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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EXPLOSIVES AND RELATED MATTERS

Additional test for 1.4S classification

Transmitted by the Expert from United Kingdom

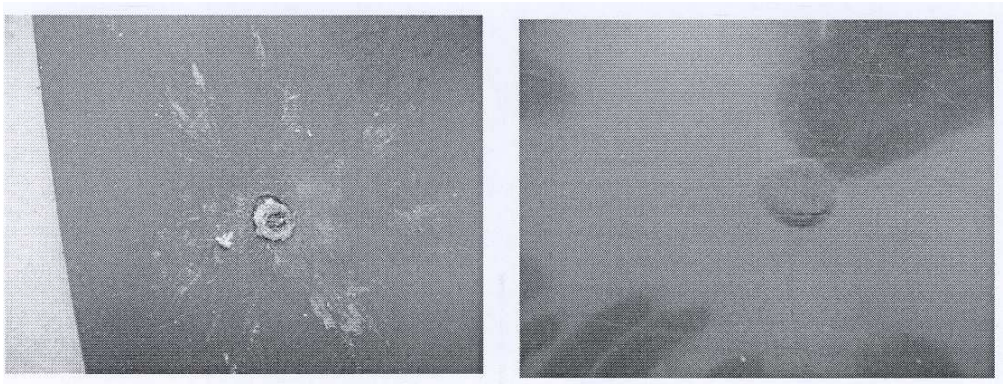
Introduction

1. At the 31st session of the UN Sub-Committee of Experts on the Transport of Dangerous Goods, the Explosives working group recommended the Canadian proposal for a Test 6(d) and the Sub-Committee agreed to place the text proposed in square brackets pending further results or proposals in favour or against the test (UN/SCETDG/31/INF.45, ST/SG/AC.10/C.3/62).

2. The Canadian working paper (ST/SG/AC.10/C.3/2008/11) has reviewed the text of the proposed Test 6(d) and there have been three further papers by IME (ST/SG/AC.10/C.3/2008/10), USA (ST/SG/AC.10/C.3/2008/55), and Germany (ST/SG/AC.10/C.3/2008/44) offering proposals requested by the Sub-Committee.

Comment

3. The expert from the United Kingdom believes it is essential that a number of energetic explosives that are 1.4S candidates from Test 6(c) are tested for accidental functioning as proposed by Canada. The UK has had concerns about some explosives articles (e.g. shaped charges, detonators, etc) when tested in Test 6(a) and 6(b) which have created significant damage to the witness plate, including perforations and large distortions of the steel plate. Only recently, the UK received an application for the classification of 1.4S detonators that clearly showed a detonator body embedding itself into and cracking the 3mm mild steel plate in the single package test.



4. Similar classification reports on shaped charges requesting 1.4S classification have shown perforations in the mild steel plate of many centimetres in diameter in both the single package and stack tests (Test 6(a) & (b)).

5. A significant quantity of 1.4S shaped charges and detonators packages are transported by air and these are permitted to be transported on passenger aircraft.

6. Like the expert from the USA, the UK would like to limit the number of candidate explosives to be subjected to the proposed 6(d) test. The USA has proposed a Special Provision limited to one UN entry (UN 0441) with a test method which is a variation on the proposed Canadian 6(d) test. The expert from the United Kingdom believes there are a number of other energetic explosives, in addition to shaped charges, that are classified as 1.4S which also produce hazardous effects outside the packaging such as the detonator example mentioned earlier. The UK suggests that the proposal from the USA is amended to include other 1.4S entries that would be identified by a variation of the USA's Special Provision.

SPXXX ***This designation shall only be used if the explosive substance or article has demonstrated in Test 6(d) that any hazardous effects arising from functioning are confined within the package.***

The expert from the United Kingdom recommends the following UN Numbers should have this proposed Special Provision applied to them;

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

7. Like the German Expert, the UK is concerned about the criteria in the proposed Test 6(d) relating to the fireball or jet of flame, the energy value of the metallic projection and the disruption or scattering of the packaging.

