

**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

29 June 2018

Fifty-third session

Geneva, 25 June – 4 July 2018

Item 2, 10(d) and 10(e) of the provisional agenda

**Explosives and related matters, Use of the Manual of Tests and
Criteria in the context of the GHS:
joint work with the GHS Sub-Committee**

Report of the Working Group on Explosives

Transmitted by the Chairman of the Working Group

Introduction

1. The working group met from 25 – 29 June 2018 in a parallel session to the plenary meeting of the Sub-Committee of Experts on the Transport of Dangerous Goods. This meeting of the working group was well attended with 34 experts in attendance from Belgium, Canada, Finland, France, Germany, Japan, Netherlands, Spain, Sweden, United Kingdom, United States of America, Australian Explosives Industry and Safety Group (AEISG), Council on Safe Transportation of Hazardous Articles (COSTHA), European Association of Automotive Suppliers (CLEPA), European Chemical Industry Council (CEFIC), Institute of Makers of Explosives (IME), and Sporting Arms and Ammunition Manufacturers' Institute (SAAMI). Annex 1 of this report provides a list of participants. The group was tasked to discuss technical matters related to official papers and to discuss informal papers as time allowed. Mr. Ed de Jong (Netherlands) served as chair of the working group and Mr. David Boston (IME), as secretary.

2. The working group met from Monday through Thursday to consider the papers assigned to it by the Sub-Committee and on Friday morning to review and approve this report. The latter half of Thursday was spent informally discussing other matters of interest while the secretary prepared this report. Those informal discussions are not reported herein. Throughout this report, the following abbreviations may be used:

- EWG – Working Group on Explosives
- GHS – Globally Harmonized System
- MTC – Manual of Tests and Criteria
- TDG – Transportation of Dangerous Goods

3. The working group was tasked by the Sub-Committee to review the following documents:

Document	Title	Paragraph
<u>Agenda Item 2(b)</u>	<u>Review of tests in parts I, II and III of the Manual of Tests and Criteria</u>	
<i>UN/SCETDG/53/INF.22 (IME)</i>	<i>Recommendations for Test Series 8</i>	4

Document	Title	Paragraph
<i>UN/SCETDG/53/INF.39 (Sweden)</i>	<i>Inconsequent use of term “a practical explosive or pyrotechnic effect” in the Model Regulations and the Manual of Tests and Criteria</i>	5
<u>Agenda Item 2(c)</u>	<u>Electronic detonators</u>	
<i>ST/SG/AC.10/C.3/2018/58 (AEISG)</i>	<i>New UN entries for electronic detonators</i>	6
<u>Agenda Item 2(e)</u>	<u>Stability tests for industrial nitrocellulose</u>	
<i>ST/SG/AC.10/C.3/2018/9 (CEFIC/WONIPA)</i>	<i>Stability tests for nitrocellulose mixtures</i>	7
<i>UN/SCETDG/53/INF.7 – UN/SCEGHS/35/INF.6 (CEFIC)</i>	<i>Classification of desensitized explosives for the purposes of supply and use according to GHS chapter 2.17: Test results on industrial nitrocellulose</i>	8
<u>Agenda Item 2(i)</u>	<u>Review of Chapter 2.1 of the GHS</u>	
<i>No documents submitted</i>	<i>See document ST/SG/AC.10/C.3/2018/33 under agenda item 10 (e)</i>	18
<u>Agenda Item 2(j)</u>	<u>Miscellaneous</u>	
<i>ST/SG/AC.10/C.3/2018/6 (Germany)</i>	<i>Update of the reference to ISO 12097 in section 2.1.3.6.4 of the Model Regulations</i>	9
<i>ST/SG/AC.10/C.3/2018/48(USA)</i>	<i>Extension of the default fireworks classification table for classification of Articles, pyrotechnic UN0431</i>	10
<i>ST/SG/AC.10/C.3/2018/52 (SAAMI)</i>	<i>Determination of electrostatic sensitiveness discharge (ESD) using the Allegany Ballistics Laboratory (ABL) ESD machine</i>	11
<i>ST/SG/AC.10/C.3/2018/53(SAAMI)</i>	<i>A method for transporting controlled shipments of explosives that are not yet classified (≤ 25 grams)</i>	12
<i>UN/SCETDG/53/INF.43 (SAAMI)</i>	<i>A method for transporting controlled shipments of explosives that are not yet classified (≤ 25 grams)</i>	12
<i>UN/SCETDG/53/INF.17 (CEFIC)</i>	<i>Transport of energetic samples for further testing</i>	13
<i>UN/SCETDG/53/INF.21 (IME)</i>	<i>Comments on UN0222 Ammonium Nitrate</i>	14
<i>UN/SCETDG/53/INF.24 (UK)</i>	<i>Additional LP101 entries into the Dangerous Goods List</i>	15
<i>UN/SCETDG/53/INF.29 (Spain)</i>	<i>Proper shipping names for explosives (UN 0237 and UN 0288)</i>	16
<u>Agenda Item 10(d)</u>	<u>Use of the Manual of Tests and Criteria in the context of the GHS</u>	
<i>ST/SG/AC.10/C.3/2018/1 – ST/SG/AC.10/C.4/2018/1 (EWG Chair)</i>	<i>Use of the Manual of Tests and Criteria in the context of GHS</i>	17
<i>UN/SCETDG/53/INF.3 – UN/SCEGHS/35/INF.3 (EWG Chair)</i>	<i>Use of the Manual of Tests and Criteria in the context of GHS (Part I, Sections 1 and 10)</i>	17
<i>UN/SCETDG/53/INF.4 – UN/SCEGHS/35/INF.4 (EWG Chair)</i>	<i>Use of the Manual of Tests and Criteria in the context of GHS (Part II, Sections 20 - 28)</i>	17
<i>UN/SCETDG/53/INF.5 – UN/SCEGHS/35/INF.5 (EWG Chair)</i>	<i>Use of the Manual of Tests and Criteria in the context of GHS (Part III, Sections 30 - 38)</i>	17
<u>Agenda Item 10(e)</u>	<u>Joint work with the GHS Sub-Committee</u>	
<i>ST/SG/AC.10/C.3/2018/33 – ST/SG/AC.10/C.4/2018/7 (Sweden)</i>	<i>Outline for a potential amended classification system for explosives in the GHS</i>	18

