the country of use. Unless an MEGC in dedicated service is fitted with an approved pressure relief device constructed of materials compatible with the gas carried, such a device shall comprise a frangible disc preceding a spring-loaded device. The space between the frangible disc and the spring-loaded device may be equipped with a pressure gauge or a suitable telltale indicator. This arrangement permits the detection of disc rupture, pinholing or leakage which could cause a malfunction of the pressure relief device. The frangible disc shall rupture at a nominal pressure 10% above the start-to-discharge pressure of the spring-loaded device.
- 6.7.5.4.4 In the case of multi-purpose MEGCs used for the carriage of low-pressure liquefied gases, the pressure-relief devices shall open at a pressure as specified in 6.7.3.7.1 for the gas having the highest maximum allowable working pressure of the gases allowed to be carried in the MEGC.

#### **6.7.5.5 *Capacity of pressure relief devices***

- 6.7.5.5.1 The combined delivery capacity of the pressure relief devices when fitted shall be sufficient that, in the event of total fire engulfment of the MEGC, the pressure (including accumulation) inside the elements does not exceed 120% of the set pressure of the pressure relief device. The formula provided in CGA S-1.2-1995 shall be used to determine the minimum total flow capacity for the system of pressure relief devices. CGA S-1.1-1994 may be used to determine

the relief capacity of individual elements. Spring-loaded pressure relief devices may be used to achieve the full relief capacity prescribed in the case of low pressure liquefied gases. In the case of multi-purpose MEGCs, the combined delivery capacity of the pressure-relief devices shall be taken for the gas which requires the highest delivery capacity of the gases allowed to be carried in the MEGC.

- 6.7.5.5.2 To determine the total required capacity of the pressure relief devices installed on the elements for the carriage of liquefied gases, the thermodynamic properties of the gas shall be considered (see, for example, CGA S-1.2-1995 for low pressure liquefied gases and CGA S-1.1-1994 for high pressure liquefied gases).

**6.7.5.6 *Marking of pressure-relief devices***

- 6.7.5.6.1 Spring loaded pressure relief devices shall be clearly and permanently marked with the following:

- (a) the pressure (in bar or kPa) at which it is set to discharge;
- (b) the allowable tolerance at the discharge pressure;
- (c) the rated flow capacity of the device in standard cubic metres of air per second ( $\text{m}^3/\text{s}$ );

When practicable, the following information shall also be shown:

- (d) the manufacturer's name and relevant catalogue number.

- 6.7.5.6.2 The rated flow capacity marked on frangible discs shall be determined according to CGA S-1.1-1994.

- 6.7.5.6.3 The rated flow capacity marked on spring loaded pressure relief devices for low pressure liquefied gases shall be determined according to ISO 4126-1:1991.

**6.7.5.7 *Connections to pressure-relief devices***

- 6.7.5.7.1 Connections to pressure-relief devices shall be of sufficient size to enable the required discharge to pass unrestricted to the pressure relief device. No stop-valve shall be installed between the element and the pressure-relief devices, except when duplicate devices are provided for maintenance or other reasons, and the stop-valves serving the devices actually in use are locked open, or the stop-valves are interlocked so that at least one of the duplicate devices is always operable and capable of meeting the requirements of 6.7.5.5. There shall be no obstruction in an opening leading to or leaving from a vent or pressure-relief device which might restrict or cut-off the flow from the element to that device. The opening through all piping and fittings shall have at least the same flow area as the inlet of the pressure relief device to which it is connected. The nominal size of the discharge piping shall be at least as large as that of the pressure relief device outlet. Vents from the pressure-relief devices, when used, shall deliver the relieved vapour or liquid to the atmosphere in conditions of minimum back-pressure on the relieving device.

**6.7.5.8** *Siting of pressure-relief devices*

- 6.7.5.8.1 Each pressure relief device shall, under maximum filling conditions, be in communication with the vapour space of the elements for the carriage of liquefied gases. The devices, when fitted, shall be so arranged as to ensure that the escaping vapour is discharged upwards and unrestrictedly as to prevent any impingement of escaping gas or liquid upon the MEGC, its elements or personnel. For flammable and oxidizing gases, the escaping gas shall be directed away from the element in such a manner that it cannot impinge upon the other elements. Heat resistant protective devices which deflect the flow of gas are permissible provided the required pressure relief device capacity is not reduced.
- 6.7.5.8.2 Arrangements shall be made to prevent access to the pressure-relief devices by unauthorized persons and to protect the devices from damage caused by the MEGC overturning.

