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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

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Item 3 of the provisional agenda

LISTING, CLASSIFICATION AND PACKING

Additional test for 1.4S classification

Transmitted by the expert from Canada

Introduction

1. At the twenty-ninth 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.3/2006/62). The Working Group on Explosives reviewed the proposal and requested that the expert from Canada prepare a new proposal, including text to be inserted in the Manual of Tests and Criteria (UN/SCETDG/29/INF.65). The present working paper represents the new proposal.

Comments

2. The sections referred to below are those in the Manual of Tests and Criteria, Fourth revised edition. If this proposal is accepted, it will also be necessary to make the appropriate revisions to Section 10 of the Manual of Tests and Criteria "Introduction to Part I".

3. Note that the section numbers in Table 16.1 have also been changed so that they agree with the text in Section 16, as they do not in the current Manual of Tests and Criteria. (This is required in the English text only.)

PROPOSAL

4. Replace Section 16.1 with the following:

“16.1 Introduction

16.1.1 The results from the four types of series 6 tests are used to determine which division, amongst Divisions 1.1, 1.2, 1.3 and 1.4, corresponds most closely to the behaviour of a product if a load is involved in a fire resulting from internal or external sources, or an explosion from internal sources (boxes 26, 28, 30, 32 and 33 of Figure 10.3). The results are also necessary to assess whether a product can be assigned to Compatibility Group S of Division 1.4 and whether or not it should be excluded from Class 1 (boxes 35 and 36 of Figure 10.3). The four types of test are:

Type 6 (a): a test on a single package to determine if there is mass explosion of the contents;

Type 6 (b): a test on packages of an explosive substance or explosive articles, or non-packaged explosive articles, to determine whether an explosion is propagated from one package to another or from a non-packaged article to another;

Type 6 (c): a test on packages of an explosive substance or explosives articles, or non-packaged explosive articles, to determine if there is a mass explosion or a hazard from dangerous projections, radiant heat and/or violent burning or any other dangerous effect when involved in a fire; and

Type 6 (d): a test on a single package of an explosive substance or explosive articles, to determine if there are hazardous effects outside the package following accidental ignition or initiation of the contents.”.

5. Replace Section 16.2 with the following:

“16.2 Test methods

16.2.1 The tests methods currently in use are listed in Table 16.1.

Table 16.1: TEST METHODS FOR TEST SERIES 6

Test code	Name of Test	Section
6 (a)	Single package test ^a	16.4.1
6 (b)	Stack test ^a	16.5.1
6 (c)	External fire (bonfire) test ^a	16.6.1
6 (d)	Unconfined single package test ^a	16.7.1

^a *Recommended test.*

16.2.2 Test types 6 (a), 6 (b), 6 (c) and 6 (d) are performed in alphabetical order. However, it is not always necessary to conduct tests of all types. Test 6 (a) may be waived if explosive articles are carried without packaging or when the package contains only one article. Test type 6 (b) may be waived if in each type 6 (a) test:

(a) The exterior of the package is undamaged by internal detonation and/or ignition; or

(b) The contents of the package fail to explode, or explode so feebly as would exclude propagation of the explosive effect from one package to another in test type 6 (b).

Test type 6 (c) may be waived if, in a type 6 (b) test, there is practically instantaneous explosion of virtually the total contents of the stack. In such cases the product is assigned to Division 1.1. Test type 6 (d) is a test used to determine whether a 1.4S classification is appropriate and is only used if:

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

(b) The functioning of the product as intended would be expected to produce effects more severe than those obtained in the 6 (c) test (e.g., where detonating explosives are present).

16.2.3 If a substance give a “—” result (no propagation of detonation) in the Series 1 type (a) test, the 6 (a) test with a detonator may be waived. If a substance give a “—” result (no or slow deflagration) in a Series 2 type (c) test, the 6 (a) test with an igniter may be waived.

16.2.4 Explanations of certain terms used in the assignment of divisions and compatibility groups are given in the Glossary in Appendix B of the Model Regulation (e.g. mass explosion, pyrotechnic substance, entire load, total contents, explode, explosion of the total contents).”.

6. Insert a new Section 16.7 after Section 16.6 as follows:

“16.7 Series 6 type (d) test prescription

16.7.1 Test 6 (d): Unconfined single package test

16.7.1.1 *Introduction*

This is a test on a single package to determine whether hazardous effects arising from accidental initiation or ignition are confined within the package.

16.7.1.2 *Apparatus and materials*

The following items are required:

- (a) A detonator to initiate the substance or article;
- (b) An igniter just sufficient to ensure ignition of the substance or article; and
- (c) A sheet of 3.0 mm thick mild steel to act as a witness plate.

Video equipment may be used.

16.7.1.2 Procedure

16.7.1.3.1 The test is applied to packages of explosive substances and articles in the condition and form in which they are offered for transport. The decision to use either an initiating stimulus or an igniting stimulus is based on the following considerations.

16.7.1.3.2 For packaged substances:

- (a) If the substance is intended to function by detonation, it should be tested with a standard detonator (Appendix 1);
- (b) If the substance is intended to function by deflagration, it should be tested with an igniter just sufficient (but not more than 30 g of black powder) to ensure ignition of the substance within the package. The igniter should be located in the centre of the substance in the package;

16.7.1.3.3 For packaged articles:

- (a) Articles provided with their own means of initiation or ignition:

The functioning of an article near the centre of the package is stimulated by the article's own means of initiation or ignition. Where this is impracticable, the article's own means of initiation or ignition is replaced by another form of stimulus having the required effect;

- (b) Articles not provided with their own means of initiation or ignition:

- (i) An article near the centre of the package is caused to function in the designed mode; or
- (ii) An article near the centre of the package is replaced by another article which can be caused to function with the same effect.

16.7.1.3.4 The package is placed on a steel witness plate on the ground without confinement.

16.7.1.3.5 The substance or article should be initiated and observations made on the following: evidence of thermal effects, projection effects, detonation, deflagration, explosion, fire or disruption of the package. ***A safe waiting period, prescribed by the test agency, should be observed after initiation.*** The test should be performed three times unless a decisive result is observed earlier (e.g. 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.

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 or jet of flame which extends more than 1 m from the package;
- (c) Disruption and scattering of the package and its contents; and
- (d) A metallic projection with a kinetic energy exceeding 8 J as assessed by the distance-mass relation given in Figure 16.6.1.1;

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.

16.7.1.5 *Examples of results*

Substance or article	Packaging	Initiation System	Events	Result
Shaped charges (open-face, 19 g RDX)	Fibreboard box 50 charge in two layers	Detonator + 6 cm of detonating cord	Witness plate perforated, package destroyed, charges scattered	Not 1.4.S