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-fifth session
Geneva, 22 - 26 June 2009
Item 2 of the provisional agenda

EXPLOSIVES AND RELATED MATTERS

Test Series 7 Intersessional Working Group

Proposed Conceptual Modifications to Test Series 7

Transmitted by the Chairman of the Working Group (United Kingdom)

Introduction

1. The United Nations (UN) Test Series (TS) 7 Intersessional Working Group (IWG) agreed at their 17-18 March 2009 meeting in Bath, United Kingdom to propose several conceptual modifications to TS 7 which, if promulgated, will ultimately affect classing articles hazard division (HD) 1.6. The details of the IWG's March 2009 deliberations are reported in the UK's other INF paper which is being submitted in conjunction with this one. An initial set of proposals is outlined herein in order to share these with the UN Sub-Committee of Experts on the Transport of Dangerous Goods, and specifically with their Explosives Working Group (EWG), so as to gather feedback on the overarching, as well as specific, aspects of the notional TS 7 changes.

Further Proposals for UN 1.6 Articles and Test Series 7 criteria

2. The WG agreed that "extremely insensitive article" candidates could not exclude Extremely Insensitive Explosives (EIS) components containing certain fuzing and/or boostering components. The prominence of such configurations in transport today requires their inclusion; but this must be appropriately controlled to insure that articles remain "extremely insensitive". It is proposed that only fuzes with two or more independent effective protective features should be allowed in HD 1.6 articles. It should be noted that any potentially sensitive fuze explosives components must always be present during TS 7 article testing.

3. The WG also agreed to a series of control measures for allowing the presence of boostering components in HD 1.6 articles (see Figure 1 below). Boostering components within an article are defined as any other than EIS-loaded explosive component aiding explosive train reliability between a fuze's output charge and an article's main EIS-containing explosive charge (regardless of whether a fuze is present or not during transport). It is proposed that in order to maintain appropriate confidence that relative HD 1.6 article insensitivity remains, such boostering components should be required to contain only explosive substances that pass the UN TS 5 Type 5 (a) cap sensitivity test and the Type 5 (b) deflagration to detonation test.

4. An exception to the above was raised for embedded boostering component substances with a maximum cross-sectional dimension (e.g., diameter) less than 50 millimeters (mm) and under five percent explosive substance volume, which would not be required to be subject to EIS testing (Test Series 5(a) and 5(b)).

5. That explosive substances other than EIS would be allowed to be present in small isolated auxiliary explosive components located within extremely insensitive articles. Assurance that ignition or initiation of such components does not cause any main explosive charge reaction would have to be established to conclude their presence will not affect existing accidental initiation or mass explosion risk during transportation.

Figure 1 below depicts an example HD 1.6 candidate article incorporating the IWG-agreed conceptual main explosive charge, fuzing, and boostering allowances.

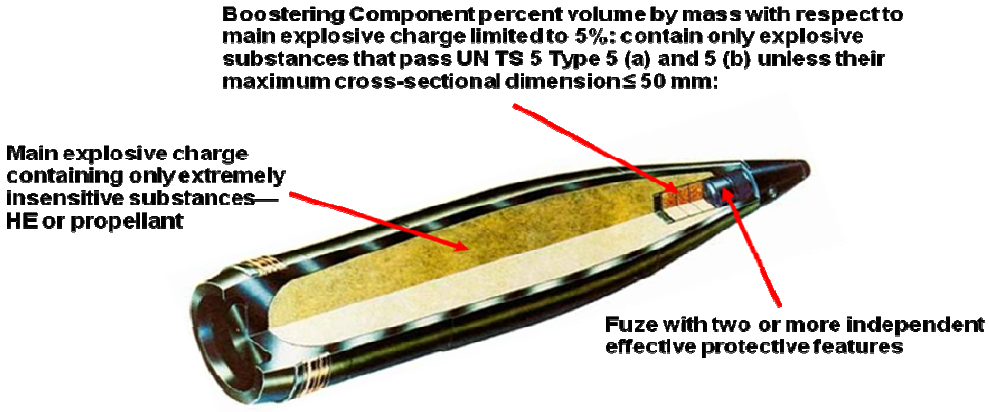

FIGURE 1. Example HD 1.6 extremely insensitive article candidate incorporating conceptual main explosive charge, fuze, and boostering component allowances

6. The WG agreed that a 1.6 article fragment impact test would need to be introduced to assess whether the presence of other than EIS-loaded components in articles might cause a deleterious affect with regard to demonstrating a negligible probability of accidental initiation or propagation. It is proposed that a 18.6 gram right-circular cylinder with a conical nose steel fragment strikes the target at a velocity of 2530 ± 90 ms^{-1}. Assessment of the aim points must be made to ensure that the most vulnerable components are targeted. The acceptance criterion for 1.6 article fragment impact testing is a reaction more severe than burning should be considered positive (failing).

7. The WG concluded that three 1.6 article stack test repetitions are excessive. We suggest that two repetitions, including one in a confined configuration should be more than adequate to assess the likelihood of a mass explosion during transportation. Main explosive charges that are not detonable (e.g., propellants in less than critical diameter configurations) should not undergo 1.6 article stack testing (i.e. testing maybe waived).

Summary

8. This refining of Test Series 7 to make it more relevant, useful and valuable for the transport of today's munition commodities should continue. This paper seeks the opinions of other experts on the proposed conceptual modifications to TS 7. A further meeting of the IWG is planned for October; details will be communicated when arrangements are finalised.

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