

**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

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Geneva, 27 June – 6 July 2016

Item 2 of the provisional agenda

**Explosives and related matters**

/47

## Report of the Working Group on Explosives

### Transmitted by the chairman of the Working Group on Explosives

#### Introduction

1. The working group met from 27 June to 1 July 2016 in a parallel session to the plenary meeting of the Sub-Committee on the Transport of Dangerous Goods. This meeting of the working group was well attended with 39 experts in attendance from Belgium, Canada, Finland, France, Germany, Japan, Netherlands, New Zealand, Norway, Poland, Romania, Spain, Sweden, United Kingdom, United States of America, Australian Explosives Industry and Safety Group (AEISG), European Chemical Industry Council (CEFIC), European Association of Automotive Suppliers (CLEPA), Fertilizers Europe, Institute of Makers of Explosives (IME), Responsible Packaging Management Association of Southern Africa (RPMASA), Sporting Arms & Ammunition Manufacturers' Institute (SAAMI), and the GHS Secretariat. 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 for three days to consider the papers assigned to it by the TDG Sub-Committee and informally on a fourth day while this report was being prepared. The informal discussions conducted on that fourth day are not reported herein.

3. 49/INF.2 listed the following papers for consideration of the working group:

<b>Document</b>	<b>Title</b>
<u>Agenda Item 2(a)</u> <i>ST/SG/AC.10/C.3/96 para 11 and Add.1 (annexes I and II)</i>	<u>Tests and criteria for flash compositions</u> <i>Report of the Sub-Committee of Experts on the Transport of Dangerous Goods on its forty-eighth session</i>
<u>Agenda Item 2(b)</u> <i>No documents</i>	<u>Review of Test Series 6</u>
<u>Agenda Item 2(c)</u> <i>ST/SG/AC.10/C.3/2016/6 (Germany)</i> <i>UN/SCETDG/49/INF.27 (Germany)</i> <i>ST/SG/AC.10/C.3/2016/10 (Germany)</i>  <i>UN/SCETDG/49/INF.36 (IME)</i>  <i>ST/SG/AC.10/C.3/2016/13 (France)</i>	<u>Review of tests in parts I and II of the Manual of Tests and Criteria</u> <i>Test results relating to the Koenen test</i> <i>Test results with emulsions (ANE) relating to the Koenen test</i> <i>Supporting material for the new design proposal for the standard detonator in the Manual of Tests and Criteria</i> <i>Design proposal for the standard detonator in the Manual of Tests and Criteria</i> <i>Proposal for replacing dibutyl phthalate (DBP) in Koenen Test</i>

<b>Document</b>	<b>Title</b>
<i>UN/SCETDG/49/INF.34 (Spain)</i>	<i>Temperature Influence on Minimum Burning Pressure for Ammonium Nitrate Emulsions (ANEs)</i>
<i>UN/SCETDG/49/INF.50 (Canada)</i>	<i>On the use of the minimum burning pressure test – Test Series 8: Tests for “ammonium nitrate emulsion or suspension or gel, intermediate for blasting explosives (ANE)” – First report on progress – Informal Correspondence Group</i>
<i>UN/SCETDG/49/INF.60 (AEISG)</i>	<i>Parametric Analysis of Test Series 8 and ANE Bulk Transport Containers</i>
<b><u>Agenda Item 2(d)</u></b>	<b><u>Review of packing instructions for explosives</u></b>
<i>No documents</i>	
<b><u>Agenda Item 2(e)</u></b>	<b><u>Globally Harmonized standard for explosives security markings</u></b>
<i>UN/SCETDG/49/INF.35 (IME)</i>	<i>Globally harmonized standard for explosives security markings</i>
<b><u>Agenda Item 2(f)</u></b>	<b><u>Classification of fireworks</u></b>
<i>No documents</i>	
<b><u>Agenda Item 2(g)</u></b>	<b><u>Classification of articles under UN 0349</u></b>
<i>No documents</i>	
<b><u>Agenda Item 2(h)</u></b>	<b><u>Review of Chapter 2.1 of the GHS</u></b>
<i>ST/SG/AC.10/C.3/2016/7 (ST/SG/AC.10/C.4/2016/2) (AEISG)</i>	<i>Review of Chapter 2.1 of the GHS</i>
<i>UN/SCETDG/49/INF.15 (UN/SCEGHS/31/INF.5) (AEISG)</i>	<i>Review of Chapter 2.1 of the GHS</i>
<i>ST/SG/AC.10/C.3/2016/47 (ST/SG/AC.10/C.4/2016/10) (SAAMI)</i>	<i>Revisions to GHS section 2.1.3</i>
<i>UN/SCETDG/49/INF.45 (UN/SCEGHS/31/INF.12) (Canada)</i>	<i>Review of Chapter 2.1 of the GHS</i>
<i>UN/SCETDG/49/INF.37 (UN/SCEGHS/31/INF.10) (Sweden)</i>	<i>Status report on the work of the informal correspondence group on the revision of GHS Chapter 2.1</i>
<b><u>Agenda Item 2(i)</u></b>	<b><u>Miscellaneous</u></b>
<i>ST/SG/AC.10/C.3/2016/18 (Canada)</i>	<i>Additional entries for Special Provision 347</i>
<i>ST/SG/AC.10/C.3/2016/19 (IME)</i>	<i>Amendment to section 1.1.2 of the Manual of Tests and Criteria</i>
<i>ST/SG/AC.10/C.3/2016/29 (Sweden)</i>	<i>Clarification of the classification of ammonium nitrate based fertilizers – draft amendments to the Model Regulations and the Manual of Tests and Criteria</i>
<i>UN/SCETDG/49/INF.5 (Sweden)</i>	<i>Clarification of the classification of ammonium nitrate based fertilizers - draft amendments to the Model Regulations and the Manual of Tests and Criteria</i>
<i>UN/SCETDG/49/INF.23 (Sweden)</i>	<i>Clarification of the classification of ammonium nitrate based fertilizers – additional clarifications and discussion topics for possible amendments</i>
<i>ST/SG/AC.10/C.3/2016/31 (SAAMI)</i>	<i>Amendments to the provisions applicable to transport of Class 1 articles packed in limited quantities</i>
<i>UN/SCETDG/49/INF.16 (Germany)</i>	<i>Clarification of SP 364</i>
<i>UN/SCETDG/49/INF.9 (Germany)</i>	<i>Transport of PENTAERYTHRITE TETRANITRATE (PETN) with less than 25 % of water but more than 9 % of water</i>
<i>UN/SCETDG/49/INF.38 - (Spain)</i>	<i>Transport of PENTAERYTHRITE TETRANITRATE (PETN) with less than 25 % but more than 9% of water amendments</i>
<i>UN/SCETDG/49/INF.20 - (CEFIC)</i>	<i>Transport of energetic samples for further testing</i>
<b><u>Agenda Item 7</u></b>	<b><u>Global harmonization of transport of dangerous goods regulations with the Model Regulations</u></b>
<i>ST/SG/AC.10/C.3/2016/15 (Romania) (paras. 11 – 15)</i>	<i>Proposals to insert the definitions “Reference steel” and “Mild steel” in section 1.2.1 of the UN Model Regulations</i>