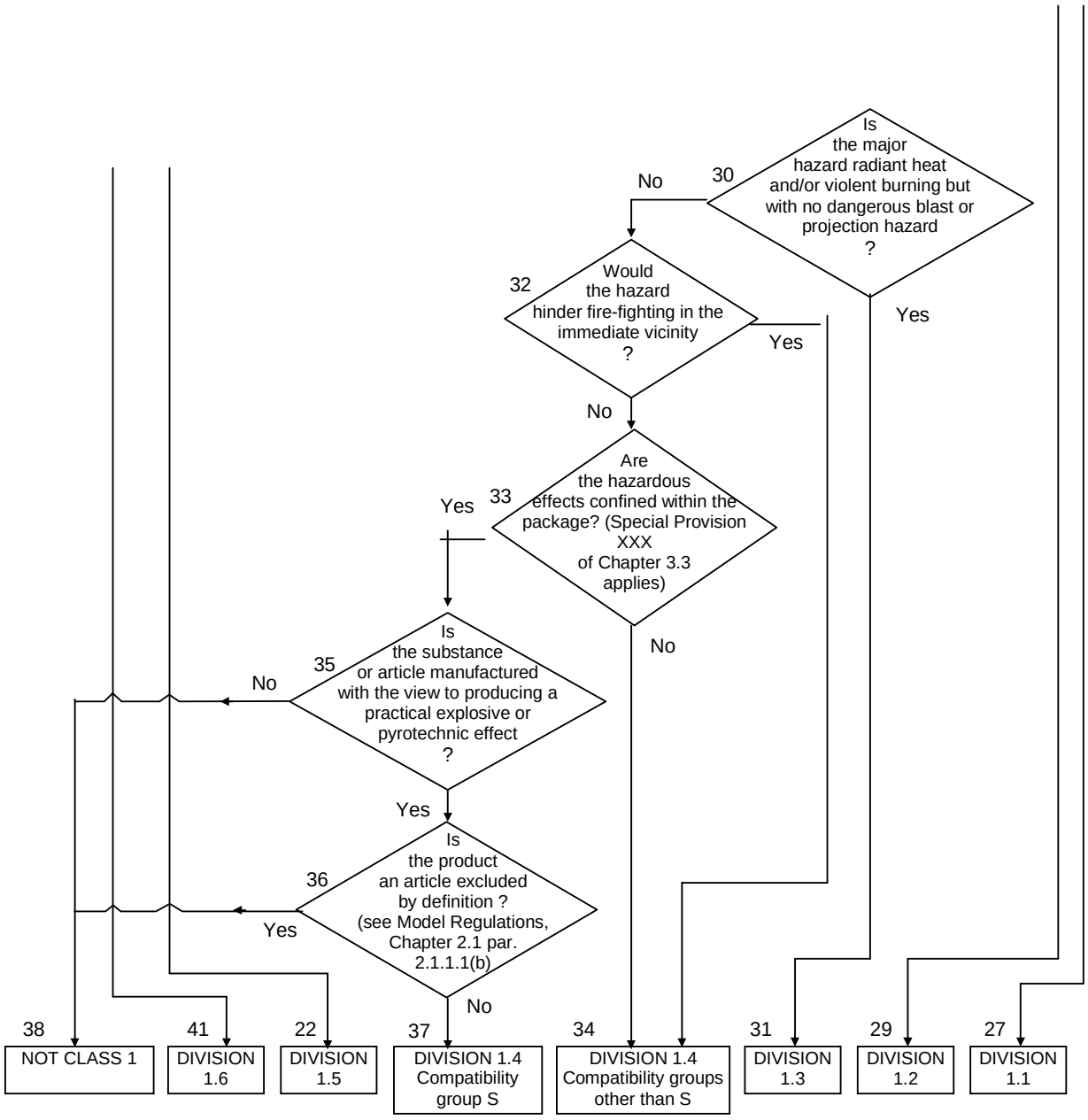
8. 1.4S Explosives are permitted to be transported with dangerous goods of other classes (7.1.3.2.2). The effect of energetic metallic fragments impacting on other dangerous goods packages could be significant. Chapter 6 of the Model Regulations does not take such impacts into account when testing packaging. The expert from the United Kingdom suggests that any metallic fragment from an explosive article (identified by the proposed Special Provision) which produces a perforation in its own package should not be classified as 1.4S.

9. The UK is also concerned about fireballs and jets of flame (e.g. from a shaped charge) but suggests the diameter of the fireball or the length of the jet of flame should be not more than the minimum dimension of the package rather than the maximum dimension.