Document	Title	Paragraph
UN/SCEGHS/53/INF.9 – UN/SCETDG/35/INF.10 (Sweden)	A sketch of a revised Chapter 2.1 for the GHS (Explosives)	18
UN/SCEGHS/53/INF.33 – UN/SCETDG/35/INF.15 (USA, IME, SAAMI)	Technical explosives classification and criteria support for an amended classification system for explosives in the GHS	18
UN/SCEGHS/53/INF.46 – UN/SCETDG/35/INF.16 (Sweden)	Status report on the work of the informal correspondence group on the revision of GHS Chapter 2.1 (Explosives)	18

Agenda Item 2(b) – Review of tests in parts I, II and III of the Manual of Tests and Criteria

4. **Subject.** Improvement of the 8(c) test for UN3375 ANE candidates

Documents: No documents submitted

Informal documents: UN/SCETDG/53/INF.22 (IME)

Discussion: Some experts were not supportive of IME’s proposal; however, there was support from USA, Canada, AEISG, Sweden as a solution while waiting for an alternative test to 8(c). The EWG chair noted, and the working group concurred, that a consensus is unlikely and suggested that IME go ahead and prepare a formal proposal for the next session so that the issue can be put to a vote. Canada offered to work with IME in preparing that formal proposal. AEISG suggested that rather than emphasizing passing a test, the formal proposal should focus on the improved safety by including a test that would encourage development of emulsions with higher MBP.

IME asked the working group if there would be support for modifying the Koenen Test. There was no indication modification would be supported at present.

Conclusion: Taking account of the comments and advice from the working group, IME, with assistance from Canada, will submit a formal proposal for the 54th TDG session.

5. **Subject.** Use of term “a practical explosive or pyrotechnic effect”

Documents: No documents submitted

Informal documents: UN/SCETDG/53/INF.39 (Sweden)

Discussion: In INF.39, Sweden contended that the phrase “... a practical explosive or pyrotechnic effect ...” is confusing and not helpful to industry or regulators. Possible solutions discussed by the working group included deletion of “practical” from the phrase and/or defining “explosive effect” and “pyrotechnic effect”. Regarding the former, time needs to be allowed to examine whether there would be unintended, harmful, consequential effects. Regarding the latter, some in the working group believed that the definitions for “explosive substance” and “pyrotechnic substance” found in Appendix C of the Model Regulations are sufficient for that purpose. The EWG also considered the suggestion that the third part of the definition of “Class 1” found in para. 2.1.1.1(c) of the Model Regulations should be deleted and, although no one could identify a single example meeting that description, opinions of the group were divided.

Sweden also contended that it is incorrect to relate the phrase “... a practical explosive or pyrotechnic effect ...” to 2.1.1.1 (c) in the second sentence in 2.1.3.3.1 of the Model Regulation “If

the substance is manufactured with a view to producing a practical explosive or pyrotechnic effect (2.1.1.1 (c)), it is unnecessary to conduct Test Series 1 and 2". Therefore, Sweden suggested to remove that reference to 2.1.1.1 (c), which many experts support.

Conclusion: Sweden will consider the comments from the working group and decide what action it may pursue in the future.

Agenda Item 2(c) – Electronic detonators

6. **Subject.** New entries for electronic detonators.

Documents: ST/SG/AC.10/C.3/2018/58 (AEISG)

Informal documents: No documents submitted

Discussion: The working group discussed at length the meaning of “programmable” in the proposed description. Some of the working group favored shifting the focus away from the meaning of this term in favor of concentrating more on the fact that these detonators are unique because of their advanced initiation requirements and that conventional initiation methods cannot be used to initiate these types of detonators. Considering input from USA, Germany, and AEISG, the working group developed a more concise definition of the term “DETONATORS, ELECTRONIC programmable for blasting”.

The working group also considered that the new entries should be added to the Indicative List of High Consequence Dangerous Goods and determined that the proposed 1.1B entry was already covered and that the proposed 1.4B and 1.4S entries should be added.

Conclusion: The working group unanimously supported the proposal from AEISG, as amended by the working group, and recommends approval by the Sub-Committee. See Amendments 1, 2, 3, and 4 in Annex 2.

Agenda Item 2(e) – Stability tests for industrial nitrocellulose

7. **Subject.** Stability Tests.

Documents: ST/SG/AC.10/C.3/2018/9 (CEFIC, WONIPA)

Informal documents: No documents submitted

Discussion: Recalling the decisions taken at the 51st and 52nd Sessions, the working group reviewed the formal proposals for the addition of tests to evaluate the stability of nitrocelluloses. To make some improvements and ensure completeness, some amendments were made regarding sample drying, wording of proposed special provisions, formatting, and provision of example results.