**6.7.5.9** *Gauging devices*

- 6.7.5.9.1 When a MEGC is intended to be filled by mass, it shall be equipped with one or more gauging devices. Level-gauges made of glass or other fragile material shall not be used.

**6.7.5.10** *MEGC supports, frameworks, lifting and tie-down attachments*

- 6.7.5.10.1 MEGCs shall be designed and constructed with a support structure to provide a secure base during carriage. The forces specified in 6.7.5.2.8 and the safety factor specified in 6.7.5.2.10 shall be considered in this aspect of the design. Skids, frameworks, cradles or other similar structures are acceptable.
- 6.7.5.10.2 The combined stresses caused by element mountings (e.g. cradles, frameworks, etc.) and MEGC lifting and tie-down attachments shall not cause excessive stress in any element. Permanent lifting and tie-down attachments shall be fitted to all MEGCs. In no case shall mountings or attachments be welded onto the elements.
- 6.7.5.10.3 In the design of supports and frameworks, the effects of environmental corrosion shall be taken into account.
- 6.7.5.10.4 When MEGCs are not protected during carriage, according to 4.2.5.3, the elements and service equipment shall be protected against damage resulting from lateral or longitudinal impact or overturning. External fittings shall be protected so as to preclude the release of the elements' contents upon impact or overturning of the MEGC on its fittings. Particular attention shall be paid to the protection of the manifold. Examples of protection include:
- (a) protection against lateral impact which may consist of longitudinal bars;
  - (b) protection against overturning which may consist of reinforcement rings or bars fixed across the frame;
  - (c) protection against rear impact which may consist of a bumper or frame;



- (d) protection of the elements and service equipment against damage from impact or overturning by use of an ISO frame in accordance with the relevant provisions of ISO 1496-3:1995.

#### **6.7.5.11** *Design approval*

- 6.7.5.11.1 The competent authority or its authorized body shall issue a design approval certificate for any new design of a MEGC. This certificate shall attest that the MEGC has been surveyed by that authority, is suitable for its intended purpose and meets the requirements of this Chapter, the applicable provisions for gases of Chapter 4.1 and of packing instruction P200. When a series of MEGCs are manufactured without change in the design, the certificate shall be valid for the entire series. The certificate shall refer to the prototype test report, the materials of construction of the manifold, the standards to which the elements are made and an approval number. The approval number shall consist of the distinguishing sign or mark of the country granting the approval, i.e. the distinguishing sign for use in international traffic, as prescribed by the Convention on Road Traffic, Vienna 1968, and a registration number. Any alternative arrangements according to 6.7.1.2 shall be indicated on the certificate. A design approval may serve for the approval of smaller MEGCs made of materials of the same type and thickness, by the same fabrication techniques and with identical supports, equivalent closures and other appurtenances.
- 6.7.5.11.2 The prototype test report for the design approval shall include at least the following:
  - (a) the results of the applicable framework test specified in ISO1496-3:1995;
  - (b) the results of the initial inspection and test specified in 6.7.5.12.3;
  - (c) the results of the impact test specified in 6.7.5.12.1; and
  - (d) certification documents verifying that the cylinders and tubes comply with the applicable standards.

