



## WORKING PAPER

### **DANGEROUS GOODS PANEL (DGP) MEETING OF THE WORKING GROUP OF THE WHOLE**

**The Hague, 3 to 7 November 2008**

**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 2011/2012 Edition**

**Agenda Item 2.2: Part 2 — Classification**

#### **CLASSIFICATION OF 1.4S EXPLOSIVES**

(Presented by G. A. Leach and D. Brennan)

##### **SUMMARY**

This seeks to clarify the 1.4S classification criteria in the Technical Instructions.

Action by the DGP-WG is in paragraph 2.

#### **1. INTRODUCTION**

1.1 During the thirty third session of the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods, the panel members nominated by the United Kingdom and the International Air Transport Association attended the explosives working group. They were invited because proposals had been made to clarify the classification criteria for explosives in division 1.4S.

1.2 During the working group it became clear that some States had a very different interpretation of the 1.4S classification criteria than others. The criteria for such classification is specified in the UN Model Regulations (and reflected in the Technical Instructions ) as:

Substances or articles so packed or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder or prohibit fire fighting or other emergency response in the immediate vicinity of the package.

1.3 Differences in interpretation were centred around the need for “hazardous effects” to be “confined within the package”. It was the long held belief of the United Kingdom and IATA panel members that this meant no projectiles or flames should exit a package but one member of the working group said that it was not possible for shaped charges to meet such a standard, even though many were

classified in Division 1.4S. Additionally, a proposal was made at the UNSCOE meeting for criteria which would allow for shaped charges to be classified in Division 1.4S if, when initiated inside a package, they did not penetrate a 3 mm thick steel witness plate underneath the package and no projectiles exited the package with a kinetic energy exceeding 8 joules (which for a 23 g charge which was referred to in the paper equates to a speed of over 90 kph). In the United Kingdom, applications for the classification of detonators in Division 1.4S have been received which clearly show a detonator body embedding itself into and cracking a 3 mm steel plate. Similar classification reports on shaped charges requesting 1.4S classification have shown perforations in a 3 mm steel plate of many centimetres in diameter. It should be borne in mind that the fuselage skin of an aircraft can be as thin as less than 1 mm. Also worthy of note is the potential for airframe failure in the event of an overpressure caused by a detonation in a pressurized aircraft.

1.4 It is suggested that it is unacceptable to continue to allow some types of explosive to be carried on passenger aircraft when it is known they may have the ability to exit the package and cause adjacent collateral damage. ST/SG/AC.10/C.3/2008/89 (see attached) has been produced by the UN expert from Canada for discussion at the December meeting of the UNSCOE, proposing to clarify the 1.4S classification criteria such that it reflects more closely the understanding of the presenters of this working paper. However, if accepted by the UN, this text would not be reflected in the Technical Instructions until the 2011-2012 Edition and it is suggested action needs to be taken in advance of this.

1.5 The DGP would appear to have 3 options:

**Option 1** Do nothing and accept the situation as it is;

**Option 2** Restrict certain explosives currently classified in Division 1.4S to cargo aircraft only. For information it is believed the following explosives are affected:

0349 Articles, explosive, n.o.s. 1.4S  
 0366 Detonators for ammunition 1.4S  
 0384 Components, explosive train, n.o.s. 1.4S  
 0441 Charges, shaped, without detonator 1.4S  
 0445 Charges, explosive, commercial without detonator 1.4S  
 0455 Detonators, non-electric for blasting 1.4S  
 0456 Detonators, electric for blasting 1.4S  
 0460 Charges, bursting, plastics bonded 1.4S  
 0481 Substances, explosive, n.o.s. 1.4S  
 0500 Detonator assemblies, non-electric for blasting 1.4S;

**Option 3** Clarify the 1.4S classification criteria in the Technical Instructions in a similar way to what is being proposed in ST/SG/AC.10/C.3/2008/89. If the working group felt this issue was in urgent need of addressing this could be by way of an addendum.

