

**Committee of Experts on the Transport of Dangerous Goods
and on the Globally Harmonized System of Classification
and Labelling of Chemicals**

25 November 2022

**Sub-Committee of Experts on the
Transport of Dangerous Goods**

Sixty-first session

Geneva, 28 November-6 December 2022
Item 10 (c) of the provisional agenda

**Issues relating to the Globally Harmonized System:
miscellaneous**

**Sub-Committee of Experts on the Globally Harmonized
System of Classification and Labelling of Chemicals**

Forty-third session

Geneva, 7-9 December 2022
Item 3 (i) of the provisional agenda

**Work on the Globally Harmonized System of
Classification and Labelling of Chemicals: other
matters**

**Comments on documents ST/SG/AC.10/C.3/2022/50 –
ST/SG/AC.10/C.4/2022/10 and informal documents INF.20
(TDG) – INF.12 (GHS): Classification of desensitized
explosives according to the GHS**

Transmitted by the expert from the United Kingdom

Introduction

1. The expert from the United Kingdom supports in principle the proposal in ST/SG/AC.10/C.3/2022/50 – ST/SG/AC.10/C.4/2022/10. The expert from the United Kingdom also notes the matters transmitted by the Australasian Explosives Industry Safety Group (AEISG) in informal document INF.20 (TDG) - INF.12 (GHS) and in particular the significance and the improved clarity introduced by the suggested changes associated with issues 3 and 4.

2. However, the United Kingdom believes that the proposal as presented in ST/SG/AC.10/C.3/2022/50 – ST/SG/AC.10/C.4/2022/10 could be further improved for clarity. The proposed improvements to Chapter 2.17 (paragraphs 2.17.2 and 2.17.4.1) and Section 51 of the Manual of Tests and Criteria are presented below for consideration by the sub-committees.

3. Further, if the AEISG proposed text for the note beneath 2.17.2.3 was not accepted, the expert from the United Kingdom proposes an alternative text as indicated in the proposal below.

Proposal

4. The text below takes account of the amendments proposed by Germany and the United States of America in document ST/SG/AC.10/C.3/2022/50 – ST/SG/AC.10/C.4/2022/10, as well as those proposed by AEISG in informal document INF.20 (TDG) – INF.12 (GHS).

5. The additional editorial improvements proposed by the expert from the United Kingdom to the proposals therein are listed below.

6. The consolidated text of Chapter 2.17 of the GHS and the relevant parts of section 51 of the Manual of Tests and Criteria, showing the proposed amendments is provided in the annex to this document.

Amendments to Chapter 2.17 of the GHS

7. Amend the text of Chapter 2.17 of the GHS, as proposed by Germany and the United States of America in document ST/SG/AC.10/C.3/2022/50 – ST/SG/AC.10/C.4/2022/10 and as amended by AEISG in informal document INF.20 (TDG) – INF.12 (GHS), as follows:

2.17.2.1 and 2.17.2.2 In the first sentence, replace “An explosive which is phlegmatized” with “A phlegmatized explosive”, and “considered in this class” with “considered for inclusion in this class”.

2.17.2.2. (b) in subparagraphs (i), (ii) and (iii), replace “according to” with “in accordance with”.

2.17.2.2. (c) Amend the beginning of the sentence to read: “it presents no mass explosion hazard and has a corrected burning rate...” and replace “according to” with “in accordance with”.

2.17.2.2 Amend the beginning of the note under paragraph 2.17.2.2 to read: “*Phlegmatized explosives which do not meet the criteria of...*”

2.17.2.3 In the first sentence replace “according to Appendix 10” with “in accordance with Appendix 10”.

[Amend the note under 2.17.2.3 as follows:

“NOTE: *Nitrocellulose mixtures containing no explosives other than nitrocellulose, do not need to meet the criterion of 2.17.2.2 (b) (ii).*”]

2.17.2.4 Replace “using the test “burning rate (external fire)” with “determined using the burning rate (external fire) test”.