Conclusion: The working group unanimously supported the proposal from CEFIC as shown in paras. 8 (as amended by the working group), 9 and 10 (as amended by the working group) of 2018/9 and recommends approval by the Sub-Committee. See Amendment 5 in Annex 2 and Amendments 1, 2, 3, and 4 in Annex 3.

8. **Subject.** Classification of desensitized explosives for supply and use under the GHS.

Documents: No documents submitted

Informal documents: UN/SCETDG/53/INF.7 – UN/SCEGHS/35/INF.6 (CEFIC)

Discussion: The working group considered additional test data developed by WONIPA, and supported the proposal to add a new Appendix 11 to the MTC providing a compilation of classification results on industrial nitrocellulose for the purposes of supply and use according to GHS chapter 2.17, which can be used for the classification of Industrial NC products. During this review, the working group made minor amendments to the proposal.

Conclusion: The working group unanimously supported the proposal from CEFIC as shown in the Annex to 53/INF.7 (35/INF.6) as amended by the working group and recommends approval by the Sub-Committee. See Amendments 5 and 6 in Annex 3.

Agenda Item 2(j) – Miscellaneous

9. **Subject.** Update of the reference to ISO 12097 in section 2.1.3.6.4 of the Model Regulations.

Documents: ST/SG/AC.10/C.3/2018/6 (Germany)

Informal documents: No documents submitted

Discussion: This proposal was previously discussed and endorsed by the working group during the 52nd Session¹. As the proposal was originally introduced in an informal paper², Germany agreed to submit a formal proposal for consideration during the 53rd Session. The USA suggested alternative wording of the proposed amendment to the note in section 2.1.3.6.4(b) because the heating rate applies to the ISO standard, but this is not the only acceptable fire test method. Germany and USA worked to prepare slight revisions to the proposed note.

Conclusion: The working group unanimously supported the proposal from Germany as amended by the working group and recommends approval by the Sub-Committee. See Amendment 6 in Annex 2.

10. **Subject.** Classification of Articles, pyrotechnic UN0431 using the default fireworks classification table.

Documents: ST/SG/AC.10/C.3/2018/48 (USA)

Informal documents: No documents submitted

Discussion: Recognizing that a related proposal from the last session was generally supported by the working group, but considered too broad by some experts, USA proposes amending para. 2.1.3.5.2 and the definition of “Articles, pyrotechnic for technical purposes” in Appendix B to clarify that fireworks meeting the 1.4G criteria in the default fireworks classification table in 2.1.3.5.5 may also be assigned to UN 0431 if they are for theatrical effects. Some of the experts supported the USA proposal but others didn’t agree that extension of the default fireworks table to UN 0431 was the right way to go about it.

Conclusion: Taking account of the comments of the working group, the USA will conduct further review and determine whether to submit an amended proposal at a future session.

¹ UN/SCETDG/52/INF.53, para. 9

² UN/SCETDG/52/INF.10

11. **Subject.** Determination of electrostatic sensitiveness discharge (ESD).

Documents: ST/SG/AC.10/C.3/2018/52 (SAAMI)

Informal documents: No documents submitted

Discussion: SAAMI gave a detailed presentation on the need for electrostatic discharge (ESD) testing and the suitability of the ABL machine for that purpose, and how this might relate to section 4.1.5.14 of the Model Regulations. Concerns were expressed about starting a precedent of including tests in the MTC that are not required by the Model Regulations. There was also little support for describing specific test methods for ESD testing with more support for providing an overview of the testing concept and providing some examples.

Conclusion: This paper was a thought starter. SAAMI took note of the comments offered by the working group and will decide whether they wish to proceed with a new proposal at a future session.

12. **Subject.** A method for transporting unapproved explosives.

Documents: ST/SG/AC.10/C.3/2018/53 (SAAMI)

Informal documents: UN/SCETDG/53/INF.43 (SAAMI)

Discussion: 2018/53 provides test data from 1977, 1983, and 2014 to support its proposal that new entries be created in the Dangerous Goods List for specialized containers to be used to transport small quantities of unapproved explosives for evaluation, testing, and research and development. INF.43 provides proposed amendments to support the proposal in 2018/53.

The discussion in the working group focused on three areas: a) the principle, b) applicability to articles, and c) how to implement. There was wide spread support in the working group for the principle of some method to ship explosives that have not yet been characterized. Although SAAMI is anxious to get this done during the current biennium for round-robin testing between laboratories, and there was some support for this from the working group, it was agreed to leave timing open for the time being. The working group noted that several countries have similar provisions for such shipments (some using the method described in DOT-SP 8451 and the SAAMI proposal); however, there were some in the working group that were concerned the method proposed by SAAMI might be proprietary. IME pointed out that the means described in the SAAMI proposal is public and that there is nothing proprietary about it. Several in the working group agreed with IME.

The working group recommended that SAAMI consider a revised proposal that addresses:

- Whether the entry (PSN) should be an n.o.s. entry or not
- Whether SP 274 and 347 should be added to the proposed entry
- Whether CA approval should be required, and if so, whether it should be required for the device or the packaging method (most favor the latter if CA approval is to be required)
- Whether the entry should be 1.4S, 1.4E, or something else
- Articles should be excluded at this time and could be added after development of sufficient supporting data (most likely in the next biennium)
- Applicability to other (non-explosive) hazardous substances, self-reactives, peroxides type A or B
- Consider a more general approach rather than describing one method in detail
- Whether UN 0190 can be used instead of new UN entries

Conclusion: Taking account of the comments and suggestions from the working group, SAAMI may return with a new proposal at a future session.