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

- 6.7.5.12.1 For MEGCs meeting the definition of container in the CSC, a prototype representing each design shall be subjected to an impact test. The prototype MEGC shall be shown to be capable of absorbing the forces resulting from an impact not less than 4 times (4 g) the MPGM of the fully loaded MEGC at a duration typical of the mechanical shocks experienced in rail transport. The following is a listing of standards describing methods acceptable for performing the impact test:

Association of American Railroads,  
Manual of Standards and Recommended Practices,  
Specifications for Acceptability of Tank Containers (AAR.600), 1992

Canadian Standards Association (CSA),  
Highway Tanks and Portable Tanks for the Transportation of Dangerous Goods  
(B620-1987)

Deutsche Bahn AG  
Zentralbereich Technik, Minden  
Transportable tanks, longitudinal dynamic impact test

Société Nationale des Chemins de Fer Français  
C.N.E.S.T. 002-1966.  
Tank containers, longitudinal external stresses and dynamic impact tests

Spoornet, South Africa  
Engineering Development Centre (EDC)  
Testing of ISO Tank Containers  
Method EDC/TES/023/000/1991-06

- 6.7.5.12.2 The elements and items of equipment of each MEGC shall be inspected and tested before being put into service for the first time (initial inspection and test). Thereafter, MEGCs shall be inspected at no more than five-year intervals (5 year periodic inspection). An exceptional inspection and test shall be performed, regardless of the last periodic inspection and test, when necessary according to 6.7.5.12.5.
- 6.7.5.12.3 The initial inspection and test of an MEGC shall include a check of the design characteristics, an external examination of the MEGC and its fittings with due regard to the gases to be carried, and a pressure test performed at the test pressures according to packing instruction P200 of 4.1.4.1. The pressure test of the manifold may be performed as a hydraulic test or by using another liquid or gas with the agreement of the competent authority or its authorized body. Before the MEGC is placed into service, a leakproofness test and a test of the satisfactory operation of all service equipment shall also be performed. When the elements and their fittings have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test.
- 6.7.5.12.4 The 5-year periodic inspection and test shall include an external examination of the structure, the elements and the service equipment in accordance with 6.7.5.12.6. The elements and the piping shall be tested at the periodicity specified in packing instruction P200 and in accordance with the provisions described in 6.2.1.5. When the elements and equipment have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test.
- 6.7.5.12.5 An exceptional inspection and test is necessary when the MEGC shows evidence of damaged or corroded areas, leakage, or other conditions that indicate a deficiency that could affect the integrity of the MEGC. The extent of the exceptional inspection and test shall depend on the amount of damage or deterioration of the MEGC. It shall include at least the examinations required under 6.7.5.12.6.
- 6.7.5.12.6 The examinations shall ensure that:
- (a) the elements are inspected externally for pitting, corrosion, abrasions, dents, distortions, defects in welds or any other conditions, including leakage, that might render the MEGC unsafe for carriage;

- (b) the piping, valves, and gaskets are inspected for corroded areas, defects, and other conditions, including leakage, that might render the MEGC unsafe for filling, discharge or carriage;
- (c) missing or loose bolts or nuts on any flanged connection or blank flange are replaced or tightened;
- (d) all emergency devices and valves are free from corrosion, distortion and any damage or defect that could prevent their normal operation. Remote closure devices and self-closing stop-valves shall be operated to demonstrate proper operation;
- (e) required markings on the MEGC are legible and in accordance with the applicable requirements; and
- (f) the framework, the supports and the arrangements for lifting the MEGC are in satisfactory condition.

6.7.5.12.7 The inspections and tests in 6.7.5.12.1, 6.7.5.12.3, 6.7.5.12.4 and 6.7.5.12.5 shall be performed or witnessed by a body authorized by the competent authority. When the pressure test is a part of the inspection and test, the test pressure shall be the one indicated on the data plate of the MEGC. While under pressure, the MEGC shall be inspected for any leaks in the elements, piping or equipment.

6.7.5.12.8 When evidence of any unsafe condition is discovered, the MEGC shall not be returned to service until it has been corrected and the applicable tests and verifications are passed.

### **6.7.5.13 *Marking***

6.7.5.13.1 Every MEGC shall be fitted with a corrosion resistant metal plate permanently attached to the MEGC in a conspicuous place readily accessible for inspection. The elements shall be marked in accordance with Chapter 6.2. At least the following information shall be marked on the plate by stamping or by any other similar method:

Country of manufacture

U Approval	Approval	For Alternative Arrangements (see 6.7.1.2):
N Country	Number	"AA"