2.17.4.1 Amend the second sentence starting with “For nitrocellulose...” to read “Where a mixture contains nitrocellulose...”.

[Amend footnote 2 to decision logic 2.17.1 as follows:

“² Test 3 (c) is not applicable to nitrocellulose mixtures containing no explosives other than nitrocellulose.”]

Amendments to Section 51 of the Manual of Tests and Criteria

8. Amend the text of section 51 of the Manual of Tests and Criteria, as proposed by Germany and the United States of America in document ST/SG/AC.10/C.3/2022/50 – ST/SG/AC.10/C.4/2022/10 and as amended by AEISG in informal document INF.20 (TDG) – INF.12 (GHS), as follows:

51.2.2 (b) and (c) Replace (three times) “according to” with “in accordance with”.

5.1.2.3 Replace “according to” with “in accordance with”.

51.3.1 In the first sentence, replace “should be performed to rule out the possibility of mass explosion.” with “should be performed to provide assurance that the likelihood of a mass explosion is very low.”.

In the second sentence replace “According to” with “In accordance with”.

In the last sentence replace “the initiation system causing” with “the same initiation system that caused”.

51.3.2 In (a), replace “before phlegmatized” with “before being phlegmatized” and “according to” with “in accordance with”.

In (c), replace “containing no other explosives, for which stability of the nitrocellulose is established according to Appendix 10.” with “containing no explosives other than nitrocellulose, for which the

stability of the nitrocellulose has been established in accordance with Appendix 10.”.

In (d), replace “according to” with “in accordance with”.

9. The Sub-Committees are invited to consider the proposed amendments listed in paragraphs 7 and 8 above when considering the proposals provided in ST/SG/AC.10/C.3/2022/50 – ST/SG/AC.10/C.4/2022/10 as well as those proposed by AEISG in informal document INF.20 (TDG) - INF.12 (GHS).

Annex

Part I: Amended version of Chapter 2.17 of the GHS

The consolidated text of Chapter 2.17 of the GHS, as amended by Germany and the United States of America in ST/SG/AC.10/C.3/2022/50 – ST/SG/AC.10/C.4/2022/10 and by AEISG in informal document INF.20 (TDG) - INF.12 (GHS) is shown below, with the additional editorial improvements proposed by the United Kingdom in this document, is shown below.

Only the amendments proposed in this document are **highlighted**. Inserted text is shown in **bold, underlined**, deleted text is ~~crossed out~~.

“CHAPTER 2.17

DESENSITIZED EXPLOSIVES

2.17.1 Definitions and general considerations

2.17.1.1 Desensitized explosives are substances and mixtures in the scope of Chapter 2.1 which are phlegmatized to suppress their explosive properties in such a manner that they meet the criteria as specified in 2.17.2 and thus may be exempted from the hazard class “Explosives” (Chapter 2.1; see paragraph 2.1.1.2.2).

2.17.1.2 The class of desensitized explosives comprises:

- (a) Solid desensitized explosives: explosive substances or mixtures which are wetted with water or alcohols or are diluted with other substances, to form a homogeneous solid mixture to suppress their explosive properties.

NOTE: This includes desensitization achieved by formation of hydrates of the substances.

- (b) Liquid desensitized explosives: explosive substances or mixtures which are dissolved or suspended in water or other liquid substances, to form a homogeneous liquid mixture to suppress their explosive properties.

2.17.2 Classification criteria

2.17.2.1 ~~An explosive which is phlegmatized~~ **A phlegmatized explosive** should be considered **for inclusion** in this class if, in that state, the exothermic decomposition energy is ≥ 300 J/g.

NOTE 1: The exothermic decomposition energy may be estimated using a suitable calorimetric technique (see section 20, sub-section 20.3.3.3 in Part II of the Manual of Tests and Criteria).

NOTE 2: Substances and mixtures with an exothermic decomposition energy < 300 J/g should be considered for other physical hazard classes (e.g. as flammable liquids or flammable solids).