Document	Title
<u>Agenda Item 10(g)</u>	<u>Use of the Manual of Tests and Criteria in the context of the GHS</u>
UN/SCETDG/49/INF.4 (UN/SCEGHS/31/INF.3) and Add.1 – Add.5 (working group Chair)	Revision of the Manual of tests and Criteria
UN/SCETDG/49/INF.6 (UN/SCEGHS/31/INF.4) (Canada, FEA)	Proposed amendments to Chapter 31 of Part III of the Manual
<u>Agenda Item 10(i)</u>	<u>Issues relating to the Globally Harmonized System of Classification and Labelling of Chemicals: miscellaneous</u>
ST/SG/AC.10/C.3/2016/30 (ST/SG/AC.10/C.4/2016/6) - (AEISG, SAAMI)	Clarification of the classification criteria for desensitised explosives in GHS

## Agenda Item 2(a) – Tests and criteria for flash compositions

4. **Subject:** Updates to the US and HSL flash composition tests

*Documents:* ST/SG/AC.10/C.3/96 para 11 and Add.1 (annexes I and II)

*Informal documents:* None

**Discussion:** The report from the 47<sup>th</sup> session states that the sub-committee accepted proposals 1 – 8 as shown in C.3/96/Add.1. Some text in the adopted text was placed in square brackets and has yet to be accepted. Adopted text may be found in Add.1:

- Annex I, Appendix 7
- Annex II, Chapter 2.1

The working group noted that in C.3/96/Add.1 (Annex 1, Appendix 7) the term “lifting charge” still appears in new section 2.4 and should be replaced with “propellant charge”.

**Conclusion:** The working group accepted the revisions shown in C.3/96 Add.1 (annexes I and II) and the revision to change “lifting charge” to “propellant charge” in new section 2.4 (C.3/96/Add.1, Annex I) and recommended removal of the square brackets from those revisions.

See C.3/96 Add.1 (annexes I and II), revisions to Appendix 7 and to Chapter 2.1 for amendments. See below for revision to new section 2.4 (C.3/96/Add.1, Annex I):

### “2.4 Test criteria and method of assessing results

The result is considered positive “+” and the pyrotechnic substances in powder form or as pyrotechnic units as presented in the fireworks, that are used in waterfalls, or to produce an aural effect, or used as a bursting charge or propellant ~~lifting~~-charge, ~~is~~are to be considered as flash compositions if ...”

## Agenda Item 2(b) – Review of Test Series 6

5. No documents were submitted

## Agenda Item 2(c) – Review of tests in parts I and II of the Manual of Tests and Criteria<sup>1</sup>

6. **Subject:** Improvements to Koenen Test

*Documents:* ST/SG/AC.10/C.3/2016/6 (Germany)

*Informal documents:* UN/SCETDG/49/INF.27 (Germany)

**Discussion:** At the 47th session, Germany proposed to amend the quality requirement of the steel tube in the Koenen Test (ST/SG/AC.10/C.3/2015/4). The Sub-Committee encouraged Germany to continue research into replacement materials for the unavailable tube steel and prepare a revised proposal which considered the comments of the working group on explosives. The UK, CEFIC and IME suggested running comparison tests on pharmaceutical and ANE samples.