13. **Subject.** Transport of energetic samples for testing.

Documents: No documents submitted

Informal documents: UN/SCETDG/53/INF.17 (CEFIC)

Discussion: Following a review of the highly complex proposal by CEFIC, most of the working group expressed the desire for additional time to confer with potentially affected stakeholders to determine what their present practices may be in order to find a practical solution to the issue described by CEFIC.

Conclusion: CEFIC was encouraged to prepare a formal proposal to aid further review by the working group.

14. **Subject.** UN0222 Ammonium nitrate

Documents: No documents submitted

Informal documents: UN/SCETDG/53/INF.21 (IME)

Discussion: Germany, USA, COSTHA, Sweden and Belgium supported the proposal. Others including Netherlands, UK and AEISG stated that they didn't understand the need for amending SP 370, didn't see how it would help, but also didn't see how it would hurt and would, therefore, likely not oppose the proposal. Sweden suggested that SP 370 be amended to simply state what entries UN 0222 does not apply to.

Conclusion: Taking account of the comments from the working group, IME will submit a formal proposal for the 54th TDG session.

15. **Subject.** Additional LP101 entries into the Dangerous Goods List

Documents: No documents submitted

Informal documents: UN/SCETDG/53/INF.24 (UK)

Discussion: The working group provided comments to the packaging expert from the UK. One issue that puzzled the working group was how UN 0012, which describes small articles and is classified as 1.4S, could have LP101 applied to it. The UK advised that, in some instances, devices that are not 1.4S in their normal packaging successfully pass testing to qualify for 1.4S and that UN 0012 was the most likely entry under which they would be transported. France commented that all the entries in Compatibility Group F would be assigned to LP101, which is currently not the case.

Conclusion: The UK will consider the comments from the working group and plans to prepare a formal proposal for the next session.

16. **Subject.** Spanish names for explosives.

Documents: No documents submitted

Informal documents: UN/SCETDG/53/INF.29 (Spain)

Discussion: The working group supported the proposal from Spain to amend the Spanish description of “Charges, shaped, flexible, linear.” The working group did not support the Spanish proposal to amend the French description for the same articles. Recognizing that there are different terms in French that could be applied to “Charges, shaped, flexible, linear” (especially in the translation of the word “shaped”), it recommends that the French text be reviewed further. One possible solution would be to expand the entry to include optional descriptions.

Conclusion: The working group supported the proposal from Spain to amend the Spanish description for “Charges, shaped, flexible, linear” and recommends approval by the Sub-Committee. See Amendment 7 in Annex 2. The working group did not support the proposal to amend the French wording of the same descriptor.

Agenda Item 10(d) – Use of the Manual of Tests and Criteria in the context of the GHS

17. **Subject.** Addition of GHS context into the MTC.

Documents: ST/SG/AC.10/C.3/2018/1 – ST/SG/AC.10/C.4/2018/1 (EWG Chair)

Informal documents: UN/SCETDG/53/INF.3 – UN/SCEGHS/35/INF.3 (EWG Chair)
UN/SCETDG/53/INF.4 – UN/SCEGHS/35/INF.4 (EWG Chair)
UN/SCETDG/53/INF.5 – UN/SCEGHS/35/INF.5 (EWG Chair)

Discussion: In reference to 2018/1, the working group reviewed INF.3 in reference to 2018/1 and made some minor corrections which are shown in Annex 3 (see **Conclusion** below). A proposal from the USA was accepted to add a sentence to the end of Section 1.1.1 of the MTC that defines the term “classifier” as it will be used in the manual once the GHS context review is completed. Except where inappropriate, references to “competent authority” are to be replaced with the term “classifier” as part of the effort to make the test manual applicable to both transport and the GHS.

Additionally, the working group accepted revisions related to self-reactives, including a consequential amendment to the Model Regulations.

The working group also completed its review of INF.4 (Sections 20 – 28) and INF.5 (Sections 30 – 38). Minor revisions were made to both. The working group also noted that the “... cylindrical pellet of 50 g RDX/wax (95/5) ...” referred to in section 21.4.1.2 is no longer available and that acceptable alternatives should be identified.

Conclusion: The working group accepted the proposals as presented in 2018/1 and INF.3 as amended and recommends approval by the Sub-Committee. See Amendment 8 in Annex 2 and Amendments 7, 8, 9, 10, 11, and 12 in Annex 3.

Regarding INF.4, for the next session, a formal document (like 2018/1) will be prepared listing all the recommended amendments. A companion INF paper (like INF.3) will also be prepared reflecting all the changes agreed to through this session.

Regarding INF.5, the chair will circulate a final review document prior to preparing documents for next session. After that final review is completed, for next session, a formal document (like 2018/1) will be prepared listing all the recommended amendments. A companion INF paper (like INF.3) will also be prepared reflecting all the changes agreed to through this session. It is intended that the determination of the SAPT is to be included in the text of Test Series H. This will be proposed in a separate paper.

Agenda Item 10(e) – Joint work with the GHS Sub-Committee

18. **Subject.** Review of GHS Chapter 2.1.