10. The Canadian paper proposes to replace the content of box 33 in Figure 10.3 and Figure 10.8. The UK believes that the current procedure set out in Figure 10.3 and 10.8 does not follow the decision making in 16.6.1.4.5 to 16.6.1.4.7 and should be amended.

11. Paragraph 16.6.1.4.5 is used to decide whether the explosive is classified as Division 1.4 other than S, and 16.6.1.4.6 is used to decide whether the explosive can be classified as 1.4S. To be classified as 1.4S the packaging has to confine the hazardous effects of accidental functioning or if the package is degraded by fire the effects will not hinder fire fighting in the immediate vicinity. Only then should the decision in 16.6.1.4.7 considered. The current procedure asks the first part of the criteria (hazard from initiation) and, if the answer to that question is "No", the decision about fire fighting is ignored before deciding the classification is 1.4S or "Not Class1".

12. The expert from the United Kingdom suggests that decision boxes 35 and box 36 should come after the decision on hazards hindering fire fighting when the results of Test Series 6 have been completed. The UK also recommends reordering boxes 32 and 33 so that decisions from Test 6(c) are considered first and then the results of Test 6(d) [if applicable by SPXXX]. The UK suggests the procedure outlined below to replace parts of Figure 10.3 and 10.8. This would also deal with one of the concerns in the IME paper (para.2 (b) (i). The changes to Figures 10.3 and 10.8 proposed by Canada, and UK, would have to be reflected in the GHS procedure (Figure 2.1.3).


30
Is the major hazard radiant heat and/or violent burning but with no dangerous blast or projection hazard ?
No
Yes
32
Would the hazard hinder fire-fighting in the immediate vicinity ?
Yes
No
33
Are the hazardous effects confined within the package? (Special Provision XXX of Chapter 3.3 applies)
Yes
No
35
Is the substance or article manufactured with the view to producing a practical explosive or pyrotechnic effect ?
No
Yes
36
Is the product an article excluded by definition ? (see Model Regulations, Chapter 2.1 par. 2.1.1.1(b)
Yes
No
38
NOT CLASS 1
41
DIVISION 1.6
22
DIVISION 1.5
37
DIVISION 1.4 Compatibility group S
34
DIVISION 1.4 Compatibility groups other than S
31
DIVISION 1.3
29
DIVISION 1.2
27
DIVISION 1.1

13. The expert from the United Kingdom suggests the following changes (*in italics*) to the text proposed by the Canadian expert

Amend the text proposal for Test 6(d) to

1) "*Type 6 (d): A test on an unconfined package of an explosive substance or explosive articles, to determine if there are hazardous effects outside the package following ignition or initiation of the contents.*"

2) Test type 6 (d) is a test used to determine whether a 1.4S classification ...

(b) The functioning of the product within the packaging producing hazardous effects, such as damage to the witness plate, perforation of the packaging by metallic projections or fireball or jet of flame, outside the packaging.

The results of test 6 (d) indicate if 1.4S is appropriate, otherwise the classification is 1.4 other than S.

3) Replace part of Figures 10.3 and 10.8 with the flow diagram discussed earlier.

4) 16.2.2

(a) The results of test series 6 (a), (b) or (c) indicate that a 1.4S classification may be applicable, and

(b) *The functioning of the product within the packaging producing hazardous effects, such as damage to the witness plate, perforation of the packaging by metallic projections or fireball or jet of flame, outside the packaging.*

5) 16.7.1.1 Introduction

This is a test on a single package to determine if there are hazardous effects outside the package following ignition or initiation of the contents

6) 16.7.1.3.5 The substance or article should be initiated and observations made on the following: *damage to the witness plate beneath the package, thermal effects such as fire ball or jet of flame, perforation or disruption of the packaging* . A safe waiting period, prescribed by the test agency, should be observed after initiation. The test should be performed three times *in three different orientations* unless a decisive result is observed earlier (e.g. *disruption or perforation of the package* or visible flames outside the package). If the results of the recommended number of tests do not enable unambiguous interpretation of the results, the number of tests should be increased.

7) 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 substances or articles in this test are confined within the package. Evidence of a hazardous effect outside the package includes:

(a) Damage to the witness plate beneath the package;

(b) *A fireball diameter or length jet of flame of the fireball more than the minimum dimension of the package,*

(c) perforation of the package by a metallic fragment.

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 substance or articles being tested. If there are hazardous effects outside the package, then the product is excluded from Compatibility Group S.