



**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-seventh session**

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Item 2 of the provisional agenda

Explosives and related matters**Proposed modifications to Test Series 7****Transmitted by the experts from the United Kingdom and the United States of America¹****Introduction**

1. The Sub-Committee will recall that the expert from the United Kingdom presented informal documents INF.41 and INF.42 at the July 2009 session which described the work of an informal working group on Test Series (TS) 7. The objective of this work being to address the historic lack of articles assigned to Division 1.6, identifying the cause and potential remedies.
2. In order to mature proposals a further informal working group meeting was hosted by the United Kingdom in the City of Bath on the 13 and 14 October 2009 with attendees representing France, Romania, Qatar, the United States of America and the United Kingdom.
3. This paper sets out the proposals developed by the informal working group with amendments detailed at annexes I and II.

¹ In accordance with the programme of work of the Sub-Committee for 2009–2010 approved by the Committee at its fourth session (refer to ST/SG/AC.10/C.3/68, para. 118 (a) and ST/SG/AC.10/36, para. 14).

Background

4. A key guiding principle adopted by the informal working group at the outset of their deliberations was that any potential remedy must be mindful of keeping Division 1.6 fitting appropriately within the overall explosives classification framework. Division 1.6 is for extremely insensitive detonating articles and the proposed changes are designed to ensure that the probability of accidental initiation or propagation of an article attaining this Division remains negligible.

5. In spite of the fact that few articles transported today can be classed Division 1.6 under existing TS 7 criteria, there coexists a number of newer substances and articles being developed and transported which have Division 1.6 characteristics although some of their specific features and individual designs do not exactly align with criteria. The overall insensitivity and safety in transport of those newer articles is believed to be equivalent with the intent of the originators of TS 7. Therefore, the informal working group considered it not only appropriate, but advantageous to propose modifications to the existing TS 7 definitions and test schemes to accommodate the new developments in article design and construction and understanding of article response mechanisms.

Proposals

6. It is proposed that the definition of Division 1.6 classification is changed by deleting the word “detonating” from the terms “extremely insensitive detonating articles” and “extremely insensitive detonating substance.” The reason being that it is not a requirement for articles entering Division 1.6 and the substances that they contain to be capable of detonating in the article being assessed.

7. It is recognised that the current position of requiring all energetic substances contained in candidate Division 1.6 articles to undergo TS7 type 7 (a) through (f) tests and is not necessary for certain fuze and booster substances where explosive hazard can be controlled through design. The paper proposes a new procedure to govern the requirement to conduct substance testing which maintains appropriate confidence that relative Division 1.6 article insensitivity remains.

8. A number of further changes to article tests of types 7 (g) through to (l), linked to the point above, are proposed to attain confidence in the behaviour of more vulnerable substances upon accidental initiation or propagation of the article, which includes:

(a) Reinforcement of the need for all energetic substances to be present in article tests of types 7(g) through (l);

(b) Addition of a Test Type 7 (l): a test to determine the sensitivity of an article to shock directed at vulnerable components;

(c) Specific targeting of vulnerable areas, often associated with fuze or boosting components, in tests of types 7 (j) and 7 (l).

9. This document also includes a proposal on "Response descriptors" used to assign a level of response to TS7 article tests. This addresses the need to improve guidance on assigning response levels and will facilitate international consistency in the analysis of test results. To achieve this a number of definitions are proposed for the Model Regulations, Appendix B, Glossary of the terms. These refer to a new proposed Appendix 8 in the Manual of Tests and Criteria which provides the detail needed to achieve this goal.

10. A number of other changes to article tests are proposed in Annex I to help achieve the following aims:

- (a) Provide improve guidance on test procedures drawing on best practice;
- (b) Develop consistency between article tests;
- (c) Introduce the proposed response descriptors.