Documents: ST/SG/AC.10/C.3/2018/33 – ST//SG/AC.10/C.4/2018/7 (Sweden)

Informal documents: UN/SCEGHS/53/INF.9 – UN/SCETDG/35/INF.10 (Sweden)
UN/SCEGHS/53/INF.33 – UN/SCETDG/35/INF.15 (USA, IME, SAAMI)
UN/SCETDG/53/INF.46 - UN/SCEGHS/35/INF.16 - (Sweden)

Introduction: This was a joint meeting of the EWG and the GHS Chapter 2.1 Informal Correspondence Group (ICG)³. The meeting was chaired by Mr. de Jong (EWG chair) and the discussion was led by Mr. Van Dam (ICG chair). The primary purpose of the meeting was to review and refine technical aspects of the Ch. 2.1 review, primarily criteria for proposed GHS categories.

As an introduction of the papers from Sweden, the ICG chair provided a slide presentation that reviewed:

- the purpose of the Ch. 2.1 review,
- the status of the work,
- the need for refinement of classification criteria,
- outstanding issues, and
- next steps

The USA introduced 53/INF.33 (35/INF.15) and discussed that the proposals therein:

- are the result of a collaborative effort of four U.S. Government agencies (OSHA, PHMSA, ATF, and DOD) and two industry associations (IME and SAAMI) representing a large number of US explosives manufacturers;
- considers packaged hazards, immediate package hazards, and hazards from those explosives that have not yet been fully characterized; and
- addresses concerns about inappropriately applying transport classifications to products that have been removed from their transport packaging and the impact that may result from under-representing the actual hazard.

USA further reminded the joint session that the UN TDG Sub-Committee chair remitted this paper to the working group with instructions to focus on the classification and criteria portion of the GHS 2.1 revision mandate and that those discussion be reflected in this report. Once the hazard criteria are finalized, the GHS Sub-Committee and the ICG may consider assignment of appropriate hazard communication label elements.

Philosophical differences: The joint session first considered the philosophical differences between the classification approaches contained in C.3/2018/33 (C.4/2018/7) and in 53/INF.33 (35/INF15). The joint session discussed at length the differences in the tables coming from the Swedish paper and that of the USA/IME/SAAMI, realizing that they are not that far apart. Issues considered by the joint session were:

- for which sectors the sub-category level of classification is useful,
- should transport packaging be a criterion for classification within the proposed GHS sub-categories, and

³ Many members of the EWG are also members of the ICG

- what is the appropriate relationship and hierarchy between transport divisions and proposed GHS sub-categories?

For some time, the joint session had difficulties reconciling transport factors versus those of other sectors (such as storage, supply, use, manufacturing, and processing), in particular relating to Division 1.4. It was proposed by some to clarify this by separating the classification table into two separate tables, while others thought a single table would be better. A draft proposal for a split but still combined table from the USA was shown as a thought starter. With joint efforts, a common understanding was eventually reached about the relation between the Division and Sub-category levels of classification. It was understood that the Divisions would be the relevant level of classification for Explosives in the transport packaging/configuration (including e.g. storage in that packaging/configuration), and the Sub-category level would be the relevant level of classification for supply and use and similar situations.

Furthermore, it was clarified that Category 1 will comprise explosives ranging from a low to a very high hazard, and would be the category assigned to explosives to which a Division cannot be assigned, e.g. in manufacturing, processing and similar situations.

With the review and acceptance of this concept, the observation was made that all philosophical differences related to this review have been resolved.

Criteria for Sub-categories: The joint session next reviewed a summary of criteria for acceptance into proposed sub-categories 2A, 2B, and 2C and unanimously agreed to the following.

For category 2A (high hazard): Not Category 2B or 2C

For category 2B (medium hazard)⁴:

- Applies to only Division 1.4 other than S.
- Packaging, other than the immediate container, doesn't substantially mitigate the hazard. The exact wording of this is yet to be worked out.
- No violent reaction in 6(a) (or 6(d) if performed) and 6(b) test (if performed). It should be noted that in some cases the 6(d) test is performed in lieu of the 6(a) test and that, in some cases, the 6(b) test is waived depending on the 6(a) test results. The exact meaning of "no violent reaction" is still being worked out by the working group; however, it is anticipated that they will make use of the criteria as present in the cited tests.
- Some consideration may also be required to categorize very small amounts of materials that have not yet been characterized. This possibility is still being evaluated and may the subject of a future proposal.

For category 2C (low hazard)⁵:

- Applies to only Division 1.4S.
- Packaging, other than the immediate container, doesn't substantially mitigate the hazard.. The exact wording of this is yet to be worked out.
- No violent reaction in 6(a) (or 6(d) if performed) and 6(b) test (if performed). It should be noted that in some cases the 6(d) test is performed in lieu of the 6(a) test and that, in some cases, the 6(b) test is waived depending on the 6(a) test results. The exact meaning of "no violent reaction" is still being worked out by the working group; however, it is anticipated that they will make use of the criteria as present in the cited tests.

⁴ All of the listed criteria must be met to be accepted into sub-category 2B

⁵ All of the listed criteria must be met to be accepted into sub-category 2C

- Some consideration may also be required to categorize very small amounts of materials that have not yet been characterized. This possibility is still being evaluated and may be the subject of a future proposal.

Conclusion: The philosophical differences discussed above have been resolved and the EWG and ICG can now continue to work on additional details needed to complete the GHS Ch. 2.1 review. Although there was unanimous agreement to the criteria for sub-category categorization, some technical details are still pending and should be resolved by the next session.

This information will be considered by the TDG Sub-Committee during the EWG report on Monday, 2 July 2018 and again during the joint TDG and GHS Sub-Committee meeting, along with reports from the ICG chair, on Tuesday, 3 July 2018, afternoon.

