

**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

4 December 2015

Forty-eighth session

Geneva, 30 November-9 December 2015

Item 2 of the provisional agenda

Explosives and related matters

Report of the Working Group on Explosives

Transmitted by the chairman of the Working Group on Explosives

Introduction

1. The working group (EWG) met from 30 November to 4 December 2015 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 40 experts in attendance from Australia, Belgium, Canada, Finland, France, Germany, Italy, Japan, Netherlands, Poland, Spain, Sweden, Switzerland, UK, USA, EU Commission, AEISG, CEFIC, CLEPA, COSTHA, Fertilizers Europe, IME, 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 EWG 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. The working group discussed the following papers.

Document	Title
<u>Agenda Item 2(a)</u> <i>ST/SG/AC.10/C.3/2015/34 (Japan)</i>	<u>Tests and criteria for flash compositions</u> <i>Proposals on the US- and HSL Flash Compositions Tests</i>
<u>Agenda Item 2(b)</u> <i>ST/SG/AC.10/C.3/2015/40 (Canada)</i>	<u>Review of Test Series 6</u> <i>Additional examination criteria for Division 1.4</i>
<u>Agenda Item 2(c)</u> <i>ST/SG/AC.10/C.3/2015/41 (Canada)</i> <i>UN/SCETDG/48/INF.22 (Spain)</i>	<u>Review of tests in parts I and II of the Manual of Tests and Criteria</u> <i>Use of the minimum burning pressure test as a replacement for some of the Series 8 Tests</i> <i>On the use of the minimum burning pressure test as a replacement for Tests 8 (c) and 8 (d)</i>
<u>Agenda Item 2(d)</u> <i>No documents</i>	<u>Review of packing instructions for explosives</u>
<u>Agenda Item 2(f)</u> <i>No documents</i>	<u>Classification of fireworks</u>
<u>Agenda Item 2(g)</u> <i>No documents; however, see: ST/SG/AC.10/C.3/2015/47 under item 2(i)</i>	<u>Classification of articles under UN 0349</u>

Document	Title
<u>Agenda Item 2(h)</u>	<u>Review of Chapter 2.1 of the GHS</u>
<i>ST/SG/AC.10/C.3/94, paras 21-22 and annex 1</i>	<i>Report of the Sub-Committee of Experts on the Transport of Dangerous Goods on its forty-seventh session</i>
<i>ST/SG/AC.10/C.4/58, paras 8-10</i>	<i>Report of the Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals on its twenty-ninth session</i>
<i>UN/SCETDG/48/INF.32</i>	<i>Status report on the work of the informal correspondence group on the revision of GHS Chapter 2.1</i>
<i>UN/SCEGHS/30/INF.9 (Sweden)</i>	
<u>Agenda Item 2(i)</u>	<u>Miscellaneous</u>
<i>ST/SG/AC.10/C.3/2015/42 (Canada)</i>	<i>Additional entries for Special Provision 347</i>
<i>ST/SG/AC.10/C.3/2015/43 (SAAMI)</i>	<i>Analogy approvals based on test results obtained using the Manual of Tests and Criteria</i>
<i>ST/SG/AC.10/C.3/2015/47 (United Kingdom)</i>	<i>Application of security provisions to Explosives, N.O.S</i>
<i>UN/SCETDG/48/INF.17 (United Kingdom)</i>	<i>Document ST/SG/AC.10/C.3/2015/47 <u>with revised paragraph 6</u></i>
<i>UN/SCETDG/48/INF.25 (Sweden)</i>	<i>Comments on document ST/SG/AC.10/C.3/2015/47 Explosives excluded from the high consequence dangerous goods list in Chapter 1.4</i>
<i>UN/SCETDG/48/INF.44 (Italy)</i>	<i>Application of Security Provisions to Explosives N.O.S – Comments on ST/SG/AC.10/C.3/2015/47 (United Kingdom) and informal document INF.17 (United Kingdom)</i>
<u>Agenda Item 10(g)</u>	<u>Use of the Manual of Tests and Criteria in the context of the GHS</u>
<i>ST/SG/AC.10/C.3/2015/50 (Chairman of the Working Group on Explosives)</i>	<i>Use of the Manual of Tests and Criteria in the context of the GHS</i>
<i>UN/SCETDG/48/INF.46 -</i>	<i>Use of the Manual of Tests and Criteria in the context of the GHS:</i>
<i>UN/SCEGHS/30/INF.13 - (Canada)</i>	<i>Proposed amendments to Chapter 31 of Part III of the Manual</i>
<i>UN/SCETDG/48/INF.47 -</i>	<i>Use of the Manual of Tests and Criteria in the context of the GHS:</i>
<i>UN/SCEGHS/30/INF.14 - (Canada)</i>	<i>Proposed amendments to Chapter 32 of Part III of the Manual</i>
<i>Background documents:</i>	
<i>ST/SG/AC.10/C.3/2014/61 (Secretariat)</i>	
<i>Informal document INF.8 and Adds 1–5 (45th session) (Secretariat)</i>	
<u>Agenda Item 10(h)</u>	<u>Miscellaneous</u>
<i>ST/SG/AC.10/C.4/2015/9</i>	<i>Further refinement of precautionary statement P502 for explosives</i>
<i>UN/SCETDG/48/INF.36</i>	<i>GHS Precautionary statement P502: Comments on document</i>
<i>UN/SCEGHS/30/INF.11 (France)</i>	<i>ST/SG/AC.10/C.4/2015/9</i>

