

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

11 May 2010

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Item 3 of the provisional agenda

Listing, classification and packing

4.1.4.1 P200 Materials compatibility requirements for gases in pressure receptacles

Transmitted by the International Organization for Standardization (ISO)

1. At the 36 Session of Sub-Committee of Experts on the Transport of Dangerous Goods the following papers on the compatibility of gases with pressure receptacles constructed from aluminium alloy were considered; ST/SG/AC.10/C.3/2009/30 (United Kingdom), UN/SCETDG/36/INF.29 (United Kingdom) and UN/SCETDG/36/INF.48 (EIGA).
2. The proposals were referred to a lunchtime working group which reported back with document UN/SCETDG/36/INF.53. The proposals of the report were adopted with the exception of the list in paragraph 5 which was placed in square bracket in view of the on-going discussions in the ISO working group currently revising ISO 11114-1 "Transportable gas cylinders -- Compatibility of cylinder and valve materials with gas contents -- Part 1: Metallic materials."
3. The ISO working group met on 11 and 12 March 2010 and completed its review of the compatibility of gases with metals. As a result, the list in square brackets in paragraph 5 of informal document INF.53 should be edited to remove UN 1911 Diborane which was deemed by the ISO experts to be compatible with aluminium alloy, based on 50 years operational experience with this gas being safely transported in aluminium alloy pressure receptacles.
4. Taking the work of the ISO working group into account, the full list of substances for which "a" should be added to the final column in the Tables in Packing Instruction P200 is as follows.

P200 TABLE NO.

| | | |
|---------|------------------------------|---|
| UN 1741 | BORON TRICHLORIDE | 2 |
| UN 1008 | BORON TRIFLUORIDE | 2 |
| UN 2189 | DICHLOROSILANE | 2 |
| UN 1052 | HYDROGEN FLUORIDE, ANHYDROUS | 3 |
| UN 2418 | SULPHUR TETRAFLUORIDE | 2 |
| UN 1076 | PHOSGENE | 2 |
| UN 1859 | SILICON TETRAFLUORIDE | 2 |

5. Experts will recall from the 36 session that UN/SCETDG/36/INF.29 (United Kingdom) provided new information concerning the failure of the aluminium alloy cylinder in Dubai. The new finding was that the small concentrations of 1,1,1 trichloroethane and

trichloroethylene in the mixture had caused a vigorous exothermic chemical reaction inside the cylinder. From studying the literature, it was evident that other halogenated hydrocarbons could also trigger a similar reaction in aluminium alloy cylinders when very dilute or when mixed together.

6. The ISO working group revising ISO 11114-1 was given a draft text on this subject to consider as an addition to the standard. However, the working group did not adopt a text and the following text (shown in italics) will be submitted for their further consideration. This text was based on information given in the literature and by contacts with the chemical industry.

Specific chlorinated hydrocarbon solvents such as 1,1,1 trichloroethane can react vigorously in the presence of aluminium, but this is prevented in practice by adding inhibitors. These stabilizing inhibitors can be rendered ineffective when different solvents are mixed together because differing systems of stabilization are used and each inhibitor can render the other ineffective. Furthermore, when such solvents are present in small concentrations in gas mixtures or in liquid solvents such as toluene the effectiveness of the inhibitors is significantly reduced.

Filling gas cylinders with chlorinated hydrocarbon solvents known to potentially react with aluminium should be avoided, unless the filler has the necessary specialized knowledge and experience using appropriate internal cylinder surface conditions. Packaging tri-and tetra-chlorinated hydrocarbon solvents and mixtures of chlorinated hydrocarbons can require particular attention.

Examples of such substances known to potentially react with aluminium are: 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1,1,2 tetrachloroethane, trichloromethyl benzene, trichloroacetyl chloride, methyl chloride, methylene chloride, trichloroethylene, 1,1,2-trichloroethane, 1,1,2,2-tetrachloroethane, 1,1,1,2-tetrachloroethane.

7. Experts, observers and industry representatives are invited to send comments on this text to chrisjubb42@tiscali.co.uk, who will communicate them to the ISO working group.