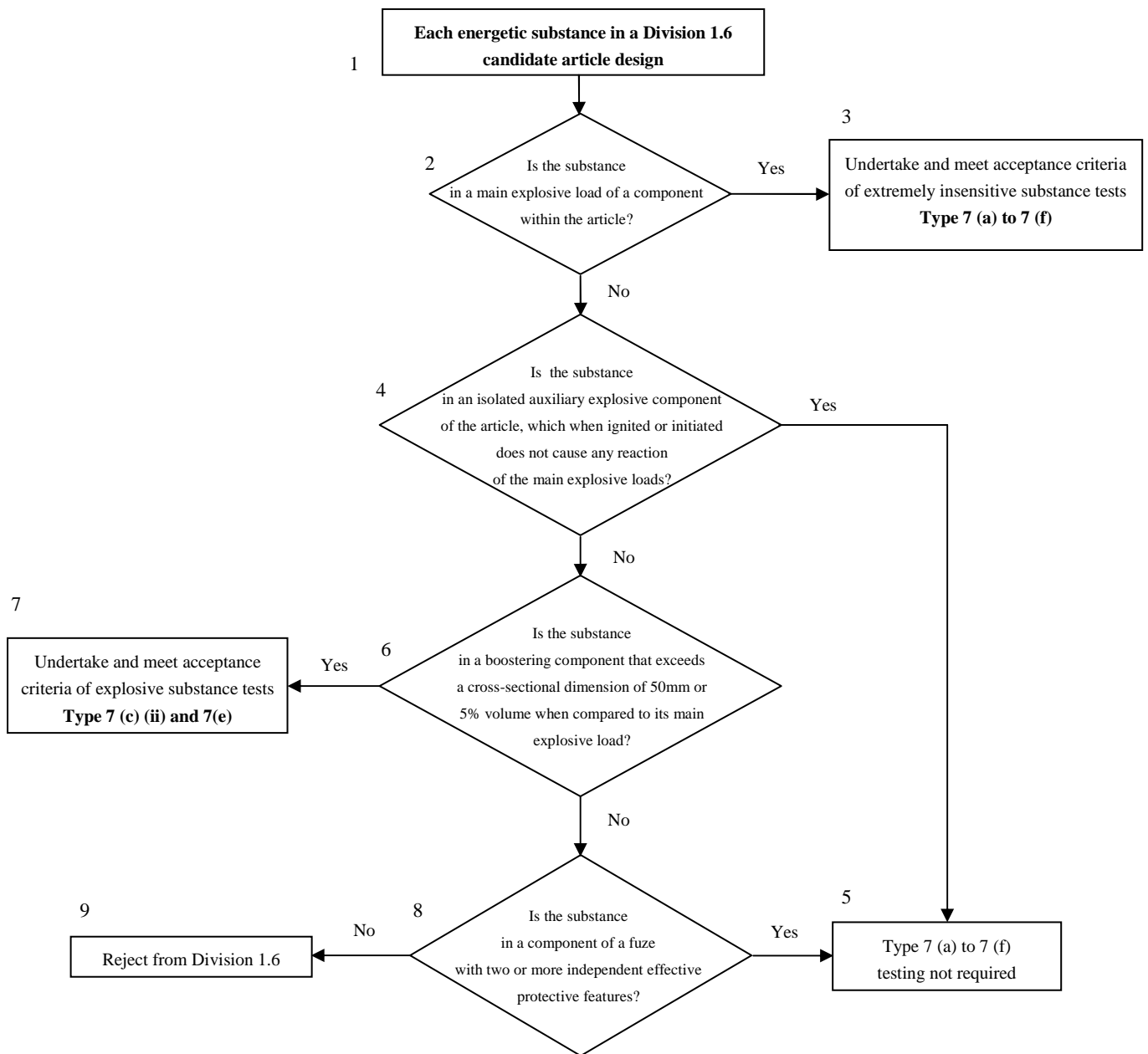
11. The experts from the United Kingdom and United States of America invite the Sub-Committee to consider these proposals for acceptance into the Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria and the Model Regulations.

Annex I

Proposed amendments to the Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria

Sub-section 10.4 Procedure for assignment to a division of Class 1

Add Figure 10.5 “Procedure to determine required substance testing for Division 1.6:



10.4.2.4 Amend the beginning to read:

“The question “Is it an extremely insensitive explosive article?” (box 40, Figure 10.3) is answered by series 7 tests and any candidate for Division 1.6 should be assessed against each of the eleven types of test comprising the series. The protocol for determining the test requirements is given in Figure 10.5. The first six types of test (7(a)-7(f)) are used to establish if a substance is an Extremely Insensitive Substance (EIS). The purpose of these tests is to develop an understanding of the sensitivity of substance(s) contained within the article, which informs and provides confidence in the article tests. The remaining five types of test (7(g), 7(h), 7(j), 7(k) and 7 (l)) are used to determine if an article predominantly containing EIS may be assigned to Division 1.6. The eleven test types are:”.

Add an additional test to the list at 10.4.2.4:

“Type 7 (l): a test to determine the sensitivity of an article to shock directed at vulnerable components.”