As of the writing of 2016/6, Germany had not received any further test results, so it executed comparison tests with ANE samples and reports on those in 49/INF.27. The tests were done on 2 emulsions with 6 trials each. 49/INF.27 concludes that the test results demonstrate, that also for emulsions and slow responding samples the change of steel quality does not have an effect on the outcome of the Koenen test.

As a result of the comparison tests, Germany recommended changing the steel tube bursting pressure criteria in terms of quality control to 28 MPa ± 4 MPa.

There was some support for the proposal in these documents; however, questions were raised about the range of tube bursting pressure criteria and the potential that current classifications might be undesirably impacted. The working group suggested that the proposed pressure range be shifted (from the proposed 28 MPa ± 4 MPa to 29 MPa ± 4 MPa) so that it included the criteria currently found in the Manual (30 MPa ± 3 MPa) as well as the new test results.

**Conclusion:** Taking into account the change recommended by the working group, the proposals in 2016/6 were accepted. See Amendments 1 – 4 in Annex 3 of this report.

7. **Subject:** Proposal for replacing dibutyl phthalate (DBP) in Koenen Test

*Documents:* ST/SG/AC.10/C.3/2016/13 (France)

*Informal documents:* None

**Discussion:** Dibutyl phthalate (DBP) is used for calibrating the heating rate in the Koenen Tests 1(b), 2(b), 8(c), and E.1. DBP is forbidden for general use within the European Union because it has been identified as substance of very high concern within the EU's REACH regulations. France has been seeking an acceptable alternative for DBP and presented the results of its research in 47/INF.40 of the 47th session. At that session, the working group suggested that the use of

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<sup>1</sup> In addition to the topics discussed under Agenda Item 2(c), a report was provided by CEFIC to update the working group on the progress of the review of Test Series H in Part II of the Manual

synthetic oils rather than natural oils might be a viable solution to the problem described by France.

France has identified a silicone oil that it believes is a suitable replacement for DBP and suggests that the silicone oil could be specified by its apparent density and by its heat capacity, with appropriate tolerances for possible regional variations in the manufacturing process and availability in various parts of the world.

**Conclusions:** The working group agreed that synthetic oil (as proposed by France) was a good substitute. It was suggested that synthetic oils might vary by manufacturer and so a round robin testing program will likely take place (coordinated by France) to investigate before the next session whether this is an issue of concern or not. To facilitate the round robin testing, France has provided the following Internet links for information regarding the silicone oil (BLUESIL FLD 47V100) it tested:

- [http://www.silitech.ch/upload/complement\\_info\\_fournisseur\\_d/32.pdf](http://www.silitech.ch/upload/complement_info_fournisseur_d/32.pdf)
- [https://www.bluestarsilicones.com/EN/our\\_offer/Product/90000817/\\_/BLUESIL-FLD-47V100](https://www.bluestarsilicones.com/EN/our_offer/Product/90000817/_/BLUESIL-FLD-47V100) (when open the second link scroll down to access TDS and SDS related to BLUESIL FLD 47V100)

8. **Subject:** UN Standard Detonator

*Documents:* ST/SG/AC.10/C.3/2016/10 (Germany)

*Informal documents:* UN/SCETDG/49/INF.36 (IME)

**Discussion:** One of the longer term problems identified by IME in 2014/4 of the 45th session, and discussed in 47/INF.10 of the 47<sup>th</sup> session (see para. 7) was the lack of availability of detonators meeting the specifications of the standard detonator that is described in Appendix 1 of the Manual of Tests and Criteria<sup>2</sup>. In 2015/26 of the 47<sup>th</sup> session, Germany sought to update the specifications for the European version of the standard detonator to align with current technological developments while seeking to avoid "... any change to the performance of the detonator, since test results should not depend on the use of the former type or the new type." In 2016/10 of the current session, Germany has provided some test data to support a new design for the European version of the standard detonator. Also provided in 2016/10 is an intention to update the proposal in 2015/26 taking into account comments from the working group at the 47<sup>th</sup> Session.

During the discussion of this issue by the working group at the 47<sup>th</sup> Session, IME suggested that it might be possible to simplify the specifications of the standard detonator and to replace the European and US versions with a single universal version. The working group agreed that this concept was desirable and encouraged IME to review further and to report back. In 49/INF.36 of this session, IME starts with the proposal from Germany in 2015/26 and suggests revisions that would simplify the specifications and achieve the goal of a universal version of the standard detonator.

**Conclusion:** The working group continued to support the possible development of a single, universal version of the standard detonator instead of the two versions currently described in Appendix 1 of the Manual. However, it feels that not enough actual data exists to perform a thorough comparison of the two current versions, specifically in regards to net explosive weight, content, pressing pressure of the base load, material of construction (aluminium vs. copper), and bottom shape for the detonator shell. Additionally, it was generally agreed that some references to

<sup>2</sup> Hereafter referred to as "the Manual"

a standard detonator in some tests may not be necessary since the intent (in those tests) is simply to ensure that a booster is initiated. However, in other cases, for instance, the cap sensitivity test, a standard, consistent output is imperative. Work will continue through the 2017/2018 biennium with a goal of a formal proposal by the end of that biennium. The work will likely be coordinated by Germany and IME.