## 2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to discuss the three options above. Depending on the outcome a further paper could be produced either for this WG08 (if the working group believes it is urgent) or for WG09.

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APPENDIX

UNITED  
NATIONS

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**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-fourth session  
Geneva, 1-9 December 2008  
Item 2 of the provisional agenda

EXPLOSIVES AND RELATED MATTERS

**Additional test for 1.4S classification**

Transmitted by the expert from Canada<sup>1</sup>

Introduction

1. At the thirty-third session of the Sub-Committee, the expert from Canada made a proposal for an additional test for determining 1.4S classification (ST/SG/AC.10/C.3/2008/11). This was a revised version of the 2006 proposal (ST/SG/AC.10/C.3/2006/62) which had been modified according to the advice of the Working Group on Explosives. The Working Group reviewed and supported this revised proposal, which was adopted by the Sub-Committee with the addition of square brackets around certain portions of the text. The present proposal contains modified text for these portions.

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<sup>1</sup> In accordance with the programme of work of the Sub-Committee for 2007-2008 approved by the Committee at its third session (refer to ST/SG/AC.10/C.3/60 para. 100 and ST/SG/AC.10/34, para. 14).

## Comments

2. The texts adopted so far by the Sub-Committee are reproduced in document ST/SG/AC.10/C.3/2008/97. Additional changes are proposed below.

## PROPOSAL

3. In 16.7.1.3.4, insert the word “donor” before “article” at the beginning of the first sentence.
4. Amend 16.7.1.4 to read as follows:

“16.7.1.4 Test criteria and method of assessing the results

Inclusion in Compatibility Group S requires that any hazardous effects arising from functioning of the articles in this test are confined within the package. Evidence of a hazardous effect outside the package includes:

- (a) Denting or perforation of the witness plate beneath the package;
- (b) A flash or flame capable of igniting an adjacent material [such as a sheet of  $80 \pm 3$  g/m<sup>2</sup> paper at a distance of 25 cm from the package];
- (c) Disruption of the package causing projection of the explosives contents; or
- (d) [A projection which passes completely through the packaging (a projection or fragment retained or stuck in the wall of the packaging is considered as non hazardous)];

The competent authority may wish to take into account the expected effect of the initiator when assessing the results of the test, if these are expected to be significant when compared to the articles being tested. If there are hazardous effects outside the package, then the product is excluded from Compatibility Group S.”.

5. Add the following examples in 16.7.1.5:

“16.7.1.5 [Examples of results

Article	Packaging	Initiation system	Events	Result
Cartridges, power device	Fibreboard box containing 20 articles (300 g of propellant each) each in a plastic bag.	One of the articles.	Articles ignited one by one, producing flames up to 2 m high outside package.	Not consistent with Compatibility Group S.
Detonator assemblies, non-electric	Fibreboard box containing 60 assemblies each in a plastic bag with its shock tube coiled in a figure 8, with attenuators on the detonators.	One of the articles.	One out of 60 detonators fired and no visible effects outside the box.	Consistent with Compatibility Group S.
Detonators, electric	Fibreboard box containing 84 assemblies, each bundled with its wire so that the blast from a firing detonator would be attenuated.	One of the articles.	One out of 84 detonators fired. The reaction caused the box to break open and released some of the assemblies but it was judged that there were no hazardous effects outside the package.	Consistent with Compatibility Group S.
Charges, shaped (open-face 19 g perforators)	Fibreboard box containing 50 charges in two layers so that pairs of charges were focused toward each other.	Detonator with approximately 60 mm of detonating cord.	Three trials were conducted. In each of the trials, the witness plate was perforated with three to four charges reacting. The packages were blown apart scattering the remaining charges over a wide area.	Not consistent with Compatibility Group S.
Detonators, electric	Fibreboard box containing 50 detonators each with a 450-mm lead wire. Each assembly was contained in its own fibreboard inner box. The boxes were separated by fibreboard panels.	One of the articles.	One out of 50 detonators fired causing one of the box flaps to open. There were no hazardous effects outside of the package.	Consistent with Compatibility Group S

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