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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 5 (a) of the provisional agenda
Miscellaneous proposals of amendments to the Model Regulations on the Transport of Dangerous Goods: packagings

Proposal for changing Section 6.2.4 to permit alternatives to the hot water bath test for small receptacles containing gas (gas cartridges) – UN 2037 – and fuel cell cartridges containing liquefied flammable gas

Submitted by the European Cylinder Makers Association (ECMA)[1]

Summary

Executive summary: Receptacles, small, containing gas, (gas cartridges) without a release device, non-refillable – UN 2037 – and fuel cell cartridges containing liquefied flammable gas – UN 3478 – are required to meet the provisions of 6.2.4 according to which they must be subjected to a test performed in a hot water bath.

This document proposes to harmonize the requirements for UN 2037 gas cartridges and UN 3478 fuel cells with those of UN 1950 aerosols and to include requirements for alternatives to the water bath test for these small receptacles and fuel cells.

Action to be taken: Amend paragraph 6.2.4.1 to permit alternatives to the hot water bath test for small receptacles containing gas (gas cartridges) UN 2037 – and fuel cell cartridges.

[1] In accordance with the programme of work of the Sub-Committee for 2011-2012 approved by the Committee at its fifth session (refer to ST/SG/AC.10/C.3/76, para. 116 and ST/SG/AC.10/38, para. 16).

Related documents:	Informal document UN/SCETDG/23/INF.14, ST/SG/AC.10/C.3/2003/51, ST/SG/AC.10/C.3/2004/22 Informal document UN/SCETDG/25/INF.93, and ST/SG/AC.10/C.3/2006/82.

Introduction

1. Whereas in paragraph 6.2.4.2 approved alternatives to the hot water bath test are permitted for aerosol dispensers, no similar permission is granted for "small receptacles containing gas (gas cartridges) or for fuel cell cartridges.".

2. Manufacturers of aerosol dispensers using new processes and having increased production rates required the option of alternative test methods to the classic hot water bath test and consequently an approved alternative to the hot water bath test was first included in paragraph 6.2.4.2, Rev 14 (2005) of the UN Model Regulations, following an application made by FEA. The requirements of the alternative are set out in paragraphs 6.2.4.2.2, 6.2.4.2.2.1, 6.2.4.2.2.2 and 6.2.4.2.2.3.

3. Some manufacturers of receptacles to UN 2037 also require an alternative to the hot water bath test essentially for the same reasons as those given in the listed related documents. These manufacturers produce high pressure liquefied gas filled cartridges such as 10ml N_2O filled cream whippers, 22ml CO_2 filled cylinders for aircraft passenger life jacket inflation or 85 ml CO_2 filled cylinders for military life preservers at rates of around 250,000 a day. In some instances test pressures are applied by heating in an oven to the required temperature and holding at that temperature for a specified period and leakage is checked by measuring the weight before and after oven heating or after storage for a long period. To confirm the burst pressure requirement samples can be hydraulically pressurised to burst.

4. The following proposal for changing paragraph 6.2.4.1 is based on the same principles as for aerosol dispensers as provided in paragraph 6.2.4.2.

Proposal

5. Replace paragraph 6.2.4.1 by the following:

6.2.4.1 *Small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas*

Each gas cartridge or fuel cell cartridge shall be subject to a test in a hot water bath or an approved water bath alternative.

6.2.4.1.1 *Hot water bath test*

6.2.4.1.1.1 The temperature of the water bath and the duration of the test shall be such that the internal pressure reaches that which would be reached at 55 °C (5 °C if the liquid phase does not exceed 95% of the capacity of the receptacle or the fuel cell cartridge at 50 °C). If the contents are sensitive to heat or if the receptacles or the fuel cell cartridges are made of plastics material which softens at this temperature, the temperature of the bath shall be set at between 20 °C and 30 °C but, in addition, one receptacle or fuel cell cartridge in 2 000 shall be tested at the higher temperature.

6.2.4.1.1.2 No leakage or permanent deformation of the receptacle or fuel cell cartridge may occur, except that a plastics receptacle or fuel cell cartridge may be deformed through softening provided that it does not leak.

6.2.4.1.2 *Alternative methods*

With the approval of the competent authority alternative methods that provide an equivalent level of safety may be used provided that the requirements of 6.2.4.1.2.1 6.2.4.1.2.2 and 6.2.4.1.2.3 are met.

6.2.4.1.2.1 Quality system

Receptacle or fuel cell cartridge fillers and manufacturers shall have a quality system. The quality system shall implement procedures to ensure that all receptacles or fuel cell cartridges that leak or have gas weights not in conformance with the declared weight limits or exhibit distortion are rejected and not offered for transport.

The quality system shall include:

(a) A description of the organisational structure and responsibilities;

(b) The relevant inspection and test, quality control, quality assurance and process operation instructions that will be used;

(c) Quality records such as inspection reports, test data, calibration data and certificates;

(d) Management reviews to ensure the effective operation of the quality system;

(e) A process for the control of documents and their revision

(f) A means for the control of non-conforming gas cartridges or fuel cell cartridges

(g) Training programmes and qualification procedures for the relevant personnel; and

(h) Procedures to ensure there is no damage to the final product.

An initial audit and periodic audits shall be conducted to the satisfaction of the competent authority. These audits shall ensure the approved system is and remains adequate and efficient. Any proposed changes to the approved system shall be notified to the competent authority in advance.

6.2.4.1.2.2 Pressure Testing

Gas cartridges and fuel cells shall be designed to withstand, without leakage or bursting, a pressure of at least twice the equilibrium pressure of the contents at 55°C or the pressure developed at maximum temperature in service, whichever is greater. Every gas cartridge and fuel cell shall be subjected to this equilibrium pressure and all cartridges and fuel cells showing evidence of leakage at a rate equal to or greater than $3.3x10^{-2}$ mbar.l.s^{-1} or distortion or any other defect shall be rejected.

6.2.4.1.2.3 Filling and leak testing

Prior to filling, the filler shall ensure that the closures (if any), and the associated sealing equipment are set appropriately and the specified gas is used. Each filled cartridge and fuel cell shall be checked for the correct weight of gas and shall be leak tested. Leakproofness shall be confirmed using leak detection equipment or by weighing before and after a specified period. The leak detection equipment shall be, at least, sensitive enough to detect a leak rate of at least $2.0x10^{-3}$ mbar.l.s^{-1}. Any filled cartridge or fuel cell that shows evidence of leakage, deformation or incorrect weight of filling shall be rejected.