

**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-second session, 2-6 December 2002,
agenda item 4(b)(ii))

NEW PROPOSALS

Hydrogen in a Metal Hydride System

Comments on ST/SG/AC.10/C.3/2002/83

Transmitted by the expert from the United States of America

1. The expert from the United States of America supports the expert from Canada's proposal in ST/SG/AC.10/C.3/2002/83 to adopt a new entry for "Hydrogen In A Metal Hydride Storage System". Adoption of an entry in the Model Regulations for Hydrogen/Metal Hydride Storage Systems will facilitate the transport of these systems especially considering the rapid introduction of these articles in commerce. While we welcome the Canadian proposal, it is the opinion of the United States that adoption of the proposed Special Provision CCC will lead to inconsistent and unnecessary assignment of sub-risks for hydrogen/metal hydride storage systems. We expressed our reservation on this point at the twenty-first session of the Sub-committee meeting in July, 2002, and after further review, maintain our position that a Division 2.1 classification is sufficient for this new entry and adequately addresses the hazards of such a system. We do not agree that it is necessary or appropriate to require a Class 4 subsidiary risk for this new entry. Our view is supported by the technical analysis that is annexed to the Canadian proposal in –C.3/2002/83.
2. The text of the proposed Special Provision CCC will create difficulties and confusion for consignors and will lead to inconsistent assignment of subsidiary risks for these hydrogen/metal hydride storage systems. If SP CCC is adopted consignors will be required to determine the state and composition of the hydridable metal alloys for hydrogen storage in order to apply the appropriate subsidiary risk. This will be difficult because the state and composition of the hydridable metal depends on the pressure in the storage system as well as the amount of hydrogen absorbed within the alloy. The amount of hydrogen absorbed will change during the use of the system and the hazard posed by the metal alloys will change based on whether it is in the in the activated, non-hydrated state or the hydrated state. Furthermore, the UN tests and criteria for Class 4 substances can not be applied to these metal alloys in the state in which they will be offered for transport. Adoption of SP CCC will also require consignors of used systems to reassess the hazards to determine if the sub-risk has changed before offering the systems for transport. Since CCC requires persons who transport a purged or cleaned storage system to ship that system (basically is metals in a container) under 3AAA with a primary hazard assignment of Division 2.1 and a subsidiary risk assignment of Div. 4.1 or 4.2 or 4.3 consignors will need to assess every system prior to transport to determine the appropriate hazard classification.

3. In actuality, if the materials are removed from the containment and suddenly exposed, they will release hydrogen as designed, revert to the non-hydrided state and undergo oxidation. However in this real-life situation, the rapid release of hydrogen would cool the material and slow the oxidation process. In this case, the oxidation would most likely be slow enough to prevent the possible ignition of nearby combustible materials. The material within the storage system will not behave the same as other Division 4.2 substances when exposed due to the dehydriding reaction that will occur. In tests conducted in the United States, in which storage systems with hydrided material were ruptured, the canisters rapidly vented hydrogen and cooled sufficiently to form ice on the vessel surface. The cooling and ice formation slowed the hydrogen release and no effects from the oxidation of the alloy were observed. On this basis, the hazards posed by the metal alloys do not seem to justify the need for requiring the subsidiary risks that would be required according to the proposed SP CCC. Since the test and criteria for Class 4 metals can't be applied to a metal alloy that is subject to an overpressure of hydrogen, the classification process will most likely be applied inconsistently and will lead to confusion for consignors as well as compliance inspectors. The expert from the United States believes that the classification of these storage systems should be based on the hazards of the article as opposed to classification on the basis of each of the substances contained. For these reasons stated above, we do not support the adoption of SP CCC as proposed in –C.3/2002/83.

Proposal

4. The Sub-Committee is requested to adopt the expert from Canada's proposal as indicated in ST/SG/AC.10/C.3/2002/83 with the exception of SP CCC.
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