

## 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

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### LISTING, CLASSIFICATION AND PACKING

#### Behaviour of propellant and "Powders" in Closed Transport Units

Transmitted by the expert from Australia

#### **SCOPE**

This proposal aims to examine the issue of classification of Powders in respect of the products behaviour in a fire when carried in a closed CTU.

#### **RELATED DOCUMENTS**

ST/SG/AC.10/C.3/2007/12 - (SAAMI).

ST/SG/AC.10/C.3/2007/17 - (Australia).

#### **Introduction**

1. In document ST/SG/AC.10/C.3/2007/12 the Sporting Arms and Ammunition Manufactures Institute (SAAMI) have proposed a new entry for smokeless powder under divisions 1.4 compatibility group C on the basis that when packaged in 3.7 kg bags it 'typically' meets the test criteria for assigning divisions 1.4.
2. The expert from Australia does not support the proposal from SAAMI for two reasons. First, the proposal appears to rely on the assumption that 3.7kg packages present a lower risk regardless of the volume being shipped. Second, the Australian expert considers that there are issues with respect of how large quantities of propellants and powder may react in a fire when carried in a closed transport unit (recognising not all propellants are classified as division 1.3 or 1.4). The easing of the requirements for smokeless powder appears inappropriate until these issues are examined.

#### **Issues**

3. The properties of powders and propellants are such that they will normally burn and not explode when ignited. If initiated with a detonator the substance is likely to explode, but as they are intended to function by deflagration, the means of initiation is not required under

test series 6(a). However, due to this property, a fire involving propellants or powders contained in a non-combustible sealed packaging is likely to have a much higher risk of explosion or projection of some part of the packaging.

4. The usual tendency of propellants and powders to burn vigorously when not confined, rather than explode, does influence the result of test series 6(c) where packages such as fibreboard box/drum and bag combinations are used. These packages break down quickly in a fire allowing the propellant or powder to burn off emitting considerable radiant heat, but involve little projection of any kind from the test site. Experience has shown that testing with packages such as light tin plate containers provides a more energetic outcome but this is still only sufficient for the allocation of division 1.3 classification, mainly due to the radiant fire hazard and minor projection hazard.
5. Despite being appropriately classified in accordance with the series 6(c) test, where such substances are then subsequently packed in a closed transport unit, such as a freight container, the risk is likely to increase depending on the volume of propellant and powder. It is accepted that for relatively small volumes, where the transport unit is involved in a fire, the outcome should not present a greater explosive potential than that demonstrated in the series 6(c) test. For larger volumes in a closed transport unit, where the transport unit is engulfed in a fire, the behavior is unlikely to be as benign. In such circumstances there is the potential that the majority of the contents of the transport unit will react in an explosive manner, regardless of the package size.
6. As noted in ST/SG/AC.10/C.3/2007/17 a similar risk exists with fireworks. However, with fireworks the potential for an explosive reaction is probably higher due to the nature of some of the compositions used and the fact many fireworks are fitted with a means of initiation. In both cases the goods are generally shipped by the container load, which means up to a normal maximum of 25 000kg of goods and packaging in a 20-foot freight container. Given that 5 000kg of fireworks composition or propellant is roughly equivalent to 1 000kg of TNT, the simultaneous initiation of this volume presents a considerable risk despite being classified as division 1.3 or 1.4 as a result of series 6(c) testing.
7. Series 6(c) provides an effective indication of the explosive potential of propellants and powders when involved in a fire, relative to the volume of the substance involved in the test. It may not be adequate when considering the same material when large volumes are transported in a closed transport unit carried by road, by inland waterways or by sea. Under such circumstances, smaller packages seem to offer no increase in safety.

## **Recommendations**

8. The SAAMI proposal should not be supported. Further it is recommended that consideration be given to:
    - i. Examining the behaviour, in a fire, of large volumes of propellants and powders packed in closed transport units; and
    - ii. Whether classifications applied to these materials as a result of small scale testing necessarily remain valid for large volume shipments.
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