
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 Globally Harmonized System of Classification and Labelling of Chemicals

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Item 2 (i) of the provisional agenda

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

Amendments to GHS Chapter 2.17 “Desensitized explosives”

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

Background

1. In the previous meetings of the sub-committees, the expert from Germany proposed amendments to Chapter 2.17 “Desensitized explosives” of the GHS (including some consequential amendments to the Manual of Tests and Criteria), see ST/SG/AC.10/C.3/2021/37-ST/SG/AC.10/C.4/2021/7.
2. Some experts picked up on the invitation to provide comments after the meeting, amongst them the expert from the United States of America. The expert from Germany is grateful for the comments and together with the expert from the United States of America aim at their best consideration in order to facilitate the further process and discussions.
3. The comments received resulted in an extensive e-mail-exchange. It turned out that some more general aspects of Chapter 2.17 of the GHS were interpreted differently by the experts. In order to find a common understanding on these points, a small web-meeting was held with the involved experts followed by some further e-mail exchange.
4. Additionally, the differences in understanding of Chapter 2.17 result also (at least partly) in diverging views as regards the necessity and rationale of the original proposal as presented in the previous session in ST/SG/AC.10/C.3/2021/37-ST/SG/AC.10/C.4/2021/7. Therefore, we deem clarification of these issues helpful in two ways:
 - (a) A common understanding and accordingly improved wording promoting this common understanding would be in the interest of a globally harmonized interpretation.
 - (b) It is a prerequisite to find a common understanding also as regards the original proposal of the previous session.

* based on paragraphs 28 to 31 of the report of the GHS Sub-Committee on its forty-first session (ST/SG/AC.10/C.4/82) and paragraph 81 of the report of the TDG Sub-Committee on its fifty-ninth session (see ST/SG/AC.10/C.3/118).

5. The issues that were discussed are presented in the following sections. The Annex to this document shows an amended section 2.17.1 and 2.17.2 taking into account the expert's feedback as understood by the experts from Germany and the United States of America as good as possible.

Issues

I. Prerequisite for acceptance into Chapter 2.17 of the GHS

6. One issue was whether only explosives in the sense of Chapter 2.1 of the GHS that are phlegmatized are candidates for classification in Chapter 2.17 or whether also other substances/mixtures having explosives properties that are phlegmatized are candidates for Chapter 2.17. Based on the web-meeting and feedback provided by some of the experts afterwards, the experts seemed to agree that Chapter 2.17 should only apply to explosives in the scope of Chapter 2.1 that are phlegmatized.

7. Therefore, it should be considered to state that more unambiguously. The current definition in section 2.17.1.1 of the GHS refers to "solid or liquid explosive substances or mixtures". This wording is probably chosen in order to exclude articles (which are not supposed to be covered by Chapter 2.17). However, this wording might cause confusion because it does not correspond exactly to the title of Chapter 2.1.

8. A possible solution might be to refer instead to "substances and mixtures in the scope of Chapter 2.1" (or similar).

II. Consideration of test series 2

9. As already discussed in the working document submitted to the last meeting (for the rationale and justification see ST/SG/AC.10/C.3/2021/37-ST/SG/AC.10/C.4/2021/7), an explosive must be phlegmatized beyond a certain point (sufficiently) in order to be exempted from Chapter 2.1 "Explosives" of the GHS. The criteria are given in section 2.17.2.1 (a) and (b) in conjunction with Note 1 in that section.*

10. The experts found that their understanding/interpretation was different as to when a phlegmatized explosive is insufficiently desensitized for acceptance into Chapter 2.17 (and instead referred back to Chapter 2.1):

- (a) Some understood that only the criteria mentioned in 2.17.2.1 (a) and (b) of the GHS would actually result in such a reference back to Chapter 2.1.
- (b) Some others understood that a phlegmatized explosive should – in that state – no longer fulfill the criteria for classification as an explosive (in the sense of Chapter 2.1) and only then might be classified as desensitized explosive (which would include passing test series 2).

11. Consequently, there was some confusion in how far the results of test series 2 of the Manual of Tests and Criteria should play a role when deciding if classification as "desensitized explosive" is possible.

12. The latter difference in understanding was also based on a reference to test series 2 in section 51.2.1 of the Manual. Formally, this reference to test series 2 is not a criterion in the sense of Chapter 2.17 of the GHS because:

- (a) Chapter 2.17 does not reference that section of the Manual at all, and

* Some explosives are phlegmatized but remain in the hazard class of explosives, for example because they (still) have a mass explosion hazard (one prominent example is PETN wetted with water, see UN No. 0150 in the Model Regulations).

- (b) the reference to test series 2 is not contained in the criteria list of points (a) and (b) in that section of the Manual.

13. In the web-meeting there seemed to be some agreement that test series 2 should play a role for Chapter 2.17 as well. This was also confirmed explicitly after the meeting by some of the experts. Based on the e-mails after the meeting, the common understanding seemed to be that an option should be introduced: If a phlegmatized explosive passes test series 2 in that state (i.e. too insensitive for inclusion into in the class of explosives), there is no need to show that the phlegmatized explosive poses no mass explosion hazard acc. to test 6 (a) or 6 (b) because this is “inherently” covered/shown by passing test series 2.