9. **Subject:** The Minimum Burning Pressure (MBP) Tests as a possible alternate or replacement for the 8(c) and/or the 8(d) tests

*Documents:* *None*

*Informal documents:* *UN/SCETDG/49/INF.34 (Spain)*  
*UN/SCETDG/49/INF.50 (Canada)*  
*UN/SCETDG/49/INF.60 (AEISG)*

**Discussion:** In 49/INF.34 Spain presents an industry report on temperature influence on the MBP test. Spain noted that the MBP tests hitherto have been performed at ambient temperature and not at elevated temperatures such as in a transport fire. 49/INF.34 concludes that “MBPs showed a decreasing linear dependence on temperature, the MBP of the studied emulsions tend to converge to similar values as the temperature at which the measurement has been carried out increases. The MBPs reach a null value at temperatures close to 200 °C.” Spain recommends “... to take into account the dependence of the MBP on the ANE temperature when the suitability of the MBP test to analyse the risk of an external fire is under consideration.”

In 49/INF.50, Canada reports on the progress made by an intersessional correspondence group (ICG) established in January 2016 by the expert from Canada. The ICG includes seven CAs and four NGOs, and its work was previously reviewed at the IGUS-EPP and CIE conference held in Bern (April, 2016) for further progressing the proposal, if deemed appropriate, or exploring alternatives. The ICG has identified 3 work streams:

- How to include the MBP test as part of TS 8 (c)
- MBP Criteria to determine the suitability of a candidate ANE to be classified in Division 5.1
- Should the MBP test be proposed as an alternative or replacement to 8 (d) Vented pipe test

49/INF.50 discusses initial responses to the 3 work streams and acknowledges the report provided in 49/INF.34 as well as a similar report from CERL from 2013.

49/INF.60 from AEISG provides context to the discussion on the MBP test as a potential alternative to the 8(c) Koenen Test. The presentation, which was distributed to the working group, highlighted the large differences in heat transfer and burst pressure between the Koenen test, the vented pipe test and tanks used in actual road transport. Results of Koenen tests were also shown that demonstrated negative results (pass) for ANEs with low (8%) water content. An example of an incident was given that shows the poor thermal conductivity of ANEs. Reference was also made to the MBP research carried out by CERL and MAXAM in which the MBP is shown to decrease with increasing temperature, as expected. The observed null MBP was shown to be consistent with the thermal decomposition seen for ANEs.

There was a discussion on the issues of classifying all ANEs using two alternative tests which are known to have different outcomes. A suggestion was made to amend the criteria in the 8(c) test. Germany pointed out that consistency with Test Series 2 and classification of other chemicals would then be lost.

The UK does not consider the Koenen test as suitable for emulsion ANEs and proposed to have the Koenen test applicable for suspensions or gels, and the MBP test applicable for emulsions due to their much higher water content and other factors. The USA believes this could be a favourable path pending further discussion at the ICG.

**Conclusion:** The ICG will continue to work through the summer to consider whether the Koenen test might be a suitable 8(c) test for gels and suspensions and the MBP test for emulsions.

## Agenda Item 2(d) – Review of packing instructions for explosives

10. No documents were submitted

## Agenda Item 2(e) – Globally Harmonized standard for explosives security markings

11. **Subject:** A simplified approach to a standardized marking format

*Documents:* None

*Informal documents:* UN/SCETDG/49/INF.35 (IME)

**Discussion:** This paper was discussed in the TDG plenary and was not discussed by the working group.

**Conclusion:** None

## Agenda Item 2(f) – Classification of fireworks

12. No documents were submitted

## Agenda Item 2(g) – Classification of articles under UN 0349

13. No documents were submitted

## Agenda Item 2(h) – Review of Chapter 2.1 of the GHS

14. **Subject:** Review of Chapter 2.1 of the GHS

*Documents:* ST/SG/AC.10/C.3/2016/7 (ST/SG/AC.10/C.4/2016/2) (AEISG)  
ST/SG/AC.10/C.3/2016/47 (ST/SG/AC.10/C.4/2016/10) (SAAMI)

*Informal documents:* UN/SCETDG/49/INF.15 (UN/SCEGHS/31/INF.5) (AEISG)  
UN/SCETDG/49/INF.45 (UN/SCEGHS/31/INF.12 (Canada))  
UN/SCETDG/49/INF.37 (UN/SCEGHS/31/INF.10) (Sweden)

**Discussion:** The papers other than 49/INF.37 provide comments and suggestions for solving problems identified by the ICG and reported in 49/INF.37. 49/INF.37 served as the basis for discussion, which was in particular focused on the GHS labelling of explosives. It was recognized that some of the problems encountered originate from an unclear definition of the scope and applicability of the GHS to the life cycle of explosives, and the working group agreed that this

needs be reviewed and clarified. In order to overcome the package-dependence of current GHS labelling elements, the working group discussed a generalization of the GHS label requirements presented in GHS Table 2.1.2, with some variations. This generalization acknowledges that detailed information on the hazard of explosives when they are not in the transport configuration is included by the manufacturer in the safety data sheet.