10.4.3.6 Amend the sentence to read:

“Tests types 7 (a) to 7 (f) should be used to establish that a substance is an extremely insensitive substance and then test types 7 (g), 7 (h), 7 (j), 7 (k) and 7 (l) used to establish that the articles predominantly containing EIS(s) may be assigned to Division 1.6.”

Add a new paragraph to detail the application of test series 7, for which the following is proposed:

“10.4.3.7 Tests of types 7 (g), 7 (h), 7 (j), 7 (k) and 7(l) should be performed to determine if an article with EIS main explosive load(s) and appropriately insensitive boosting components may be assigned to Division 1.6. These tests are applied to articles in the condition and form in which they are offered for transport, except that non-explosive components may be omitted or simulated if the competent authority is satisfied that this does not invalidate the results of the tests. The procedure detailing testing requirements is given in Figure 10.5 and some points of explanation are given below.

(a) Complex articles may contain multiple substances and this procedure should be completed for all substances within the article to be classified.

(b) The question “Is the substance in a main explosive load of a component within the article?” (Box 2 of Figure 10.5) is answered by examining the design of the article. Main explosive load substances are those loaded into components within the article that are not fuze, boosting, or isolated auxiliary explosive components. All substances in main explosive loads must “Undertake and meet acceptance criteria of extremely insensitive substance tests, Type 7 (a) to 7 (f)” (Box 3 of Figure 10.5). If a ‘+’ result is obtained for any main explosive load substance to any Type 7 (a) to 7 (f) test, the substance is not an EIS and the answer to the question in Box 24 of Figure 10.3 is “No.” The article is not a candidate for Division 1.6.

(c) Answering the question “Is the substance in an isolated auxiliary explosive component of the article, which when ignited or initiated does not cause any reaction of the main explosive loads?” (Box 4 of Figure 10.5) requires knowledge of the design of the article plus the explosive effects that occur when such components are initiated or ignited, either in their design mode or accidentally. Typically these will be small explosive actuators or pyromechanical devices that produce movement, cutting or opening functions. If the answer is ‘yes’ to this question, Type 7 (a) to 7 (f) testing is not required for substances in isolated auxiliary explosive components and the article remains a candidate for Division 1.6.

(d) The question “Is the substance in a boosting component that exceeds a cross-sectional dimension of 50 millimetres or 5 percent volume when compared to its main explosive load?” (Box 6 of Figure 10.5) is answered by examining the design of the article. All substances in such larger boosting components, including those contained in explosive components of dual-protected fuzes in an article, must “Undertake and meet acceptance criteria of explosive substance tests, Type 7 (c) (ii) and 7 (e)” (box 7 of Figure 10.5). If a ‘+’ result is obtained for any such larger boosting component substance to either Type 7 (c) (ii) and 7 (e) tests, the answer to the question in Box 24 of Figure 10.3 is “No.” The article is not a candidate for Division 1.6.

(e) The question “Is the substance in a component of a fuze with two or more independent effective protective features (Box 8 of Figure 10.5) is answered by an understanding of the design and development of the article. If the answer is ‘no’, the article is not considered to have suitable intrinsic safety characteristics and the answer to the question in Box 24 of Figure 10.3 is ‘No’ the article is not a candidate for Division 1.6.”

Section 17 Test Series 7

17.1 Introduction

Amend the end of the first sentence to read “... any candidate for Division 1.6 should be assessed against each of the eleven types of test comprising the series.”

Amend the second sentence to read “The first six types of test (7(a) to 7(f)) are used to establish if a substance is an Extremely Insensitive Substance (EIS) and the remaining five types of test (7 (g), 7 (h), 7 (j), 7 (k) and 7 (l)) are used to determine if an article predominantly containing EIS(s) may be assigned to Division 1.6. The eleven test types are:”.

Add an additional test to the list:

“Type 7 (l): a test to determine the sensitivity of the article to shock directed at vulnerable components.”.

In Table 17.1 Test Methods for test series 7, replace "EIDS" with "EIS"

Add an additional test on articles:

"7 (l) 1.6 article fragment impact test 17.14.1".

Sub-section 17.3 Test conditions

Insert a new paragraph before existing 17.3.1:

“17.3.1 All energetic components must always be present in articles during Series 7 testing of types 7 (g) to 7 (l). Smaller explosive components containing substances not subjected to tests of type 7 (a) to 7 (f) shall be specifically targeted in tests 7(j) and 7(l) when it is assessed that they will cause the most severe reaction from the test article, to ensure the probability of accidental initiation or propagation of a Division 1.6 article remains negligible.”.

