

COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS AND ON THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS

Sub-Committee of Experts on the
Transport of Dangerous Goods

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Item 4 (c) of the provisional agenda

PACKAGINGS

Miscellaneous proposals

Revision of 4.1.3 to incorporate requirements for pressure receptacles
to containing liquid or solid dangerous goods other than of Class 2

Comments on ST/SG/AC.10/C.3/2004/55 (United Kingdom)

Additions and alternative proposals

Transmitted by the International Council of Chemical Associations (ICCA)

1. Introduction

During last Sub-committee meeting, December 2003, the proposals of United States of America and United Kingdom on requirements for pressure receptacles containing liquid or solid dangerous goods other than of Class 2, were discussed. It was concluded that a revised paper should be submitted. ICCA offered to give their comments and idea's to be incorporated in such a proposal. Due to time constraints the comments were given to the expert from the United Kingdom a late stage. To contribute to the discussion and to offer additions and alternative proposals, ICCA is submitting this information paper.

2. Comments and to ST/SG/AC.10/C.3/2004/55

As raised during the last Sub-committee meeting one of the main problems of the current requirements for pressure receptacles containing liquid or solid dangerous goods other than of Class 2 is that their use is conditional upon meeting the requirements of packing instruction P200 and Chapter 6.2. The standards in Chapter 6.2 are primarily for gasses and are not fully or even partly applicable for liquids and solids. Many cylinders currently used are built according to other standards and are not UN marked pressure receptacles. While the United Kingdom proposal may be generally acceptable when UN marked pressure receptacles are used, it does not adequately address to most commonly used pressure receptacles for liquids and solids. The substances of concern are not transported under the same high pressures as gases and in principle the pressure receptacles used only have to be of sufficient strength to prohibit unintended leakage under normal conditions of transport and to cope with overpressures imposed by a blanketing gas, if required or the pressures that are realized when the substances are filled or emptied using pressure. The pressure receptacles that are commonly used exceed the standards and are more robust than the other packagings that are commonly authorized for these liquids and solid dangerous goods (e.g. drums, jerricans, combination packagings).

In the United Kingdom proposal a new part of chapter 4.1.3 is proposed (4.1.3.4 of ST/SG/AC.10/C.3/2004/55).

In this new chapter, there remains a reference to chapter 6.2. Further, there is a requirement of 6 bar for the test pressure given (in addition, a proposed minimum design pressure of 150 bar is proposed in P400 while currently P400 requires a minimum design pressure of 10 bar). However, in the current packaging instructions values for minimum **design** pressures of 10 bar (P400) or 4 bar (in P401/402) and minimum **test** pressures 10 bar (in P601, 602) are required (apart from the reference to the general requirements of P200 referred to in P800/802). *Note: design and test pressure are used both which seems to be inconsistent!*

Further, solids and liquids assigned to packing instruction P001/P002 which are handled in cylinders are not accommodated while there is a need for this (with the exception that some substances have to be explicitly excluded, see 4.1.3.4.1 of the United Kingdom proposal or 4.1.3.6.1.1 of this ICCA Inf. paper).

3. Alternatives and additions to proposal ST/SG/AC.10/C.3/2004/55

In view of the above mentioned points, ICCA proposes to revise 4.1.3.6 and to incorporate consequential amendments in the relevant packing instructions to address our concerns.

The primary issues are:

- ?? General requirements need to be included for substances assigned to P001/002, P400/401/402, P403, P404, P410, P601/602 and P800/802;
- ?? Certain substances should not be authorized for transport in pressure receptacles;
- ?? Construction, testing and inspection according to standards recognized by competent authorities should be authorized;
- ?? Requirements on capacities, degree of filling, filling/refilling, pressure testing (general and specific for some packing instructions), periodic inspection, emergency relief devices, and more practical aspects like location of openings and foot ring, service equipment for mechanical handling should be specified;
- ?? Marking of pressure receptacles should be addressed;
- ?? Particular requirements for different packing instructions should also be addressed

4. Proposal

Replace the existing 4.1.3.6 by the following text:

4.1.3.6 Requirements applicable to the use of cylinders, tubes, pressure drums and bundles of cylinders for liquid and solid substances other than Classes 1, 2 and 7.

