



Secretariat

Distr.  
GENERAL

ST/SG/AC.10/C.3/2008/35  
10 April 2008

Original: ENGLISH

---

**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

Thirty-third session  
Geneva, 30 June-9 July (a.m.) 2008  
Item 4 of the provisional agenda

**LISTING, CLASSIFICATION AND PACKING**

Amendment to UN 3468, Hydrogen in a metal hydride storage system

Transmitted by the US Fuel Cell Council\*

**Background**

1. As the utilization of gaseous hydrogen evolves from the chemical industry into various emerging applications, such as fuel for fuel cells and other specialty hydrogen applications, the importance of new and improved storage techniques has become essential. One of these techniques employs the absorption of hydrogen into specially formulated alloys. The material can be stored and transported in a solid form, and the hydrogen later released and used under specific thermodynamic conditions. This document proposes, for UN 3468 "Hydrogen in a metal hydride storage system", the adoption of a new packing instruction P205 in replacement to current P099 and the adoption of a new special provision 32x, in addition to special provision 321.

---

\* In accordance with the programme of work of the Sub-Committee for 2007-2008 approved by the Committee at its third session (refer to ST/SG/AC.10/C.3/60 para. 100 and ST/SG/AC.10/C.3/34, para. 14).

2. At the 32nd session of the Sub-Committee in December 2007, ISO submitted a report on ISO/DIS 16111 “Transportable gas storage devices – Hydrogen absorbed in reversible metal hydrides” (UN/SCETDG/32/INF.34) which advised that the document has now reached the enquiry stage where it was circulated for a vote amongst ISO membership until 28 February 2008. Special efforts were made by ISO to ensure this International standard is published in time for the 4th Session of the Committee of Expert on the Transport of Dangerous Goods in December 2008 to make it possible to refer to the standard in the UN Model Regulations and associated packing instructions being developed.

3. Class 2 substances (gases) are currently grouped in the UN Model Regulations into 3 packing instructions:

- (a) PI 200 covering the majority of class 2 substances (compressed, liquefied & dissolved gases i.e. more than a hundred articles) in pressure receptacle including UN1001 Acetylene dissolved
- (b) PI 201 covering non pressurized toxic gas such as UN 3171, 3168 and 3169 and,
- (c) PI 203 covering refrigerated liquefied gases in closed cryogenic containers.

A paper from the expert from the United Kingdom, ST/SG/AC.10/C.3/2007/42, submitted at the 32<sup>nd</sup> session, proposed the adoption of a new Packing instruction P204 for Division 2.2, non oxidizing, refrigerated liquefied gases in open cryogenic receptacles

4. P099 which apply to UN 3478, Hydrogen in metal hydride storage system states:

“Only packagings which are approved by the competent authority for these goods may be used (see 4.1.3.7). A copy of the competent authority approval shall accompany each consignment or, the transport document shall include an indication that the package was approved by the competent authority.”.

### **Proposal**

5. In the Dangerous Goods List of Chapter 3.2:

In column (8) for UN 3468 replace P099 with P[205] and add special provision 32x to special provision 321.

6. Insert in section 3.3.1 the following new special provisions:

32x Hydrogen in metal hydride storage systems which are not permitted under P[205], such as those intended to be used as fixed fuel storage onboard hydrogen fuelled vehicles, must be approved by the competent authority for these goods, before acceptance for transport. A copy of the competent authority approval shall accompany each consignment or, the transport document shall include an indication that the package was approved by the competent authority.

7. Insert the following packing instruction in sub-section 4.1.4.1 for UN 3468:

P[205]	PACKING INSTRUCTION	P[205]
<p>This instruction applies to Division 2.1 HYDROGEN IN METAL HYDRIDE STORAGE SYSTEM or, HYDROGEN IN METAL HYDRIDE STORAGE SYSTEM CONTAINED IN EQUIPMENT or HYDROGEN IN METAL HYDRIDE STORAGE SYSTEM PACKED WITH EQUIPMENT.</p> <p>This packing instruction defines the requirements applicable to the material, design, construction, and testing of transportable hydrogen gas storage systems, referred to as “metal hydride assemblies” (MH assemblies) which utilize shells not exceeding 150 litres in water capacity and have a maximum developed pressure (MDP) not exceeding 25 MPa. Only refillable storage MH assemblies where hydrogen is the only transferred media are covered by this packing instruction. MH assemblies intended to be used as fixed fuel storage onboard hydrogen fuelled vehicles are excluded. The MH assembly components shall be made of materials that are suitable for the range of conditions expected during normal service and transport conditions over the service life of the MH assembly. Components that are in contact with gaseous hydrogen and/or metal hydride material shall be sufficiently resistant to their chemical and physical action under normal service conditions to maintain operational and pressure containment integrity. Hydrogen absorbing alloys and/or metal hydride materials that are readily susceptible to rapid disassociation or explosion when exposed to prolonged heating shall not be used in a MH assembly. Only metal hydride assemblies certified under ISO 16111 and meeting the service conditions, design criteria, type tests, batch tests and routine tests for transportable hydride-based hydrogen storage systems in accordance with ISO 16111 are permitted under this packing instruction.</p>		

---