2.17.2.2 ~~An explosive which is phlegmatized~~ **A phlegmatized explosive** should be considered **for inclusion** in this class if in that state, it meets the following criteria:

- (a) It is not intended to produce a practical explosive or pyrotechnic effect; and
- (b) It is phlegmatized to an extent that,
- (i) it has no mass explosion hazard **in accordance with** ~~according to~~ test series 6 (a) or 6 (b) of the *Manual of Tests and Criteria*; and
- (ii) it is not too sensitive or thermally unstable **in accordance with** ~~according to~~ test series 3 of the *Manual of Tests and Criteria*;

or that

- (iii) it is too insensitive for inclusion into in the class of explosives **in accordance with** ~~according to~~ test series 2 of the *Manual of Tests and Criteria*; and
- (c) it **presents has** no mass explosion hazard and **has** a corrected burning rate ≤ 1200 kg/min **in accordance with** ~~according to~~ the burning rate test of subsection 51.4 of the *Manual of Tests and Criteria*

NOTE: **Phlegmatized explosives** ~~Substances and mixtures~~ which do not meet the criteria of 2.17.2.2 should be classified as explosives (see Chapter 2.1).

2.17.2.3 In addition to the criteria in 2.17.2.1 and 2.17.2.2, nitrocellulose should be stable ~~according to~~ **in accordance with** Appendix 10 of the *Manual of Tests and Criteria* in order to be used in nitrocellulose mixtures considered for this class.

~~**NOTE:** Nitrocellulose mixtures containing no other explosives than nitrocellulose, do not need to meet the criterion of 2.17.2.2 (b) (ii).~~

["NOTE: Nitrocellulose mixtures containing no explosives other explosives than nitrocellulose, do not need to meet the criterion of 2.17.2.2 (b) (ii)."]

2.17.2.4 Desensitized explosives shall be classified as packaged for supply and use in one of the four categories of this class depending on the corrected burning rate (A_C) **determined using the burning rate (external fire) test using the test "burning rate test (external fire)"** described in Part V, sub-section 51.4 of the *Manual of Tests and Criteria*, according to Table 2.17.1:

Table 2.17.1: Criteria for desensitized explosives

Category	Criteria
1	Desensitized explosives with a corrected burning rate (A_C) equal to or greater than 300 kg/min but not more than 1200 kg/min
2	Desensitized explosives with a corrected burning rate (A_C) equal to or greater than 140 kg/min but less than 300 kg/min
3	Desensitized explosives with a corrected burning rate (A_C) equal to or greater than 60 kg/min but less than 140 kg/min
4	Desensitized explosives with a corrected burning rate (A_C) less than 60 kg/min

NOTE 1: Desensitized explosives should be prepared so that they remain homogeneous and do not separate during normal storage and handling, particularly if desensitized by wetting. The manufacturer/supplier should give information in the safety data sheet about the shelf-life and instructions on verifying desensitization. Under certain conditions the content of desensitizing agent (e.g. phlegmatizer, wetting agent or treatment) may decrease during supply and use, and thus, the hazard potential of desensitized explosive may increase. In addition, the safety data sheet should include advice on avoiding increased fire, blast or protection hazards when the substance or mixture is not sufficiently desensitized.

NOTE 2: Desensitized explosives may be treated differently for some regulatory purposes (e.g. transport). Classification of solid desensitized explosives for transport purposes is addressed in Chapter 2.4, section 2.4.2.4 of the UN Model Regulations. Classification of liquid desensitized explosives is addressed in Chapter 2.3, section 2.3.1.4 of the Model Regulations.

NOTE 3: Explosive properties of desensitized explosives should be determined by test series 2 of the *Manual of Tests and Criteria* and should be communicated in the safety data sheet. For testing of liquid desensitized explosives for transport purposes, refer to section 32, sub-section 32.3.2 of the *Manual of Tests and Criteria*. Testing of solid desensitized explosives for transport purposes is addressed in section 33, sub-section 33.2.3 of the *Manual of Tests and Criteria*.