4.1.3.6.1 General requirements applicable to liquid and solid substances

4.1.3.6.1.1 Unless otherwise indicated in the relevant packing instruction or by a special provision in column 9 of the Dangerous Goods List, pressure receptacles conforming to the applicable requirements of this chapter are authorized for the transport of any liquid or solid substance other than explosives, thermally unstable substances, organic peroxides, self reactive substances, substances where significant pressure may develop by evolution of chemical reaction and radioactive material unless permitted in 4.1.9. In addition to the general requirements, liquid and solid substances assigned to packing instructions P400, P401, P402, P601 or P602 shall meet the particular requirements in 4.1.3.6.2, as appropriate.

4.1.3.6.1.2 Cylinders, tubes, pressure drums and bundles of cylinders intended for transport of liquid and solid substances shall be designed, constructed, tested, manufactured and inspected in accordance with National or International standards, recognized by the competent authority of the country of manufacture. UN marked pressure receptacles that meet the requirements of these Model Regulation and non-UN pressure

receptacles are authorized for use if all other requirements of this section are met. All conditions, including fatigue, to which cylinders, tubes, pressure drums and bundles of cylinders will be subjected during normal conditions of transport, should be taken into consideration. Every design type of cylinder, tube, pressure drum or bundle of cylinders should be approved by the competent authority of the country of manufacture. In addition to these standards, the requirements of this chapter shall also be met.

4.1.3.6.1.3 Unless otherwise indicated in the relevant packaging instruction, pressure receptacles shall be manufactured of a material that is not affected by the contents and have a capacity of not more than 450 liters. The receptacles shall not be filled to more than 95% by volume at 50 °C.

4.1.3.6.1.4 Unless otherwise indicated or approved by the competent authority, the pressure receptacle shall be subjected to an initial test and periodic tests every 5 years at a pressure of not less than 0.6 MPa (6 bar, gauge pressure) (i.e. 0.4 MPa design pressure).

4.1.3.6.1.5 The periodic inspection shall include an external examination, a pressure test or equivalent effective non-destructive testing with the agreement of the competent authority including an inspection of all accessories (e.g. tightness of valves, emergency relief valves of fusible elements). Pressure receptacles shall not be filled after they become due for periodic inspection but may be transported after the expiry of the time limit and after external inspection.

4.1.3.6.1.6 Prior to filling, the filler shall perform an inspection of the pressure receptacle and ensure that the pressure receptacle is authorized for the substances to be transported and that the provisions of these regulations have been met. Refillable pressure receptacles shall not be filled with a substance different from that previously contained unless the necessary operations for change of service have been performed.

4.1.3.6.1.7 Unless otherwise indicated, pressure receptacles may be provided with an emergency pressure relief device designed to avoid bursting in case of overfill or fire accidents.

Pressure receptacle valves shall be designed and constructed in such a way that they are inherently able to withstand damage without release of the contents or shall be protected from damage which could cause inadvertent release of the contents of the pressure receptacle, by one of the following methods:

- (a) Valves are placed inside the neck of the pressure receptacle and protected by a threaded plug or cap;
- (b) Valves are protected by caps. Caps shall possess vent-holes of sufficient cross-sectional area to evacuate the gas if leakage occurs at the valves;
- (c) Valves are protected by shrouds or guards;
- (d) Pressure receptacles are transported in frames, (e.g. bundles); or
- (e) Pressure receptacles are transported in an outer packaging. The packaging as prepared for transport shall be capable of meeting the drop test specified in 6.1.5.3 at the packing group I performance level.

4.1.3.6.1.8 The pressure receptacle shall be transported in up-right position. All openings shall be above liquid level, in the vapor phase of the pressure receptacle, however this does not preclude internal dip tubes. Bottom openings are not allowed. Cylinders and pressure drums with a diameter larger than 150 mm shall have a foot ring or otherwise stable basis. Cylinders and pressure drums with a capacity above 200 l, should be provided with service equipment for mechanical handling (e.g. forklift pockets, lashing lugs).

4.1.3.6.1.9 The construction of cylinders or pressure drums shall be such that the minimum burst ratio (burst pressure divided by test pressure) is not less than:

- 1.50 for refillable pressure receptacles,
- 2.00 for non-refillable pressure receptacles.