Amend 17.3.1 to become 17.3.2 and:

Amend the first sentence “... use as the explosive load...”; to read “... use as a main explosive load...”

Insert a new second sentence “A substance intended for use as a larger (dimensionally) boosting component in an article of Division 1.6, where the volumetric size limit relative

to the main explosive load it is boosting is met, should be tested in accordance with Test Series 3 and tests of type 7 (c) (ii) and 7 (e).”.

Amend 17.3.2 to become 17.3.3 and:

Amend the end of the first sentence to read “...until after main explosive load and certain boosting component substances have undergone appropriate tests of type 7 (a) to 7 (f) to determine whether they meet the substance requirements for Division 1.6.”.

Insert a new second sentence to read: “Guidance on the substance testing determination process is given under section 10.4.3.6.”.

Amend 17.3.3 to become 17.3.4 and:

In the first sentence replace “...and 7 (k) should be performed to determine if an article with an EIDS load may be assigned...” ; by “...7 (k) and 7 (l) should be performed to determine if an article with EIS main load(s) and appropriately insensitive boosting components may be assigned...”

Insert a new paragraph 17.3.5:

“17.3.5 Response levels referred to within the following individual Test Series 7 test prescriptions are provided at Appendix 8 (Response descriptors), to aid in the assessment of the results of tests of types 7 (g), 7 (h), 7 (j), 7 (k) and 7 (l) and should be reported to the competent authority to support assignment to Division 1.6.”.

Sub-section 17.10 Series 7 type 7 (g) test prescription

Amend 17.10.1 test name to read “Test 7 (g): 1.6 article (or component level) external fire test”.

Under 17.10.1.3 Procedure: the existing text is to be numbered 17.10.1.3.1. Add the following new paragraphs.

“17.10.1.3.2 Colour still photographs are taken to document the condition of the test item and the test equipment before and after the test. Energetic materials remains, fragmentation, blast, projections, cratering, witness screen damage, and thrust are documented as an indication of the article’s response level.

17.10.1.3.3 Colour video for the duration of each trial can be vital to assessment of response. In siting the camera(s), it is important to ensure that the field of view will not be obstructed by any of the test facilities or instrumentation and that the field of view will include all necessary information.

17.10.1.3.4 To classify complex articles containing multiple EIS main explosive loads, external fire testing at the individual main load component level should be conducted to fully characterise the article’s response level.”.

Amend the beginning of 17.10.1.4 to read “If there is a response level more severe than burning as outlined in Appendix 8, the result is ...”.

Sub-section 17.11 Series 7 type (h) test prescription

Amend 17.11.1 test name to read “Test 7 (h): 1.6 article or component level slow cook-off test”.

17.11.1.3.2 In first sentence replace “the unit” by “the test item”.

Amend the second sentence to read “Energetic materials remains, fragmentation, blast, projections, cratering, witness plate damage, and thrust are documented as an indication of the article’s response level.”.

Delete the third and fourth sentences.

Add additional sentences; “Colour video for the duration of each trial can be vital to assessment of response. In siting the camera(s), it is important to ensure that the field of view will not be obstructed by any of the test facilities or instrumentation and that the field of view will include all necessary information.”.

17.11.1.3.3 Add an additional sentence after the first to read: “To classify complex articles containing multiple EIS main explosive loads, slow cook-off testing at the individual main load component level should be conducted to fully characterise the article’s response level.”.

17.11.1.4 Amend to read “If there is a response level more severe than burning as outlined in Appendix 8, the result is noted as "+" and the items are not classified as Division 1.6 articles.”.

Sub-section 17.12 Series 7 type (j) test prescription

Amend 17.12.1 test name to read “Test 7 (h): 1.6 article or component level bullet impact test”.

17.12.1.2 Amend the first sentence to read “Three 12.7 mm guns are used to fire service 12.7 mm armour-piercing ammunition with a projectile mass of 0.046 kg.”.

Insert a second sentence to read “Standard propellant loads may require adjustment to achieve projectile velocities within tolerance.”.

Amend the existing second sentence to read “The guns are fired by remote control and protected...”

Amend the existing third sentence to read “The firing gun muzzles should be at a minimum range of at least 10 m from the test item to assure bullet stabilization prior to impact, and at a maximum range of 30 m from the test item depending upon the explosive weight of the test item.”.