Annex 1

Working Group on Explosives (25 – 29 June 2018)

List of Participants

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Annex 2

Working Group on Explosives (25 – 29 June 2018)

Changes for the Model Regulations (20th Revised Edition)

Notes: Source of proposed change is indicated by *italicized text* (Source: XXX)

Red indicates deleted text

Blue indicates inserted text

Amendment 1. **Chapter 1.4** – Add entries 05X1 and 05X2 to Table 1.4.1 as shown below:

Class 1, Division 1.1 explosives

Class 1, Division 1.2 explosives

Class 1, Division 1.3 compatibility group C explosives

Class 1, Division 1.4 UN Nos. 0104, 0237, 0255, 0267, 0289, 0361, 0365, 0366, 0440, 0441, 0455, 0456, ~~and~~ 0500, 05X1 and 05X2

Source: Para. 6 of this report.

Amendment 2. **Chapter 3.2** – Add three new entries for electronic detonators as shown below:

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
						(7a)	(7b)	Packing instruction	Special packing provisions	Instructions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5/4.3.2	4.2.5
05X0	<u>DETONATORS, ELECTRONIC programmable for blasting†</u>	<u>1.1B</u>				<u>0</u>	<u>E0</u>	<u>P131</u>			
05X1	<u>DETONATORS, ELECTRONIC programmable for blasting†</u>	<u>1.4B</u>				<u>0</u>	<u>E0</u>	<u>P131</u>			
05X2	<u>DETONATORS, ELECTRONIC programmable for blasting†</u>	<u>1.4S</u>			<u>347</u>	<u>0</u>	<u>E0</u>	<u>P131</u>			

Source: ST/SG/AC.10/C.3/2018/58, Para. 11 as amended by the working group and Para. 6 of this report.

Amendment 3. **Appendix B** – Amend the definition of “Detonators” as shown below:

Detonators

Articles consisting of a small metal or plastics tube containing explosives such as lead azide, PETN or combinations of explosives. They are designed to start a detonation train. They may be constructed to detonate instantaneously, or may contain a delay element. The term includes:

DETONATORS FOR AMMUNITION and

DETONATORS for blasting, ~~both~~ ELECTRIC, and NON-ELECTRIC, and ELECTRONIC programmable.

Detonating relays without flexible detonating cord are included.

Source: ST/SG/AC.10/C.3/2018/58, Para. 12(a) and Para. 6 of this report.

Amendment 4. Appendix B – Add a new definition for “DETONATORS, ELECTRONIC programmable for blasting” as shown below:

DETONATORS, ELECTRONIC programmable for blasting

Detonators with enhanced safety and security features, utilizing electronic components to transmit a firing signal with validated commands and secure communications. Detonators of this type cannot be initiated by other means.

Source: ST/SG/AC.10/C.3/2018/58, Para. 12(b) as amended by the working group and Para. 6 of this report.

Amendment 5. Chapter 3.3 – Insert the following special provisions in chapter 3.3 of the Model Regulations:

Special provision [XXX] for Class 1 entries (UN Nos. 0340, 0341, 0342 and 0343):

“[XXX] The consignor must ensure that nitrocellulose meets the criteria of the Bergmann-Junk test or methyl violet paper test in the Manual of Tests and Criteria Appendix 10”. Tests of type 3 (c) need not be applied.”

Special provision [YYY] for Division 4.1 entries (UN Nos. 2555, 2556, 2557 and nitrocellulose under UN No.3380):

“[YYY] The consignor must ensure that nitrocellulose meets the criteria of the Bergmann-Junk test or methyl violet paper test in the Manual of Tests and Criteria Appendix 10”.

Source: ST/SG/AC.10/C.3/2018/9, Para. 8 as amended by the working group and Para. 7 of this report.

Amendment 6. Chapter 2.1 – Amend the Note in Section 2.1.3.6.4 (b) to read as follows:

NOTE: Where the integrity of the article may be affected in the event of an external fire these criteria shall be examined by a fire test.

One such ~~as~~ method is described in ISO ~~12097-3~~14451-2 using a heating rate of 80 K/min.

Source: ST/SG/AC.10/C.3/2018/6, Paras. 6 – 7 and Para. 9 of this report.

Amendment 7. Dangerous Goods List in the Spanish Version of the Model Regulations – Amend the description entries UN 0238 and UN 0288 to read “CARGAS MOLDEADAS LINEALES FLEXIBLES”:

Source: UN/SCETDG/53/INF.29, Para. 9, and Para. 16 of this report.

Amendment 8. Section 2.4.3.2.3.1 – Amend the new Note to Section 2.4.3.2.3.1 as shown below:

NOTE: Self-reactive substances, ~~except for type G,~~ giving also a positive result with this test method, shall not be classified in Division 4.2 but in Division 4.1 (see 2.4.2.3.1.1).

Source: Para. 17 of this report.

Annex 3

Working Group on Explosives (25 – 29 June 2018)

Changes for the Test Manual (6th Revised Edition)

Notes: Source of proposed change is indicated by *italicized text (Source: XXX)*

Red indicates deleted text

Blue indicates inserted text

Amendment 1. **Appendices** – Add new Appendix XX as shown in para. 10 of ST/SG/AC.10/C.3/2018/9.

Source: ST/SG/AC.10/C.3/2018/9, Para. 10, and Para. 7 of this report.