4.1.3.6.1.10 Marking of pressure receptacles

Pressure receptacles used for liquid and solid substances shall be marked clearly and legibly with certification, operational and manufacturing marks as specified by the applicable design standard or requirements of the country of manufacture. These marks shall be permanently affixed (e.g. stamped, engraved, etched or glued) 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 or corrosion resistant plate welded on the outer jacket of a closed receptacle). Except for the UN packaging symbol, when required, the minimum size of the marks shall be 3 mm for pressure receptacle 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 packaging symbol, when required, shall be 10 mm for pressure cylinders and pressure drums with a diameter greater than or equal to 140 mm and 5 mm for pressure receptacles with a diameter less than 140 mm. At least the following shall be included in the markings:

- (a) *The UN packaging symbol (if applicable);*
- (b) *Construction standard or design specification to which the pressure receptacle was constructed and approved;*
- (c) *Country of approval;*
- (d) *Stamp of inspection body;*
- (e) *Date of initial inspection;*
- (f) *Test pressure or working pressure;*
- (g) *Manufacturer's mark;*
- (h) *The serial number assigned by the manufacturer;*

Additional marks for periodic testing

- (i) *Date (month, year) of the last test undergone; and*
- (j) *Identification of the person or body that performed the test as required by the competent authority.*

4.1.3.6.2 Particular requirements applicable to liquid and solid substances assigned to packing instruction P400, P401, P402, P601, P602.

4.1.3.6.2.1 Pressure receptacles for liquid and solid substances of packing instruction P400

Pressure receptacles assigned to P400 shall be made of steel and shall be subjected to an initial test and periodic tests every 10 years at a pressure of not less than 1MPa (10 bar) (gauge pressure). During carriage, the liquid shall be under a layer of inert gas with a gauge pressure of not less than 20 kPa (0.2 bar).

4.1.3.6.2.2 Pressure receptacles for liquid and solid substances assigned to packing instruction P401 and P402.

Pressure receptacles assigned to P401 and P402 shall be made of steel and subjected to an initial test and periodic tests every 10 years at a pressure of not less than 0.6MPa (6 bar, gauge pressure). During carriage, the liquid shall be under a layer of inert gas with a gauge pressure of not less than 20 kPa (0.2 bar).

4.1.3.6.2.3 Pressure receptacles for liquid and solid substances assigned to packing instruction P601 and P602.

Pressure receptacles assigned to P601 and P602 shall be subjected to an initial test and periodic tests every

10 years at a pressure of not less than 1MPa (10 bar) (gauge pressure). Pressure receptacles may not be equipped with any pressure relief device. Each pressure receptacle containing a toxic by inhalation liquid with an LC50 less than or equal to 200 ml/m³ (ppm) shall be closed with a plug or valve conforming to the following:

- (a) Each plug or valve shall have a taper-threaded connection directly to the pressure receptacle and be capable of withstanding the test pressure of the pressure receptacle without damage or leakage;
- (b) Each valve shall be of the packless type with non-perforated diaphragm, except that, for corrosive materials, a valve may be of the packed type with an assembly made gas-tight by means of a seal cap with gasketed joint attached to the valve body or the pressure receptacle to prevent loss of material through or past the packing;
- (c) Each valve outlet shall be sealed by a threaded cap or threaded solid plug and inert gasketing material;
- (d) The materials of construction for the pressure receptacle, valves, plugs, outlet caps, luting, and gaskets shall be compatible with each other and with the lading.

Each pressure receptacle with a wall thickness at any point of less than 2.0 mm and each pressure receptacle that does not have fitted valve protection shall be transported in an outer packaging. Pressure receptacles may not be manifolded or interconnected.

Renumber current chapters 4.1.3.7 to 4.1.3.8.1 accordingly

Consequential amendments:

Add in P001 and P002 a new row reading:

Cylinders, tubes, pressure drums and bundles of cylinders may be used provided that they fulfill the requirements of 4.1.3.6.

Replace (1) in P400, P401 and P402 with the following sentences:

Cylinders, tubes, pressure drums and bundles of cylinders may be used provided that they fulfill the requirements of 4.1.3.6.

Add in P403, P404 and P410 the following sentence:

Cylinders, tubes, pressure drums and bundles of cylinders may be used provided that they fulfill the requirements of 4.1.3.6.

Replace (4) in P601 and P602 with the following sentences:

Cylinders, tubes, pressure drums and bundles of cylinders may be used provided that they fulfill the requirements of 4.1.3.6.

Replace (1) in P800 with the following sentences:

Cylinders, tubes, pressure drums and bundles of cylinders may be used provided that they fulfill the requirements of 4.1.3.6.

Replace (5) in P802 with the following sentences:

Cylinders, tubes, pressure drums and bundles of cylinders may be used provided that they fulfill the requirements of 4.1.3.6.