In the existing fourth sentence replace “... restraining the item against...”; by “...restraining the test item against...”.

Delete the last sentence.

17.12.1.3 The existing text is to be numbered 17.12.1.3.1. Amend the beginning of the first sentence to read “The candidate Division 1.6 article is subjected to a three-round...”.

Amend the remainder of the paragraph to read “The test is repeated in three different orientations, striking the test item in the most vulnerable areas as assessed by the competent authority. These are areas for which an assessment of the explosive sensitivity (explosiveness and sensitiveness) combined with knowledge of the article design indicate the potential producing the most violent response level.”.

Add the following paragraphs:

“17.12.1.3.2 Colour still photographs are taken to document the condition of the test item and the test equipment before and after the test. Energetic materials remains, fragmentation, blast, projections, cratering, witness plate damage, and thrust are documented as an indication of the article’s response level.

17.12.1.3.3 Colour video for the duration of each trial can be vital to assessment of response. In siting the camera(s), it is important to ensure that the field of view will not be obstructed by any of the test facilities or instrumentation and that the field of view will include all necessary information.

17.12.1.3.4 To classify complex articles containing multiple EIS main explosive loads, bullet impact testing at the individual main load component level should be conducted to fully characterise the article's response level."

17.12.1.4 Amend to read "If there is a response level more severe than burning as outlined in Appendix 8, the result is noted as "+" and the items are not classified as Division 1.6 articles."

Sub-section 17.13 Series 7 type (k) test prescription

17.13.1.2 Amend to read "The experimental set-up is the same as for test 6 (b) (see 16.5.1.2), with one trial conducted confined, and another unconfined. The test should only be conducted on detonable candidate Division 1.6 articles; the test 7 (k) article stack test is waived for non-detonable candidates for Division 1.6 (evidence is available to demonstrate that the article cannot support a detonation). Where the article is designed to provide a detonation output, the article's own means of initiation or a stimulus of similar power shall be used to initiate the donor. If the detonable article is not designed to detonate, the donor shall be detonated using an initiation system selected to minimise the influence of its explosive effects on the acceptor article(s)."

17.13.1.3 In the second sentence, replace "...performed three unless..." by "performed twice unless".

Insert a new third sentence to read "Colour still photographs are taken to document the condition of the test item and the test equipment before and after the test."

Amend the existing third sentence to read "Energetic materials remains, fragmentation, blast, projections, cratering, witness plate damage, and thrust are documented and used to assess whether or not any acceptor has detonated (including partially)."

Add the following text at the end of this paragraph "Colour video for the duration of each trial can be vital to assessment of response. In siting the camera(s), it is important to ensure that the field of view will not be obstructed by any of the test facilities or instrumentation and that the field of view will include all necessary information. Comparing data from the two stack test trials to data from a single donor calibration shot, or to a calculated donor detonation pressure, can be useful in assessing the response level of acceptors."

17.13.1.4 Amend the second sentence to read "Acceptor article response levels assessed as no reaction, burning, deflagration, or explosion as outlined in Appendix 8 are considered as negative results and noted as "—"."

Sub-section 17.14 (new)

Add the following new sub-section:

"17.14 Series 7 type (l) test prescription

17.14.1 Test 7 (l): 1.6 article (or component level) fragment impact test

17.14.1.1 Introduction

This test is used to determine the response of an article in its transport configuration to a localised shock input representative of a fragment strike typical of that produced from a nearby detonating article.

17.14.1.2 Apparatus and materials

To reduce variability due to yaw, a gun system is recommended for firing a standard 18.6 gram steel fragment in the shape of a right-circular cylinder with a conical nose, as detailed in Figure 17.14.1, at a candidate Division 1.6 article. The distance between the firing device and the test item should ensure that the fragment is ballistically stable at impact. Barricades should protect the remote control gun system from the potential damaging effects of the test item's reaction.

17.14.1.3 Procedure

17.14.1.3.1 The test is repeated in two different orientations, striking the test item in the most vulnerable areas as assessed by the competent authority. These are areas for which an assessment of the explosive sensitivity (explosiveness and sensitiveness) combined with knowledge of the article design indicate the potential for producing the most violent response level. Typically, one test would be conducted targeting a non-EIS boosting component and the second test would target the centre of the main explosive load. The orientation of impact should generally be normal to the outer surface of the article. The fragment impact velocity should be 2530 ± 90 m/s.

