



WORKING PAPER

DANGEROUS GOODS PANEL (DGP)

TWENTIETH MEETING

Montréal, 24 October to 4 November 2005

Agenda Item 2: Development of recommendations for amendments to the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) for incorporation in the 2007-2008 Edition

PACKING AND TRANSPORT PROVISIONS FOR HYDROGEN IN METAL HYDRIDE STORAGE SYSTEM (UN3468)

(Presented by R. Richard)

SUMMARY

This document proposes to amend the Technical Instructions to authorize the transport of “**Hydrogen in a metal hydride storage system**” (UN 3468) on cargo aircraft. While currently forbidden for transport on both passenger and cargo only aircraft, it is proposed that, like hydrogen, the systems be permitted for transport on cargo only aircraft. A packing instruction is proposed for these storage systems which relies on an ISO standard developed to ensure safety of such systems during use and transport. Certain exceptions from this general standard are proposed for small storage systems with an internal volume not more than 120 ml.

1. INTRODUCTION

1.1 At the Working Group of the Whole DGP held in April 2005, the Working Group agreed to add Special Provision A2 to the entry for “**Hydrogen in a metal hydride storage system**” (UN 3468). At that time, the Panel Member nominated by the United States was requested to draft a packing instruction suitable for the air transport of these systems. This proposal is made in response to that request. However, after further consideration, it is believed that the hazards posed by these systems is no greater than that of hydrogen and there is no safety reason why the systems should not be permitted for transport on cargo only aircraft provided appropriate provisions for the packaging and safety of the storage system design are prescribed. Accordingly, this document proposes that the Technical Instructions be amended to permit these storage systems to be transported on cargo only aircraft. To this end, a packing instruction is proposed for these storage systems which relies on an ISO standard

developed to ensure safety of such systems during use and transport. Certain exceptions from this general standard are proposed for small storage systems with an internal volume not more than 120 ml.

1.2 ISO 16111 addresses the safe design and use of transportable hydrogen gas 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 1.8m 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.

2. PROPOSAL

2.1 Amend the entry for **Hydrogen in a metal hydride storage system**, UN 3468 in the Dangerous Goods List (Table 3-1) as follows:

- 1 In column 5, insert “Gas flammable”;
- 2 In Column 7, remove “A2” (as adopted by WG/05), and insert “A1”;
- 3 In column 11, insert “214”; and
- 4 In column 12, insert “100 kg G”.

2.2 In Part 4, Chapter 4, add a new Packing Instruction 214 as follows:

214

PACKING INSTRUCTION

214

This instruction applies to storage systems containing hydrogen absorbed in a metal hydride (UN3468) individually or when contained in equipment and apparatus when transported on cargo aircraft.

Storage systems must be constructed and certified to meet the requirements of ISO 16111.

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 appropriate national authority of the State in which they are approved and filled.

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 6.5.1.5.

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.

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.

Storage systems must be filled in accordance with procedures provided by the manufacturer of the system in accordance with ISO 16111, 8.3.2.

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:

- the specification cylinder requirements of ISO 16111, 5.1 when the cylinder meets all applicable design type tests;

-the requirement of ISO 16111, 5.4 to be fitted with a pressure relief device; and

-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.