III. Original concern as presented in ST/SG/AC.10/C.3/2021/37-ST/SG/AC.10/C.4/2021/7

14. The proposal according to working document ST/SG/AC.10/C.3/2021/37-ST/SG/AC.10/C.4/2021/7 of the previous session aimed at adding a further condition that phlegmatized explosives have to fulfill in order to be accepted for classification as desensitized explosives according to Chapter 2.17. For details see specifically paragraphs 9 to 17 of ST/SG/AC.10/C.3/2021/37-ST/SG/AC.10/C.4/2021/7.

15. Explosives that are too sensitive or thermally unstable according to test series 3 (as mentioned in footnote 1 in section 2.17.1.1) should at least be diluted in such a way that they are no longer too sensitive or unstable according to test series 3 in order to classify them as desensitized explosives in the sense of Chapter 2.17. However, currently that goes without stating it explicitly. This requirement (naturally) can be waived if the explosive itself is not too sensitive or thermally unstable according to test series 3. It is also not necessary if the phlegmatized explosive, in that state, has passed test series 2 (i.e. if it is too insensitive for inclusion into Chapter 2.1).

16. The current footnote 1 in 2.17.1.1 is then no longer necessary because it would be ensured that desensitized explosives are not too sensitive or thermally unstable in the sense of test series 3. Additionally, the according information for the SDS is covered by Section 9 in Annex 4 to the GHS.

17. In addition, the nitrocellulose in nitrocellulose mixtures should be stable in the sense of Appendix 10 of the Manual of Tests and Criteria in order to classify them as desensitized explosives in the sense of Chapter 2.17 of the GHS.

Discussion points and request to the Sub-Committee

18. The Annex to this document shows sections 2.17.1 and 2.17.2 of the GHS with the following amendments:

- (a) Amended wording to clearly indicate that only explosives in the sense of Chapter 2.1 that are phlegmatized are candidates for Chapter 2.17, i.e. that Chapter 2.17 is a derivative of Chapter 2.1 (see section 1, paragraphs 6 to 8 above);
- (b) Inclusion of test series 2 as an option to show that an explosive is phlegmatized sufficiently to be accepted into Chapter 2.17 (see section 2, paragraphs 9 to 13 above);
- (c) Inclusion of conditions regarding sensitivity and thermal stability in order to be accepted into Chapter 2.17 (see section 3, paragraphs 14 to 17 above).

19. The Sub-Committee is invited to discuss the outlined proposal. During the previous meeting of the GHS Sub-Committee, a number of experts asked that this issue should also be discussed by the Working Group on Explosives. We will share with the TDG Sub-Committee as we progress the issue.

20. Based on the feedback received, the experts from Germany and the United States of America would follow-up as appropriate and prepare a working document for the next session of the sub-committees.

Annex

Amended sections 2.17.1 to 2.17.2 of Chapter 2.17 of the GHS

(Explanatory remarks are in brackets. (Amendments compared to the current text are shown as follows: additions are underlined, deletions in strikethrough.)

2.17.1 Definitions and general considerations

2.17.1.1 Desensitized explosives are substances and mixtures in the scope of Chapter 2.1 ~~solid or liquid explosive substances or mixtures~~ which are phlegmatized to suppress their explosive properties in such a manner that they meet the criteria as specified in section 2.17.2 ~~and thus do not mass explode and do not burn too rapidly and therefore~~ 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

(As opposed to the current text (which works with “unless”) it is suggested to word the text “positively”, i.e. list the conditions that have to be met.)

2.17.2.1 An explosive which is phlegmatized should be considered 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 should be considered 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 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 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 according to test series 2 of the Manual of Tests and Criteria; and

- (c) it has no mass explosion hazard and a corrected burning rate ≤ 1200 kg/min according to the burning rate test of sub-section 51.4 of the Manual of Tests and Criteria.

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

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

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

2.17.2.1 Any explosive while in a desensitized state shall be considered in this class unless, in that state:

- (a) It is intended to produce a practical explosive or pyrotechnic effect;
(b) It has a mass explosion hazard according to test series 6 (a) or 6 (b) or the corrected burning rate according to the burning rate test described in part V, subsection 51.4 of the Manual of Tests and Criteria is greater than 1200 kg/min; or
(c) The exothermic decomposition energy is less than 300 J/g.

NOTE 1: Substances or mixtures which meet the criterion (a) or (b) in their desensitized state shall be classified as explosives (see Chapter 2.1). Substances or mixtures which meet the criterion (c) may fall within the scope of other physical hazard classes.

NOTE 2: 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)."

(No amendments are foreseen in the further text of the current Section 2.17.2; only the numbering of the sections has to be adapted. Consequential amendments would be needed in the remainder of Chapter 2.17, and in Section 51 of the Manual of Tests and Criteria.)