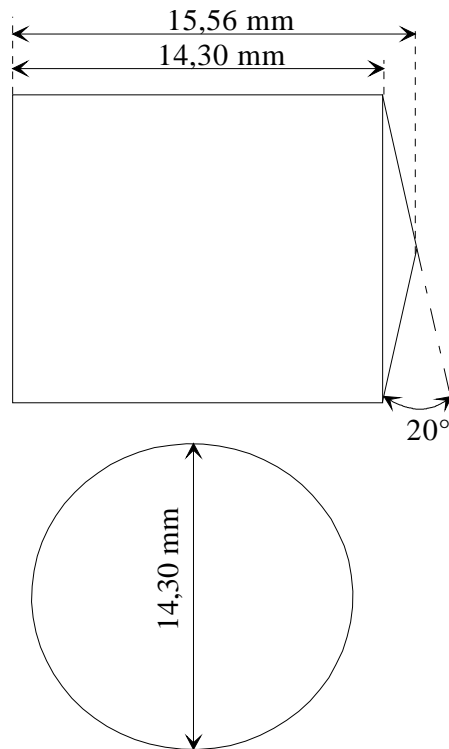
17.14.1.3.2 Colour still photographs are taken to document the condition of the test item and the test equipment before and after the test. Energetic materials remains, fragmentation, blast, projections, cratering, witness plate damage, and thrust are documented as an indication of the article's response level.

17.14.1.3.3 Colour video for the duration of each trial can be vital to assessment of response. In siting the camera(s), it is important to ensure that the field of view will not be obstructed by any of the test facilities or instrumentation and that the field of view will include all necessary information.

17.14.1.3.4 To classify complex articles containing multiple EIS main explosive loads, fragment impact testing at the individual main load component level should be conducted to fully characterise the article's response level.

17.14.1.4 Test criteria and method of assessing results

If there is a response level more severe than burning as outlined in Appendix 8, the result is noted as "+" and the items are not classified as Division 1.6 articles.



Notes:

Shape: a conical ended cylinder with the ratio $\frac{L \text{ (length)}}{D \text{ (diameter)}} > 1$ for stability;

Tolerances: ± 0.05 mm and $\pm 0^{\circ}30'$

Fragment Mass: 18.6 grams

Fragment Material: a mild carbon steel with a Brinell Hardness (HB) less than 270

