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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**

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

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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**

Amendments to the classification of desensitized explosives according to the GHS

**Transmitted by the experts from Germany, the United States of
America and the United Kingdom**

This informal document contains the clean version of the text of Chapter 2.17 of the GHS and Section 51 of the Manual of Tests and Criteria as contained in UN-SCEGHS-43-INF05e_UN-SCETDG-61-INF04e and amended (provisionally) in the Sub-Committee TDG based on parts of Inf. UN-SCEGHS-43-INF12e-UN-SCETDG-61-INF20e and UN-SCEGHS-43-INF18e_UN-SCETDG-61-INF42e. These amendments are shown in track changes together with commenting fields informing about the origin of the respective changes.

Amended version of Chapter 2.17 of the GHS (clean version)

“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 ~~A phlegmatized explosive. An explosive which is phlegmatized~~ 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 ~~A phlegmatized explosive. An explosive which is phlegmatized~~ 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 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 sub-section 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).

Commented [CW1]: All amendments in sections 2.17.2.1 to 2.17.2.4 are based on UK document UN-SCEGHS-43-INF18e_UN-SCETDG-61-INF42e, paragraph 7.

2.17.2.3 In addition to the criteria in 2.17.2.1 and 2.17.2.2, nitrocellulose should be stable ~~in accordance with~~ ~~according to~~ 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 other 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.

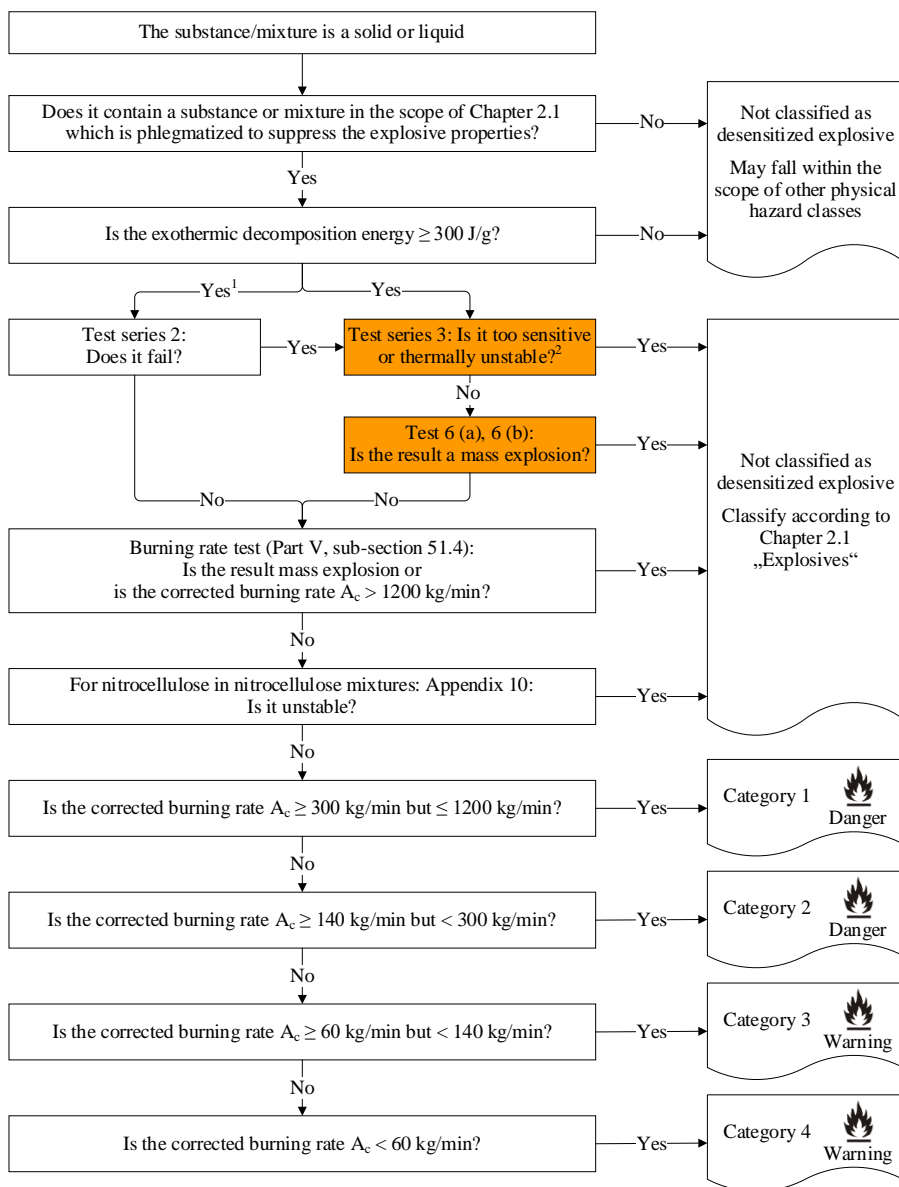
2.17.4.1 Decision logic

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 nitrocellulose ~~For nitrocellulose~~, additional data for the stability of the nitrocellulose 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.

Commented [CW2]: Amendment is based on UK document UN-SCEGHS-43-INF18e_UN-SCETDG-61-INF42e, paragraph 7.

Commented [CW3]: This was not contained in the UK proposal. But it is needed due to the amendment by the UK. We have to make clear that Appendix 10 is for the nitrocellulose and not the mixture (that was a request by Ed de Jong in the last meeting, see the conclusion in paragraph 18 of the report of the WGE as endorsed in paragraph 100 of the report of the last TDG-Meeting and paragraph 37 of the report of the last GHS-meeting).

Decision logic 2.17.1 for desensitized explosives



Commented [CW4]: Based on the proposal by AEISG-document UN-SCEGHS-43-INF12e-UN-SCETDG-61-INF20e: The order of the boxes marked in orange has been reversed. However, other than in the proposal by AEISG, the box with test series 2 must be positioned such that it does not bypass the box with test series 3 in case test series 2 is failed.

Commented [CW5]: Amendment in footnote 2 is based on UK document UN-SCEGHS-43-INF18e_UN-SCETDG-61-INF42e, paragraph 7.

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 series 3 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*).”.

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

“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 energy³, 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 ;
- (c) ~~in accordance with~~ ~~according to~~ the corrected burning rate test; ~~and~~
- (d) ~~and~~ 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 rule out the possibility of mass explosion. ~~In accordance with~~ ~~According to~~ test 6 (a), substances and mixtures should be tested 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).

Commented [CW6]: Amendments in section 51.2 and 51.3 are based on UK document UN-SCEGHS-43-INF18e_UN-SCETDG-61-INF42e, paragraph 8 – except for the 2nd amendment in 51.2.2 (c), see below comment.

Commented [CW7]: This does not result from the AEISG or UK paper but would be more in line with the usual style of connecting the elements of an enumeration (i.e. have the “and” or the “or” at the end).

³ 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).

- 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 series 3 is not applicable to nitrocellulose mixtures containing no other explosives other than nitrocellulose, for which the stability of the nitrocellulose has been~~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 waived⁴. 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]

⁴ If test 1 (a) is not carried out, test 6 (a) cannot be waived.