Amendment 2. **Appendices** – Revise section 2.4.1 of new Appendix XX (see Amendment 1 above) as shown below:

2.4.1 The test result is considered "+" and the substance is classified as unstable if the quantity of NO gas given off is more than 2.5 ml/g of NC. If the quantity of NO gas given off is less than or equal to 2.5 ml/g, of NC the result is "-" and the substance is classified as stable.

Source: Para. 7 of this report.

Amendment 3. **Appendices** – Add section 2.5 to new Appendix XX (see Amendment 1 above) as shown below

2.5 Examples of results

Quantity of NO gas/g of NC	Result
2.6 ml	+
2.5 ml	-

Source: Para. 7 of this report.

Amendment 4. **Appendices** – Revise section 3.2.2.1 of new Appendix XX (see Amendment 1 above) as shown below:

3.2.2.1 A sample of dry nitrocellulose weighing 2.50 ± 0.01 g. The moisture content of the sample must be below 1% after the drying process and at the time, when it is introduced in the tube. Drying conditions must be chosen, which avoid a decomposition of the NC, e.g. 50° C in a vacuum oven.

Source: Para. 7 of this report.

Amendment 5. **Section 51.4.5.1** – Replace the entire text of section 51.4.5.1 with the following text:

51.4.5.1 A compilation for the test results and classification data for more than 200 Industrial Nitrocellulose is given in Appendix XX.

Source: UN/SCETDG/53/INF.7 – UN/SCEGHS/35/INF.6, Annex, and Para. 8 of this report.

Amendment 6. **Appendices** – Add new Appendix XX as follows:

Appendix XX

Compilation of classification results on industrial nitrocellulose for the purposes of supply and use according to GHS chapter 2.17, which can be used for the classification of Industrial NC products.

Requirements for the use of the test results for the classification of industrial nitrocellulose products:

1. The test results in this appendix can only be used for the classification of industrial nitrocellulose products packed in UN approved fibre board boxes (4G) or fibre drums (1G) according to packing instruction P406. They cannot be used for nitrocellulose products in other pressure resistant packaging like steel drums.
2. The test results in this appendix can only be used for industrial nitrocellulose products which fulfill the test requirements of the Bergmann Junk test for the thermal stability demonstrated by the fact that the quantity of nitrous vapours given off is not more than 2.5 ml/g NO during the test at 132 °C. The Bergman-Junk stability test is described in Appendix YY of the Manual of Tests and Criteria.

Test results

3. All industrial nitrocellulose products worldwide can be made comparable based upon their nitrogen content and their Norm-viscosities (according to ISO 14446). WONIPA has therefore used this method for presenting the results of the BAM tests in the following table. It should be noted that BAM also uses the Norm-viscosities in the publications of the storage group classifications, whereby the storage group classification refers to the storage of industrial nitrocellulose in warehouses.

4. According to their Nitrogen content three types of industrial nitrocellulose products have been defined:

- (a) **E** grades as ester soluble products with nitrogen content from 11.8 to 12.3 %;
- (b) **M**-grades as medium soluble grades with nitrogen content of 11.3 to 11.8 %;
- (c) **A**-grades as alcohol soluble grades with a nitrogen content of 10.7 to 11.3 %.

The testing results have been grouped accordingly into 3 separate tables.

5. The first column of the tables provides the types of the industrial nitrocellulose, which are identified according to ISO 14446 by a combination of two elements:

- (a) A 1- or 2-digit number, which indicates the concentration of the NC solution that is required for a viscosity of 400 ± 25 mPa·s; and
- (b) A letter which identifies the solvent in which the NC-product is soluble.
 - E stands for ester soluble
 - M stands for medium soluble
 - A stands for alcohol soluble

For example for the NC-type 4E in the first table, with a concentration of 4 %, a viscosity of 400 ± 25 mPa·s is achieved.

The viscosities are measured in a solvent mixture of 95 % acetone/5 % water with a Höppler viscometer. Historically industrial nitrocellulose types have been developed for a number of Norm-viscosities only and not for all Norm-viscosities. As it is technically possible to produce products with all Norm-viscosities, all relevant Norm-viscosities were entered in the tables, but some cells in the tables therefore remain empty.

6. The results of the tests are presented per phlegmatizer content for the phlegmatizers Isopropanol (IPA), Ethanol (ETH), Butanol (BUT) and Water and NC-chips with plasticiser.

Compilation of category classifications for NC-Norm grades according to GHS chapter 2.17 desensitized explosives (Tests made by BAM in the years from 1981 to 2011)

IPA = Isopropanol, ETH = Ethanol, BUT = Butanol

(a) Part Ester soluble E-grades with a Nitrogen Content of 11.8 to 12.3 %

NC-type	IPA 35 %	IPA 30%	ETH		BUT		Water 35 %	NC-Chips with 20 % Plasticizer
			35 %	30 %	35 %	30%		
3E								
4E	1 (330)	1 (760)	3	3	1 (530)	1 (540)		1 (1115)
5E								
6E	2		3		1 (390)			1 (1115)
7E	2	1 (430)	3	3	1 (320)	1 (420)		1 (1115)
8E	2		3		2	1 (420)		1 (1115)
9E	2	1 (330)	3	3	2	1 (420)		1 (1115)
10E	2		3		2			1 (1115)
11E								
12E	3	2	4	3	2	1 (330)	4	1 (1115)
13E	3		4		2			1 (1115)
14E								
15E	3	2	4	3	2	2		1 (1115)
16E								
17E								
18E	3		4		3			1 (1115)
19E								
20E	3	3	4	3	3			1 (1115)
21E					3	3		1 (1115)
22E	3	3	4	3	3	3	4	1 (1115)
23E	3	3	4		3		4	1 (1115)
24E	3	3	4	3	3	3		1 (1115)
25E	3	3	4	3	3	3	4	1 (1115)
26E								
27E	3	3	4	3	3	3		1 (1115)
28E	3	3	4		3			
29E								
30E					3	3		
31E	3		4					1 (1115)
32E	3	3	4	3	3	3		1 (1115)
33E								
34E	4	3	4	3	3			1 (1115)
35E								
36E								
37E								
38E								