NOTE 4: For the purposes of storage, supply and use, desensitized explosives do not fall additionally within the scope of chapters 2.1 (explosives), 2.6 (flammable liquids) and 2.7 (flammable solids).

2.17.3 Hazard communication

General and specific considerations concerning labelling requirements are provided in *Hazard communication: Labelling* (Chapter 1.4). Annex 1 contains summary tables about classification and labelling. Annex 3 contains examples of precautionary statements and pictograms which can be used where allowed by the competent authority.

Table 2.17.2: Label elements for desensitized explosives

	Category 1	Category 2	Category 3	Category 4
Symbol	Flame	Flame	Flame	Flame
Signal word	Danger	Danger	Warning	Warning
Hazard statement	Fire, blast or projection hazard; increased risk of explosion if desensitizing agent is reduced	Fire or projection hazard; increased risk of explosion if desensitizing agent is reduced	Fire or projection hazard; increased risk of explosion if desensitizing agent is reduced	Fire hazard; increased risk of explosion if desensitizing agent is reduced

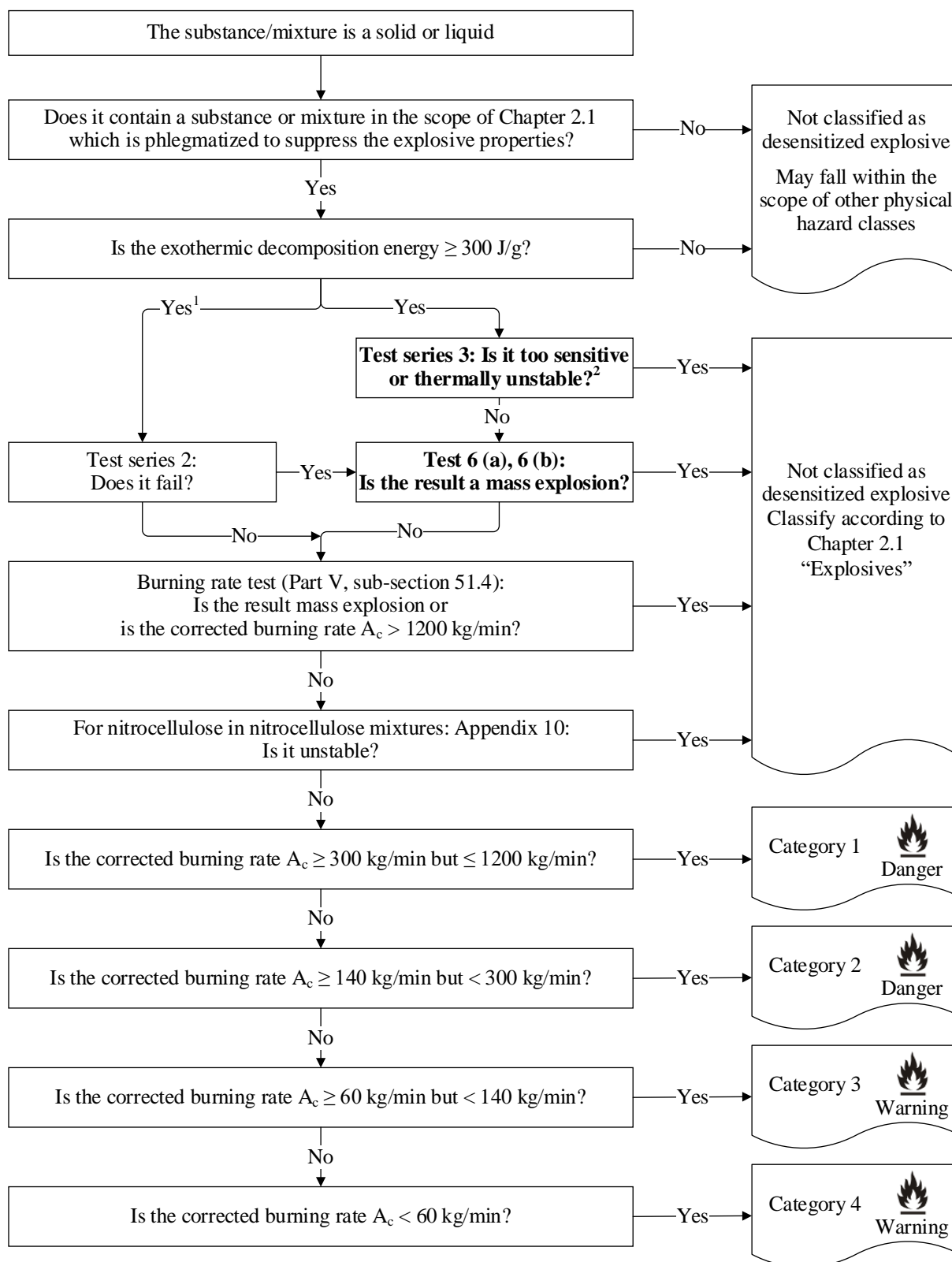
2.17.4 Decision logic and guidance

The decision logic and guidance which follow are not part of the harmonized classification system, but have been provided here as additional guidance. It is strongly recommended that the person responsible for classification studies the criteria before and during use of the decision logic.

2.17.4.1 Decision logic

To classify desensitized explosives, data for the sensitivity, thermal stability, explosive potential and the corrected burning rate should be determined as described in Part I and Part V of the *Manual of Tests and Criteria*. **Where a mixture contains Per** nitrocellulose, additional data for the stability as described in Appendix 10 of the *Manual of Tests and Criteria* are needed in order to be used in nitrocellulose mixtures considered for this class. Classification is according to decision logic 2.17.1.

Decision logic 2.17.1 for desensitized explosives