The working group considered the use of the term “unstable explosives” within Chapter 2.1 and concluded that the term is technically incorrect as what is being identified are explosives that fail Test Series 3 (substances) or 4 (articles), i.e., unsuitable for transport, but may remain suitable for other purposes.

The working group advanced the idea that all explosive divisions other than 1.4 and the category currently termed unstable explosives should bear the exploding bomb pictogram, the signal word “Danger” and the hazard statement “Explosive”. For Division 1.4, there was no consensus on the most appropriate labelling, but the idea of separating out from this Division those substances, mixtures and articles that also without (transport) packaging pose only a minor hazard was generally accepted. The exemption list is yet to be agreed, but a draft list based on UN-numbers for transport was developed. The USA was not supportive, and the UK agreed, of a list based only on UN numbers unless additional parameters were put in place to cover the wide variety of packaging possibilities.

The idea of introducing GHS Categories in the classification of explosives was discussed, which would also replace the denotation “unstable explosive” with Category 1.

**Conclusion:** The above will be discussed at a dedicated meeting during the session of the GHS-subcommittee and work will continue to refine the issues reported above as well as others identified in the papers listed under this section, resulting in proposals for the next session.

## Agenda Item 2(i) – Miscellaneous

15. **Subject:** Additional entries for Special Provision 347

*Documents:* ST/SG/AC.10/C.3/2016/18 (Canada)

*Informal documents:* None

**Discussion:** When SP 347 is applied against an explosives entry, it requires that the 6(d) test be passed before 1.4S can be assigned. Currently SP 347 applies to eight 1.4S entries including shaped charges, detonators, power device cartridges, detonator assemblies, and plastic bonded bursting charges. At the 48th session, Canada recommended reviewing the list of UN entries for articles and substances whose classification is normally package dependent or that are generic, and to apply SP 347 to those entries as well as the 8 entries to which SP 347 already applies (2015/42). This would have expanded SP 347 applicability to an additional 10 entries including fireworks, tubular primers, detonating fuzes, flares, pyrotechnic articles, ships flares, and n.o.s. entries. The working group didn't agree that 1.4S classifications of all of these explosives needed examination by the 6(d) test; however, it supported applying SP 347 to the NOS entries cited in the paper and to UN 0367 (Fuzes, detonating). Canada agreed to return with a modified proposal and in 2016/18 Canada proposes to apply SP 347 to:

- UN 0349 (ARTICLES, EXPLOSIVE, N.O.S.)
- UN 0367 (FUZES, DETONATING)
- UN 0384 (COMPONENTS, EXPLOSIVE TRAIN, N.O.S.)
- UN 0481 (SUBSTANCES, EXPLOSIVE, N.O.S.)



**Conclusion:** The working group unanimously accepted the proposal in 2016/18 and recommends acceptance by the Sub-Committee. See Amendment 1 in Annex 2 of this report.

16. **Subject:** Revision of Sections 1.1.2 and 2.3 of the Manual

*Documents:* ST/SG/AC.10/C.3/2016/19 (IME)

*Informal documents:* None

**Discussion:** During the working group meeting at the 48th session, it was noted that a reference to “testing authority” in Section 1.1.2 of the Manual incorrectly implies that the testing authority has the responsibility for classification of dangerous goods. IME agreed to submit a proposal for the 49th session to correct this misconception. Working with the working group chair, it was discovered that Section 2.3 of Appendix 6 also required a similar correction. In 2016/19, IME proposes to amend references to “testing authority” in Section 1.1.2 and Section 2.3 (of Appendix 6) to read “testing body” and to remove the comments in both sections referring to responsibility for classification.

The working group considered the proposal by IME to replace the term “testing authority” with “testing body” and agreed that “testing body” was the more appropriate descriptor.

Since the terms “competence” and “competent authority” might be used in different contexts in several regulations (e.g. transport modal regulations), France suggested that the proposal recommending “competence” of testing bodies be amended to recommend “technical competence” of testing bodies. Germany and Netherlands supported this modification and the working group recommended amending the proposal by IME to read “technical competence” in the place of “competence”.

The USA supported the proposal in 2016/19, and noted that the change would not conflict with situations where testing bodies can be designated greater responsibility by the Competent Authority. Since the Manual is a collection of tests used to classify dangerous goods and since the responsibility of the competent authority to classify explosives is established in the Model Regulations, the working group agreed with the IME proposal to remove those references from Section 1.1.2 and Section 2.3 of Appendix 6.

**Conclusion:** The working group unanimously accepted the proposals in 2016/19 as modified by France and recommends acceptance by the Sub-Committee. See Amendments 5 and 6 in Annex 3 of this report.

17. **Subject:** Classification of ammonium nitrate based fertilizers (UN 2067 & 2071 & SP 307)

*Documents:* ST/SG/AC.10/C.3/2016/29 (Sweden)

*Informal documents:* UN/SCETDG/49/INF.5 (Sweden)  
UN/SCETDG/49/INF.23 (Sweden)

**Discussion:** Citing difficulties in understanding and applying the provisions for classification of ammonium nitrate based fertilizers, especially SP307, to properly classify (for transport) AN-containing fertilizers, an *ad hoc* working group under IGUS<sup>3</sup>, consisting of experts from Sweden,

<sup>3</sup> IGUS is the International Group of experts on the explosion risks of Unstable Substances, which has been active in the field of hazardous materials, including dangerous goods, for over 50 years. Experts participate in IGUS due to their expertise, and not as representatives of their country or organization. See [www.igus-experts.org](http://www.igus-experts.org) for further information.