Compilation of category classifications for NC-Norm grades according to GHS chapter 2.17 desensitized explosives (Tests made by BAM in the years from 1981 to 2011 (continued))

IPA = Isopropanol, ETH = Ethanol, BUT = Butanol

(b) Part Medium soluble M-grades with a Nitrogen content of 11.3 to 11.8 %

<i>NC-Type</i>	<i>IPA 35 %</i>	<i>IPA 30%</i>	<i>ETH 35 %</i>	<i>ETH 30 %</i>	<i>BUT 35 %</i>	<i>BUT 30%</i>	<i>Water 35 %</i>	<i>NC-Chips with 20 % Plasticizer</i>
12M					3			
13M								
14M	3	3	4	3				1 (1115)
15M					3	2		
16M								
17M	3	3	4	3	3			1 (1115)
18M	3	3	4	3	3			1 (1115)
19M								
20M								
21M	3	3	4	4	3			1 (1115)
22M								
23M								
24M					3	3		
25M					3	3		
26M								
27M	4	3	4	4	3	3	4	1 (1115)
28M								
29M								
30M					3	3		
31M								
32M					3	3		
33M								
34M	4	3	4	4	4			1 (1115)

Compilation of category classifications for NC-Norm grades according to GHS chapter 2.17 desensitized explosives (Tests made by BAM in the years from 1981 to 2011 (continued))

IPA = Isopropanol, ETH = Ethanol, BUT = Butanol

(c) Part Alcohol-soluble A-grades with a Nitrogen content of 10.7 to 11.3 %

<i>NC-type</i>	<i>IPA 35 %</i>	<i>IPA 30%</i>	<i>ETH 35 %</i>	<i>ETH 30 %</i>	<i>BUT 35 %</i>	<i>BUT 30%</i>	<i>Water 35 %</i>	<i>NC-Chips with 20 % Plasticizer</i>
7A								
8A								
9A	4	3	4	3	3			1 (1115)
10A								
11A								
12A								
13A								
14A								
15A	4	3	4	3	4	2		1 (1115)
16A								
17A								
18A								
19A								
20A								
21A								
22A								
23A	4	3	4	4	4			1 (1115)
24A					4	3		
25A					4	3		
26A								
27A	4	3	4	4	4	3		1 (1115)
28A								
29A								
30A	4	3	4	4	4	3	4	1 (1115)
31A	4	3	4	4				1 (1115)
32A	4	3	4	4	4	3		
33A		3	4					1 (1115)
34A								
35A								

Source: UN/SCETDG/53/INF.7 – UN/SCEGHS/35/INF.6, Annex, and Para. 8 of this report.

Amendment 7. Throughout the MTC – Amend the Manual of Tests and Criteria as shown on pages 2 - 28 of ST/SG/AC.10/C.3/2018/1 – ST/SG/AC.10/C.4/2018/1.

Source: ST/SG/AC.10/C.3/2018/1 – ST/SG/AC.10/C.4/2018/1 pages 2 – 28 and Para. 17 of this report.

Amendment 8. Section 1.1.1 – Revise section 1.1.1 of the Manual of Tests and Criteria as shown below:

- a) In the seventh line: replace “competent authorities and manufacturers and suppliers” with “classifiers”.
- b) Add a new last sentence to read: “Although the term “classifier(s)” is used generically throughout the manual to indicate the entity providing the classification, in some sectors this may be limited specifically to a competent authority or designated testing authority, whereas in others it may allow for self-classification by manufacturers or suppliers. The sector for classification should be taken into account for each occurrence of this term to correctly identify the entity responsible for classification.”

Source: Para. 17 of this report.

Amendment 9. Section 1.1.9 – in the first line: replace “manual” with “Manual”.

Source: Para. 17 of this report.

Amendment 10. Section 1.2.1.4.3 – Revise section 1.2.1.4.3 of the Manual of Tests and Criteria as shown below:

- a) In the first line: replace “except for” by “Type A to “and replace the rest of the sentence by “should not be tested in the self-heating test N.4, as the test result will give a false positive result (i.e. temperature increase due to thermal decomposition rather than oxidative self-heating).”
- b) In the second sentence: insert at the beginning “Self-reactive substances of type G and” and change the capital “O” to lower case in “Organic”.

Source: Para. 17 of this report.

Amendment 11. Section 10.1.2 – in the sixth sentence: replace “competent authorities” with “classifiers”

Source: Para. 17 of this report.

Amendment 12. Section 10.2.2 – document .../2018/1 does not give amendments to paragraph 10.2.2 but the working group felt that some amendments were necessary. Amend the paragraph to read as shown below:

The producer, distributor or their agent~~other applicant~~ for the classification of a new product, should provide document adequate information concerning the names and characteristics of all explosive substances in the product and ~~should furnish the results of~~ all relevant tests which have been done. This information should be furnished to the classifier, if required.

Source: Para. 17 of this report.