Figure 17.14.1 Standard fragment for 1.6 article fragment impact test

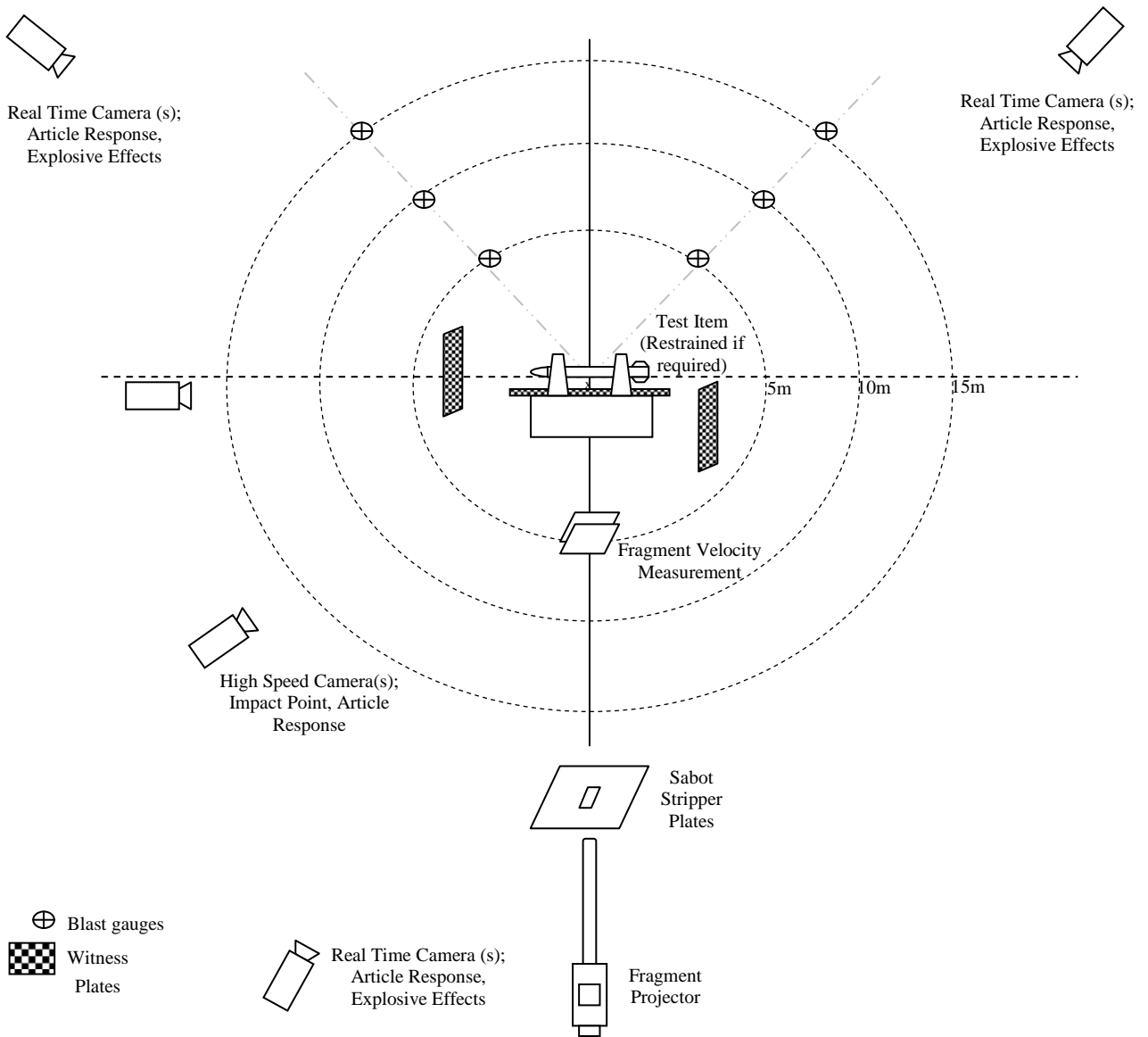


Figure 17.14.2 Typical setup for 1.6 article fragment impact test

Appendix 8 (new)

Add a new appendix 8 to read as follows:

"APPENDIX 8

RESPONSE DESCRIPTORS

These Response descriptors are designed to be used by Subject Matter Experts (SMEs) to determine the response type of articles. For example, articles vary greatly in size, type, packaging and energetic materials; these differences need to be taken into account. For a reaction to be judged a particular type, the Primary evidence (denoted P in the table below) for that type would need to be present. The entire (both primary and secondary) body of evidence must be weighed carefully and used in its entirety by experienced SMEs to assess the reaction. The secondary evidence provides other indicators that may be present.

Response level	Observed or measured effects				
	Energetic materials (EM)	Case	Blast	Fragment or EM projection	Other
Detonation	Prompt consumption of all EM once the reaction starts	(P) Rapid plastic deformation of the metal casing contacting the EM with extensive high shear rate fragmentation	(P) Shock wave with magnitude & timescale = to a calculated value or measured value from a calibration test	Perforation, fragmentation and/or plastic deformation of witness plates	Ground craters of a size corresponding to the amount of EM in the article
Partial detonation		(P) Rapid plastic deformation of some, but not all, of the metal casing contacting the EM with extensive high shear rate fragmentation	(P) Shock wave with magnitude & timescale < that of a calculated value or measured value from a calibration test Damage to neighboring structures	Perforation, plastic deformation and/or fragmentation of adjacent witness plates. Scattered burned or unburned EM.	Ground craters of a size corresponding to the amount of EM that detonated.
Explosion	(P) Rapid combustion of some or all of the EM once the article reaction starts	(P) Extensive fracture of metal casings with no evidence of high shear rate fragmentation resulting in larger and fewer fragments than observed from purposely detonated calibration tests ☐	Observation or measurement of a pressure wave throughout the test arena with peak magnitude << and significantly longer duration than of a measured value from a calibration test	Witness plate damage. Significant long distance scattering of burning or unburned EM.	Ground craters.
Deflagration	(P) Combustion of some or all of the EM	(P) Rupture of casings resulting in a few large pieces that might include enclosures or attachments. *☐	Some evidence of pressure in the test arena which may vary in time or space.	(P) At least one piece (casing, enclosure or attachment) travels beyond 15m with an energy level > 20J based on the distance/mass relationship of Figure 16.6.1.1. Significant scattered burning or unburned EM, generally beyond 15 m.	(P) There is no primary evidence of a more severe reaction and there is evidence of thrust capable of propelling the article beyond 15m. Longer reaction time than would be expected in an explosion reaction.