Netherlands, United Kingdom, France and Germany is seeking to make the process more easily understood. To this end, in 2016/29, they have developed a new section (proposed Section 39) for the Manual that provides procedures and criteria for classifying AN-based fertilizers and a flow chart to assist in determining the correct classification. While it is stated that “... the aim of the work at this point is not to introduce any new requirements or criteria for fertilizers – only to clarify the already existing ones in order to avoid misinterpretations (deliberate or unintended) in the classification of fertilizers”, the USA noted that the flowchart has decision points based on ammonium sulphate content which are not in the current special provisions. The working group discussed these changes and agreed there was adequate justification for their addition.

Concerns were raised that the proposals as presented included further changes to existing provisions of the Model Regulations and introduced new terms, particularly for various AN types, which were ill-defined, could lead to confusion.

49/INF.5 (which is Annex III of 2016/29) provides a detailed explanation as to how the proposed draft changes correspond to the current provisions for classification of AN-based fertilizers.

49/INF.23 provides some late arriving additional clarifications by way of some amendments to the proposed section 39, as well as a few points for discussion.

**Conclusion:** The proposals in documents 2016/29, 49/INF.5, and 49/INF.23 were discussed in detail by the working group. There was general support for the insertion of a new section 39 in the Manual and for reflecting the complicated requirements in a flow chart. A few modifications were made to assure that only the current Special Provisions are reflected in the proposals and no new criteria, definitions or limits are introduced. Sweden will prepare an amended proposal for a future session taking account of the comments of the working group.

It was confirmed that the current section 38 of the Manual contained a requirement on ammonium nitrate that originated from an old version of SP193 that was accidentally not removed when the SP193 was modified. The group concluded that it was appropriate to remove that sentence since test results take precedence over this no longer applicable requirement. This change will be highlighted and included in the next consolidated version of the revised draft of the 7th edition of the Manual.

18. **Subject:** Transport of class 1 articles in limited quantities

*Documents:* ST/SG/AC.10/C.3/2016/31 (SAAMI)

*Informal documents:* None

**Discussion:** In 2016/31, SAAMI makes two proposals: (1) to remove the requirement for specification packaging of ammunition (UN0012, UN0014, and UN0055) to better align with the limited quantity system, and (2) to allow an alternative to the 6(d) test when ammunition is packaged according to a proven configuration.

There was some support and some reservations in general for proposal 1 in 2016/31 but the working group did not support proposal 2 as written. The working group supported the possibility of developing a default classification system for ammunition that would preclude the dependence on specification packaging requirements and the 6(d) test for transport in limited quantities.

**Conclusion:** SAAMI will consider the comments from the working group as it prepares an amended proposal for a future session.

19. **Subject:** Clarification of SP 364

*Documents:* None

*Informal documents:* UN/SCETDG/49/INF.16 (Germany)

**Discussion:** In 49/INF.16, Germany proposes to clarify that wording in SP 364 should make clear that tests (and not mere consideration or, if possible, by a calculation or other form of separate procedure without practical demonstration) are the basis for the application of SP 364 and should be aligned with wordings found in other similar places. The Netherlands and Sweden supported the proposal from Germany.

SAAMI explained that capability requirements are frequently used in the LQ system, and this also allows for variations in the approaches of different Competent Authorities. USA noted that they classify these articles by default and do not support the change proposed in 49/INF.16.

**Conclusion:** Considering a review of the 6(d) test and evaluation of a default classification for certain ammunition, the working group agreed to defer this topic to a future discussion before considering this proposal for amending SP 364.

20. **Subject:** Transport of PENTAERYTHRITE TETRANITRATE (PETN) with less than 25 % of water but more than 9 % of water

*Documents:* None

*Informal documents:* UN/SCETDG/49/INF.9 (Germany)  
UN/SCETDG/49/INF.38 (Spain)

**Discussion:** 49/INF.9 provides information on sensitivity tests of PETN with different water contents and concludes that the water in wetted PETN is only loosely attached to the crystals and can easily be removed even at ambient temperature. Proposes to not change the actual conditions for the transport of PETN. This avoids an undue increase in risk during transport.

In 49/INF.38, Spain reports that the results provided in 49/INF.9 vary significantly from tests results obtained by LOM in Spain. Spain suggests to perform a round robin test with interested laboratories and it would provide test material to interested labs and would coordinate the work.

The USA noted that Competent Authorities can authorize lower percentages of water on a case-by-case basis, but that the test results reported in 49/INF.9 confirm that there is a lot of variability in the affinity of PETN to water and agreed with the conclusion that no changes should be made. Since PETN's affinity for water is so low, the UK opposed reducing the current water content of UN 0150 below 25% since there may be in general insufficient water present to ensure homogeneous desensitization of the PETN while in transport. Spain advised that their current concern is not to lower the water content in UN 0150, but rather it is the wide variability in test results. They explained that they proposed the round robin tests so that the phenomenon could be better understood and possibly controlled. A number of labs expressed an interest to participate.