Manufacturer's name or mark

Manufacturer's serial number

Authorized body for the design approval

Year of manufacture

Test pressure: \_\_\_\_\_ bar gauge

Design temperature range \_\_\_\_\_ °C to \_\_\_\_\_ °C

Number of elements \_\_\_\_\_

Total water capacity \_\_\_\_\_ litres

Initial pressure test date and identification of the authorised body

Date and type of most recent periodic tests

Month \_\_\_\_\_ Year \_\_\_\_\_

Stamp of the authorised body who performed or witnessed the most recent test

**NOTE:** No metal plate may be fixed to the elements.

6.7.5.13.2 The following information shall be marked on a metal plate firmly secured to the MEGC:

Name of the operator

Maximum permissible load mass \_\_\_\_\_ kg

Working pressure at 15°C: \_\_\_\_\_ bar gauge

Maximum permissible gross mass (MPGM) \_\_\_\_\_ kg

Unladen (tare) mass \_\_\_\_\_ kg"

## Chapter 6.8

6.8.2.1.7 For tank vehicles/tank wagons and tank containers, add the following after the existing text:

"Shells, other than shells according to 6.8.2.2.6, designed to be equipped with vacuum valves shall be able to withstand, without permanent deformation, an external pressure of not less than 21 kPa (0.21 bar) above the internal pressure. The vacuum valves shall be set to relieve at a vacuum setting not greater than the tank's design vacuum pressure. Shells, which are not designed to be equipped with a vacuum valve shall be able to withstand, without permanent deformation an external pressure of not less than 40 kPa (0.4 bar) above the internal pressure."

6.8.2.1.16 Add at the end the following sentence:

"The minimum values shall, however, not be exceeded when the formula given in 6.8.2.1.18 is applied."

6.8.2.1.18 (RID only) The existing formula in 6.8.2.1.18 concerns only the left hand column. Add the following formula in the right hand column:

$$e_1 = \frac{464e_0}{\sqrt[3]{(Rm_1A_1)^2}}$$

(RID only) The existing formula in footnote 3 concerns only the left hand column. Add the following formula in the right hand column:

$$e_1 = e_0 \sqrt[3]{\left(\frac{Rm_0A_0}{Rm_1A_1}\right)^2}$$

(ADR only), right hand column: Delete the formula and the line between the columns in 6.8.2.1.18 (in the text and in footnote 4). The formulae in the left hand column apply to the whole page.

6.8.2.1.19 The table in 6.8.2.1.19 of ADR, left hand column, should apply to both columns in ADR and to the right hand column only in RID.

Add the following text to the right hand column:

"The thickness of shells which are fitted with protection against damage in conformity with 6.8.2.1.20 shall not be less than the values given in the table below."

6.8.2.3.1 Amend the fourth indent as follows:

"- Special construction (TC), equipment (TE) and type approval (TA) requirements of 6.8.4 applicable to the type."

6.8.2.4.1 Amend as follows:

"Shells and their equipment shall either together or separately undergo an initial inspection before being put into service. This inspection shall include:

- a check of conformity to the approved type;
- a check of the design characteristics<sup>8</sup>
- an examination of the internal and external conditions;
- a hydraulic pressure test<sup>9</sup> at the test pressure indicated on the plate prescribed in 6.8.2.5.1; and
- a leakproofness test and a check of satisfactory operation of the equipment.

Except in the case of Class 2, the test pressure for the hydraulic pressure test depends on the calculation pressure and shall be at least equal to the pressure indicated below:

Calculation pressure (bar)	Test pressure (bar)
$G^{10}$	$G^{10}$
1.5	1.5
2.65	2.65
4	4
10	4
15	4
21	10 (4) <sup>11</sup>

<sup>8</sup> *The check of the design characteristics shall also include, for shells requiring a test pressure of 1 MPa (10 bar) or higher, the taking of weld test-pieces (work samples) in accordance with 6.8.2.1.23 and the tests prescribed in 6.8.5.*

<sup>9</sup> *In special cases and with the agreement of the expert approved by the competent authority, the hydraulic pressure test may be replaced by a pressure test using another liquid or gas, where such an operation does not present any danger.*

<sup>10</sup> *G = minimum calculation pressure according to the general requirements of 6.8.2.1.14 (see 4.3.4.1).*

<sup>11</sup> *Minimum test pressure for UN No 1744 bromine or UN No 1744 bromine solution.*

The minimum test pressures for Class 2 are given in the table of gases and gas mixtures in 4.3.3.2.5.