¹ Test series 2 is optional. The alternative route (via test 6 (a) and (b) and test series 3) may be taken directly without performing test series 2.

² Test 3 (c) is not applicable to nitrocellulose mixtures containing no **other** explosives **other** than nitrocellulose.

2.17.4.2 Guidance

2.17.4.2.1 The classification procedure for desensitized explosives does not apply if:

- (a) The substances or mixtures contain no explosives according to the criteria in Chapter 2.1; or
- (b) The exothermic decomposition energy is less than 300 J/g.

2.17.4.2.2 The exothermic decomposition energy should be determined using the explosive already desensitized (i.e.: the homogenous solid or liquids mixture formed by the explosive and the substance(s) used to suppress its explosive properties). The exothermic decomposition energy may be estimated using a suitable calorimetric technique (see section 20, sub-section 20.3.3.3 in Part II of the *Manual of Tests and Criteria*).”.

Part II: Amended section 51 of the Manual of Tests and Criteria (clean version)

The consolidated text of section 51 of the Manual of Tests and Criteria, as amended by Germany and the United States of America in ST/SG/AC.10/C.3/2022/50 – ST/SG/AC.10/C.4/2022/10 and by AEISG in informal document INF.20 (TDG) - INF.12 (GHS), is shown below with the additional editorial improvements proposed by the United Kingdom in this document.

Only the amendments proposed in this document are **highlighted**. Inserted text is shown in **bold, underlined**, deleted text is ~~crossed out~~.

“SECTION 51

CLASSIFICATION PROCEDURES, TEST METHODS AND CRITERIA RELATING TO THE HAZARD CLASS DESENSITIZED EXPLOSIVES

“51.1 Purpose

51.1.1 This section presents the United Nations scheme of the classification of liquid and solid desensitized explosives (see Chapter 2.17 of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)). The text should be used in conjunction with the classification principles of Chapter 2.17 of the GHS and the test series given in sections 12 and 13 and sub-sections 16.4 and 16.5 of this Manual.