**Conclusion:** The working group favored the conclusions in 49/INF.9 that no changes be made to the water desensitization requirements for UN0150 PETN (1.1D). Also, because of the disparity noted between tests reported by Germany in 49/INF.9 and those reported by Spain in 49/INF.38, several labs agreed to participate in the round robin testing to investigate further. This testing will be coordinated by Spain (LOM).

21. **Subject:** Transport of energetic samples for further testing

*Documents:* None

*Informal documents:* UN/SCETDG/49/INF.20 (CEFIC)

**Discussion:** CEFIC, along with BAM (Germany), is looking for acceptable packaging to allow transport of very small quantities (mg to grams) of samples of energetic materials that may have "...functional groups listed in tables A6.1 and/or A6.2 in Annex 6 (Screening Procedures) of the Manual of Tests and Criteria, thus indicating explosive or self-reactive properties; however, they are not designed to be explosives of Class 1." This paper reports on results of tests performed at BAM and concludes that a safe package design has been found. Proposes review by the working group so that a formal proposal can be developed for the 50th Session.

**Conclusion:** The working group supported the proposal in principle. Several delegations noted that the scope of applicable substances should be more precisely defined. CEFIC intends to prepare a formal proposal for the 50th Session (Dec 2016).

## **Agenda Item 7 – Global harmonization of transport of dangerous goods regulations with the Model Regulations**

22. **Subject:** Proposals to insert the definitions "Reference steel" and "Mild steel" in section 1.2.1 of the UN Model Regulations

*Documents:* ST/SG/AC.10/C.3/2016/15 (Romania)

*Informal documents:* None

**Discussion:** At the request of Romania and the Sub-Committee, the working group discussed the proposals in 2016/15 in light of paras. 11 – 15 of that document. After a review of the occurrences of "mild steel" within the Manual, it was concluded that the proposals in 2016/15 would have no impact on performance of tests described in the Manual.

## **Agenda Item 10(g) – Issues relating to the Globally Harmonized System of Classification and Labelling of Chemicals: use of the Manual of tests and criteria in the context of the GHS**

23. **Subject:** Revision of the Manual of Tests and Criteria

*Documents:* None

*Informal documents:* UN/SCETDG/49/INF.4 (UN/SCEGHS/31/INF.3) (Working Group Chair) and Adds. 1 – 5  
UN/SCETDG/49/INF.6 (UN/SCEGHS/31/INF.4) (Canada, FEA)

**Discussion:** 49/INF.4 and its addenda contain a proposed revised text of the Manual to take account of its use in the context of the GHS. The work is split between the documents as follows:

- 49/INF.4 – Chapter 1 (General Introduction)
- 49/INF.4/Add.1 – Chapters 10 – 17 (Test Series 1 – 7)
- 49/INF.4/Add.2 – Chapter 18 (Test Series 8)
- 49/INF.4/Add.3 – Chapters 20 – 28 (Test Series A – H)
- 49/INF.4/Add.4 – Chapters 30 – 51 (Class 2, Class 3, Class 4, Division 5.1, Class 8 and Class 9)
- 49/INF.4/Add.5 – Appendices

In 49/INF.6 Canada and FEA propose a minor correction to Table 31.5.4.4 as published in 49/INF.4/Add.4.

The working group spent considerable time reviewing 49/INF.4 and Section 10 of Add.1 and noted that several of the general changes led to confusion. The group identified solutions and the chairman will follow up with new proposals.

**Conclusion:** It was determined to create text in Part I of the Manual to clarify the intent that the configuration is most often the transport package and no additional testing is required for other sectors. The working group completed its review of 49/INF.4 and Section 10 within 49/INF.4/Add.1. The work will continue in the intercessional period and will include continuing the review of the rest of Add.1, review of Add.2 – Add.5, development of a chapter to describe in general terms how to use the manual in GHS efforts and to explain the importance of packaging for certain explosives classifications.

## Agenda Item 10(i) – Issues relating to the Globally Harmonized System of Classification and Labelling of Chemicals: Miscellaneous

24. **Subject:** Clarification of the classification criteria for desensitised explosives in GHS

*Documents:* ST/SG/AC.10/C.3/2016/30 (ST/SG/AC.10/C.4/2016/6) (AEISG, SAAMI)

*Informal documents:* None

**Discussion:** AEISG and SAAMI have indicated that some regulatory authorities have misconstrued the intent of GHS section 2.17.2.1 to mean that it applies “... to the explosive in its non-desensitised state. For example, paragraph (a) has been interpreted that wet TNT (UN 1356) that meets the test criteria must nevertheless be classified as an explosive because the intent is to later remove the desensitiser and use the material as an explosive.” In 2016/30, AEISG and SAAMI are seeking to correct this misconception with some revisions to section 2.17.2.1.

There was general support for the problem described by AEISG and SAAMI; however, the working group was of the opinion that the proposed revisions to GHS section 2.17.2.1 were too difficult to understand. SAAMI provided some revised text to amend the proposal in 2016/30 and that was accepted by the working group. The working group noted that acceptance of this proposal would also require a consequential amendment in Note 1 of section 2.17.2.1.