The hydraulic pressure test shall be carried out on the shell as a whole and separately on each compartment of compartmented shells.

(ADR only)

The test shall be carried out on each compartment at a pressure at least equal to 1.3 times the maximum working pressure.

The hydraulic pressure test shall be carried out before the installation of such thermal equipment as may be necessary.

If the shells and their equipment are tested separately, they shall be jointly subjected to a leakproofness test after assembly in accordance with 6.8.2.4.3.

The leakproofness test shall be carried out separately on each compartment of compartmented shells."

6.8.2.4.2 Amend as follows:

"6.8.2.4.2 Shells and their equipment shall undergo periodic inspections at fixed intervals. The periodic inspections shall include: an external and internal examination and, as a general rule, a hydraulic pressure test <sup>9</sup> (for the test pressure for the shells and compartments if applicable, see 6.8.2.4.1).

Sheathing for thermal or other insulation shall be removed only to the extent required for reliable appraisal of the characteristics of the shell.

In the case of tanks intended for the carriage of powdery or granular substances, and with the agreement of the expert approved by the competent authority, the periodic hydraulic pressure test may be omitted and replaced by leakproofness tests in accordance with 6.8.2.4.3.

The maximum intervals for inspection shall be six years. | The maximum intervals for inspections shall be five years."

6.8.2.4.3 Amend the second sentence as follows:

"For this purpose the tank shall be subjected to an effective internal pressure at least equal to the maximum working pressure. For tanks intended for the carriage of liquids, when a gas is used for the leakproofness test it shall be carried out at a pressure at least equal to 25 % of the maximum working pressure. In all cases, it shall not be less than 20 kPa (0.2 bar) (gauge pressure)."

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<sup>9</sup> *In special cases and with the agreement of the expert approved by the competent authority, the hydraulic pressure test may be replaced by a pressure test using another liquid or gas, where such an operation does not present any danger.*

6.8.2.5.1 (RID only) Delete the last indent starting with "test pressure...".

6.8.2.6 Replace "(Reserved)" by the following:

"The requirements of Chapter 6.8 are considered to have been complied with if the following standard is applied:

Applicable paragraphs	Reference	Title of document
6.8.2.4 6.8.3.4	EN 12972:2001 (with the exception of annexes D and E)	Tanks for transport of dangerous goods-testing, inspection and marking of metallic tanks."

6.8.3.2.9 Amend as follows:

"Tanks intended for the carriage of compressed or liquefied gases or dissolved gases, may be fitted with spring-loaded safety valves. These valves shall be capable of opening automatically under a pressure between 0.9 and 1.0 times the test pressure of the tank to which they are fitted. They shall be of such a type as to resist dynamic stresses, including liquid surge. The use of dead weight or counter weight valves is prohibited. The required capacity of the safety valves shall be calculated in accordance with the formula contained in 6.7.3.8.1.1."

6.8.4 (b) Amend as follows:

**TE2** Becomes "(Reserved)".

**TE15** Add a new special provision TE15 as follows:

(RID/ADR, both columns):

"TE15 Tanks fitted with vacuum valves which open at a negative pressure of not less than 21 kPa (0.21 bar) shall be considered as being hermetically closed."

For tank wagons only (left column) add:

"Tanks are also to be considered hermetically closed when they are equipped with controlled ventilation (auto-vent) valves that open at a negative pressure exceeding [0.4] [0.21] bar."

**TE21** Add a new special provision TE21 as follows: "TE21 The closures shall be protected with lockable caps."

6.8.5.4 Add the following new paragraph:

**"6.8.5.4 Reference to standards**

The requirements of 6.8.5.2 and 6.8.5.3 shall be deemed to have been complied with if the following relevant standards have been applied:

EN 1252-1:1998 Cryogenic vessels- Materials- Part 1: Toughness requirements for temperature below – 80 °C.

[prEN 1252-2: 2000 Cryogenic vessels- Materials- Part 2: Toughness requirements for temperature between – 80 °C and – 20 °C]."

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