For testing of liquid desensitized explosives for transport purposes, refer to section 32, sub-section 32.3.2 of this Manual and to Chapter 2.3, sub-section 2.3.1.4 of the Model Regulations. Testing of solid desensitized explosives for transport purposes is addressed in section 33, sub-section 33.3 of this Manual and in Chapter 2.4, sub-section 2.4.2.4 of the Model Regulations.

51.2 Scope

51.2.1 Desensitized explosives are substances and mixtures in the scope of Chapter 2.1 of the GHS which are phlegmatized to suppress their explosive properties in such a manner that they meet the criteria as specified in 2.17.2 of the GHS and thus may be exempted from the hazard class “Explosives” (Chapter 2.1 of GHS).

51.2.2 Desensitized explosives should be tested

- (a) for their exothermic decomposition energy¹, if attempting to exit the class of desensitized explosives;
- (b) **in accordance with** ~~according to~~ test 1 (a), test series 2 and 3 and tests 6 (a) and (b), respectively of this Manual and **in accordance with** ~~according to~~ the classification procedure in section 51.3, to preclude a mass explosion in the corrected burning rate test; and
- (c) **in accordance with** ~~according to~~ the corrected burning rate test;

51.2.3 Nitrocellulose should be tested **in accordance with** ~~according to~~ Appendix 10 of this Manual in order to be used in nitrocellulose mixtures.

51.3 Classification procedure

51.3.1 Before packaged substances or mixtures are subjected to the burning rate test, tests as specified below should be performed to **provide assurance that the likelihood of a mass explosion is very low** ~~rule out the possibility of mass explosion.~~ **In accordance with** ~~According to~~ test 6 (a), substances and mixtures should be tested

¹ The exothermic decomposition energy should be determined using the explosive already desensitized (i.e.: the homogenous solid or liquids mixture formed by the explosive and the substance(s) used to suppress its explosive properties). The exothermic decomposition energy may be estimated using a suitable calorimetric technique (see Section 20, sub-section 20.3.3.3 in Part II of this Manual).

first with a standard detonator (Appendix 1 of the Manual) and, if no explosion occurs, with an igniter just sufficient (but not more than 30 g of black powder) to ensure ignition of the substance or mixture in the packaging. If there is a positive result in test 6 (a), test 6 (b) should be performed with the **same** initiation system **that caused causing** the positive result in test 6 (a).

51.3.2 It is not always necessary to conduct tests of all types:

- (a) Test series 3 may be waived if the explosive itself (i.e. before **being** phlegmatized) is not too sensitive or thermally unstable **in accordance with according to** test series 3.
- (b) Test series 3 and tests 6 (a) and (b) may be waived if test series 2 has been passed.
- (c) Test 3 (c) is not applicable to nitrocellulose mixtures containing no **other** explosives **other than nitrocellulose**, for which **the** stability of the nitrocellulose is established **in accordance with according to** Appendix 10.
- (d) Tests 6 (a) and 6 (b) may be modified or waived **in accordance with according to** section 51.3.3.
- (e) Test 6 (b) may be waived if in each type 6 (a) test:
 - (i) The exterior of the package is undamaged by internal detonation and/or ignition; or
 - (ii) 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 6 (b).

51.3.3 If a substance or mixture gives a negative result (no propagation of detonation) in test 1 (a), test 6 (a) with a detonator may be waived¹. If a substance or mixture gives a negative result (no or slow deflagration) in test 2 (c), test 6 (a) with an igniter may be waived.

51.3.4 The test for determination of the burning rate by large-scale test need not be performed if, in test 6 (b), there is practically instantaneous explosion of virtually the total contents of the stack. In such cases the product is assigned to the class of explosives (see Chapter 2.1 of the GHS).”

[The remainder of the text of current section 51 remains unchanged]

¹ If test 1 (a) is not carried out, test 6 (a) cannot be waived.