Response level	Observed or measured effects				
	Energetic materials (EM)	Case	Blast	Fragment or EM projection	Other
Burn	(P) Low pressure burn of some or all of the EM	(P) The casing may rupture resulting in a few large pieces that might include enclosures or attachments. * π	Some evidence of insignificant pressure in the test arena.	(P) No item (casing, enclosure, attachment or EM) travels beyond 15m with an energy level > 20J based on the distance/mass relationship detailed at Figure 16.6.1.1 . (P) A small amount of burning or unburned EM relative to the total amount in the article may be scattered, generally within 15m but no farther than 30m.	(P) No evidence of thrust capable of propelling the article beyond 15m. For a rocket motor a significantly longer reaction time than if initiated in its design mode.
No Reaction	(P) No reaction of the EM without a continued external stimulus. (P) Recovery of all or most of the unreacted EM with no indication of a sustained combustion.	(P) No fragmentation of the casing or packaging greater than that from a comparable inert test item. *	None	None	None

* Note: Mechanical threats will directly induce damage causing disruption of the article or even a pneumatic response resulting in parts, particularly closures, being projected. This evidence can be misinterpreted as being driven by the reaction of the energetic material contained in the article, which may result in a more severe response descriptor being assigned. Comparison of observed evidence with that of a corresponding inert article can be useful in helping to determine the article’s response.”

Consequential amendments

Wherever it appears, replace the acronym "EIDS" by "EIS" in Table 1.2, contents of Part 1, and sub-sections 17.4, 17.5, 17.6, 17.7, 17.8 and 17.9.

In the contents of Part 1:

(a) In the entries for "17.10.1 Test 7 (g), 17.11.1 Test 7 (h) and 17.12.1 Test (j)", insert "(or component level)" after "Article".

(b) Add the following:

"17.14 Series 7 type (l) test prescription;

17.14.1 Test 7 (l) * 1.6 Articles (or component level) fragment impact test (UN)".

In the General Table of Contents, add at the end "Appendix 8 RESPONSE DESCRIPTOR".

Annex II

Proposed amendments to the Recommendations on the Transport of Dangerous Goods; Model Regulations

Chapter 2.1

2.1.1.4 (f) Delete the word "detonating".

2.1.2.1.1 In the description for compatibility group N, delete the word "detonating".

Appendix B Glossary of Terms

Insert the following definitions:

“AUXILIARY EXPLOSIVE COMPONENT, isolated

An “isolated auxiliary explosive component” is a small device that explosively performs an operation related to the article’s functioning, other than its main explosive loads’ performance. Functioning of the component does not cause any reaction of the main explosive loads contained within the article.”.

“BURNING

An explosive effects level which is defined in Appendix 8, Response descriptors, of the Manual of Tests and Criteria.”.

“DEFLAGRATION

An explosive effects level which is defined in Appendix 8, Response descriptors, of the Manual of Tests and Criteria.”.

“DETONATION

An explosive effects level which is defined in Appendix 8, Response descriptors, of the Manual of Tests and Criteria.”.

“DETONATION, partial

An explosive effects level which is defined in Appendix 8, Response descriptors, of the Manual of Tests and Criteria.”.

“EXPLOSION

An explosive effects level which is defined in Appendix 8, Response descriptors, of the Manual of Tests and Criteria.”.

“FUZING, INDEPENDENT EFFECTIVE PROTECTIVE FEATURES within dual-protected fuze arrangements are considered equivalent to the means of initiation or ignition not being present in an article. Mechanical protective features may typically include an interrupter (rotor or slider) that houses an initiator or igniter and keeps the explosive train in an out-of-line position until unlocked by at least two proper environmental stimuli. Multiple electronically-controlled features are also commonly incorporated into fuzing to provide comparable protectiveness in in-line explosive trains. Evidence to demonstrate that such features are effective in not allowing accidental or premature initiation or ignition of their main explosive load, generally obtained during article developmental testing, and

documentation explaining the features' operational independence from each other, should be made available to competent authorities.”

In the definition for “ARTICLES, EXPLOSIVE, EXTREMELY INSENSITIVE (ARTICLES, EEI).”, delete the word "detonating" before "substance".

Replace the definition for "EXPLOSIVE, EXTREMELY INSENSITIVE DETONATING SUBSTANCE (EIDS)" by a definition for “EXPLOSIVE, EXTREMELY INSENSITIVE SUBSTANCE (EIS)" to read as follows: A substance which has demonstrated through tests that it is so insensitive that there is very little probability of accidental initiation”.