New Zealand noted that similar wording is also found in Section 51 of the Manual. The working group took note of this and suggested a consequential amendment to that section.

**Conclusion:** The working group unanimously accepted the proposals in 2016/30 as modified by SAAMI as well as the consequential amendment to Note 1. See Amendment 1 in Annex 4 of this report. A consequential amendment is required in Section 51 of the Manual. See Amendment 7 in Annex 3 of this report.

**Annex 1**  
**Working Group on Explosives (27 June - 1 July 2016)**  
**List of Participants**

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## **Annex 2**

### **Working Group on Explosives (27 June - 1 July 2016) Changes for the Model Regulations (19th Revised Edition)**

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

**Red** indicates deleted text

**Blue** indicates inserted text

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#### **Amendment 1.**

**Chapter 3.2, Dangerous Goods List** – Insert “347” in Column 6 (Special Provisions) against the following UN Nos.: 0349, 0367, 0384, and 481

*Source: ST/SG/AC.10/C.3/2016/18, Para. 15 and Para. 7 of this report.*

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## Annex 3

### Working Group on Explosives (27 June - 1 July 2016)

### 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

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#### **Amendment 1.**

**Section 11.5.1.2.1** – amend sub-para (d) as shown below:

- (d) The bursting pressure as determined by quasi-static load through an incompressible fluid shall be ~~30 ± 3 MPa~~29 MPa ± 4 MPa.

Source: *ST/SG/AC.10/C.3/2016/6, Para. 6 (as amended by the working group) and Para. 6 of this report.*

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#### **Amendment 2.**

**Section 12.5.1.2.1** – amend sub-para (d) as shown below:

- (d) The bursting pressure as determined by quasi-static load through an incompressible fluid shall be ~~30 ± 3 MPa~~29 MPa ± 4 MPa.

Source: *ST/SG/AC.10/C.3/2016/6, Para. 6 (as amended by the working group) and Para. 6 of this report.*

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#### **Amendment 3.**

**Section 18.6.1.2.1** – amend sub-para (d) as shown below:

- (d) The bursting pressure as determined by quasi-static load through an incompressible fluid shall be ~~30 ± 3 MPa~~29 MPa ± 4 MPa.

Source: *ST/SG/AC.10/C.3/2016/6, Para. 6 (as amended by the working group) and Para. 6 of this report.*

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#### **Amendment 4.**

**Section 25.4.1.2.1** – amend sub-para (d) as shown below:

- (d) The bursting pressure as determined by quasi-static load through an incompressible fluid shall be ~~30 ± 3 MPa~~29 MPa ± 4 MPa.

Source: *ST/SG/AC.10/C.3/2016/6, Para. 6 (as amended by the working group) and Para. 6 of this report.*

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#### **Amendment 5.**

**Section 1.1.2** – amend as shown below:

It therefore assumes technical competence on the part of the testing ~~authority body~~and  
~~leaves responsibility for classification with them.~~

Source: *ST/SG/AC.10/C.3/2016/19, Para. 5 (as amended by the working group) and Para. 16 of this report.*

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#### **Amendment 6.**

**Appendix 6, Section 2.3** – amend as shown below:

The remarks 1.1.2 from section 1 "General introduction" are emphasized that technical  
competence on the part of the testing ~~authority body~~ is assumed ~~and responsibility for~~  
~~classification is left with them.~~

Source: *ST/SG/AC.10/C.3/2016/19, Para. 6 (as amended by the working group) and Para. 16 of this report.*



**Amendment 7.****Section 51.2.2** – amend as shown below:

- 51.2.2 The appropriate classification procedures for desensitized explosives should be undertaken before they are offered for supply and use unless, in that state:
- (a) ~~They are manufactured with the view to producing a practical, explosive or pyrotechnic effect~~ They are intended to produce a practical explosive or pyrotechnic effect;
  - (b) They have a mass explosion hazard according to Test Series 6(a) or 6(b) or ~~their~~ the corrected burning rate according to the burning rate test 51.4 is more than 1 200 kg/min;
  - (c) ~~Their~~ The exothermic decomposition energy is less than 300 J/g<sup>2</sup>.

Source: Para. 24 (Conclusion) of this report.

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## Annex 4

### Working Group on Explosives (27 June - 1 July 2016)

### Changes for the GHS Document (6th Revised Edition)

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

**Red** indicates deleted text

**Blue** indicates inserted text

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#### **Amendment 1.**

**Section 2.17.2.1** – amend as shown below:

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

- (a) ~~It is manufactured with the view to producing a practical, explosive or pyrotechnic effect~~ It is intended to produce a practical explosive or pyrotechnic effect; or
- (b) It has a mass explosion hazard according to test series 6 (a) or 6 (b) or ~~their~~ the corrected burning rate according to the burning rate test described in part V, subsection 51.4 of the *United Nations Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria* is greater than 1200kg/min; or
- (c) ~~Their~~ The exothermic decomposition energy is less than 300J/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 *United Nations Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria*).*

Source: *ST/SG/AC.10/C.3/2016/30, para. 6 (as amended by the working group) and Para. 24 of this report.*