



Secretariat

Distr.  
GENERAL

ST/SG/AC.10/C.3/2005/32  
2 September 2005

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

Twenty-eighth session, 28 November-7 December 2005  
Item 5 of the provisional agenda

LISTING, CLASSIFICATION AND PACKING

Requirements for hydrogen absorbed in a metal hydride storage system

Submitted by the experts from Japan and the United States of America

1. At the twenty-seventh session of the Sub-Committee, the expert from Japan asked that his paper (SG/AC.10/C.3/2005/16) be deferred. Subsequently the experts from Japan and the United States of America have prepared a new proposal addressing the requirements for HYDROGEN IN METAL HYDRIDE STORAGE SYSTEM, UN 3468. This paper proposes to include a new packing instruction for the entry “HYDROGEN IN A METAL HYDRIDE STORAGE SYSTEM, (UN3468)” and to amend the proper shipping name to address equipment containing or packed with hydrogen storage systems.

2. The entry for UN 3468 in the Dangerous Goods List was originally assigned P099 as a place holder until a specific packing instruction could be developed. In the interim, an ISO standard that includes requirements for the design and construction of hydrogen absorbed in metal hydride storage systems has been developed through the cooperation of industry and government technical experts. ISO 16111 addresses the safe design and use of storage systems, including all necessary valves, relief devices, and appurtenances, intended for use with reversible metal hydride hydrogen storage systems. The standard requires successful completion of rigorous type testing, including: a Fire Test; a Drop Test from 1.8 m in several orientations; a Leak Test to ensure no leakage of hydrogen gas; and a hydrogen cycling and strain measurement test, which includes extensive vibration of the canister between charge cycles to induce worst-case material settling conditions. The proposed packing instruction relies on the ISO 16111 standard to ensure safety of such systems during use and transport and also addresses filling and packaging for equipment packed with or containing storage systems. The packing instruction includes an exception for small storage systems with an internal volume of not more than 120 ml consistent with the requirements of the International Electrotechnical Commission (IEC) Standard for micro fuel cells, IEC 62282-6-1 Micro Fuel Cell Safety Standard. On this basis, there is no need to address many of the requirements proposed in SG/AC.10/C.3/2005/16 such as including provisions in the Manual of Tests and

Criteria, introducing a new proper shipping name and a new special packing provision (PP). This paper proposes a much simpler approach.

**Proposal**

3. Amend the proper shipping name for UN 3468 in the Dangerous Goods List (DGL) to read:

“HYDROGEN IN A METAL HYDRIDE STORAGE SYSTEM *or* HYDROGEN IN A METAL HYDRIDE STORAGE SYSTEM CONTAINED IN EQUIPMENT *or* HYDROGEN IN A METAL HYDRIDE STORAGE SYSTEM PACKED WITH EQUIPMENT”

Amend the Index accordingly.

**In column 8 of the Dangerous Goods List, change “P099” to “P2XX”.**

**In Part 4, add a new Packing Instruction 2XX as follows:**

P2xx	PACKING INSTRUCTION	P2xx
<p>This instruction applies to storage systems containing hydrogen absorbed in a metal hydride (UN3468) individually or when contained in or packed with equipment.</p>		
<p>Storage systems must be constructed and certified to meet the requirements of ISO 16111.</p>		
<p>Storage systems employing cylinders other than UN marked and certified cylinders may be used if the design, construction, testing, approval and markings conform to the requirements of the relevant competent authority of the State in which they are approved and filled.</p>		
<p>Storage systems for which prescribed periodic tests have become due must not be filled and offered for transport until such retests have been successfully completed in accordance with 6.2.1.5.</p>		
<p>Storage systems with a water capacity of 1 l or less must be packaged in rigid outer packagings constructed of suitable material of adequate strength and design in relation to the packaging capacity and its intended use. They must be adequately secured or cushioned so as to prevent damage during normal conditions of transport.</p>		
<p>When storage systems are packed with equipment, they shall be tightly packed in inner packagings or placed in the outer packaging with cushioning material so that the systems are protected against damage that may be caused by the movement or placement of the equipment and the cartridges within the outer packaging. When storage systems are installed in equipment, they shall be protected against short circuit and the system must be protected from inadvertent operation.</p>		
<p>Storage systems must be filled in accordance with procedures provided by the manufacturer of the system in accordance with ISO 16111, 8.3.2.</p>		
<p>Storage systems with a water capacity of 120 ml or less are excepted from the following requirements when the pressure in the storage system does not exceed 5 MPa at 55 °C and, each storage system is capable of withstanding, without bursting, a pressure of 2 times the cylinder design pressure or 200 kPa greater than the cylinder design pressure at 55 °C, whichever is greater:</p>		
<ul style="list-style-type: none"><li>- the specification cylinder requirements of ISO 16111, 5.1 when the cylinder meets all applicable design type tests;</li><li>- the requirement of ISO 16111, 5.4 to be fitted with a pressure relief device; and</li><li>- the acceptance criteria of ISO 16111, 6.1.4 if the system is fitted with an integral venting feature or designed to prevent violent rupture or fragmentation when the system is subjected to the prescribed fire test.</li></ul>		