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.3/2015/34 (Japan)*

Informal documents: *None*

Discussion: Regarding the US and HSL flash composition tests, work has been completed in comparing the two tests to ensure their acceptability for use in classifying fireworks. After a final review during the 47th Session, a general consensus was reached by the working group and Japan was asked to formalize proposals in a working document for the 48th Session. Except as noted below, the working group agreed that the proposals in 2015/34 were appropriate. Exceptions noted were:

- Since black powder is not considered a flash composition, black powder example entries should be removed from the example tables in proposals 4 and 5.
- The working group noted that some of proposal 4, related to section 4 of Appendix 7 of the Manual of Tests and Criteria (MTC) were already contained in Rev. 6 and were not needed. However, a reference to “lifting charge” should be changed to “propellant charge” (see below). Also, a reference to aural effect that appeared in Rev.5 of the MTC is missing from Rev.6 and should be restored. Finally, the update to the example table in proposal 4 was needed and accepted by the working group with the amendment discussed above.
- Throughout the proposals in 2015/34, references to “lifting charge” should be changed to “propellant charge”.
- The working group noted a difference in the use of “aural effect” vs. “report effect” as in the other parts of the default table.
- In proposal 6, the working group preferred simpler wording.
- In proposal 7, the name of the test (HSL Flash Composition Test) should be added to the proposed amended Note 2(a) of section 2.1.3.5.5 of the Model Regulations.
- In proposal 8, the proposed wording in the “Specification” column of the table should be amended to be consistent with the wording accepted for proposal 6.

Conclusion: The working group accepted the proposals 1 – 8, with certain amendments (discussed above) in the Annex to 2015/34. See Amendments 1 – 3 in Annex 2 of this report and Amendments 1 – 5 in Annex 3.

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

5. **Subject:** Expansion of Test Series 6(d) for certain Division 1.4 other than S explosives

Documents: ST/SG/AC.10/C.3/2015/40 (Canada)

Informal documents: None

Discussion: Canada proposes to expand the use of the 6(d) test to ensure that explosives that might present a significant hazard during transport (if accidentally initiated) are not classified into Division 1.4. They propose to do this by adding blast measurement criteria to the 6(d) test and by applying SP 347 to the following entries (in addition to the current eight and those proposed by Canada in document ...C.3/2015/42):

- UN 0276 – CARTRIDGES, POWER DEVICE (1.4C)
- UN 0350 – ARTICLES, EXPLOSIVES, N.O.S. (1.4B)
- UN 0351 – ARTICLES, EXPLOSIVES, N.O.S. (1.4C)
- UN 0352 – ARTICLES, EXPLOSIVES, N.O.S. (1.4D)
- UN 0444 – CHARGES, EXPLOSIVE, COMMERCIAL without detonator (1.4D)
- UN 0472 – ARTICLES, EXPLOSIVES, N.O.S. (1.4F)
- UN 0479 – SUBSTANCES, EXPLOSIVE, N.O.S. (1.4C)
- UN 0480 – SUBSTANCES, EXPLOSIVE, N.O.S. (1.4D)

Canada proposes that, if a peak incident blast pressure of more than 35 kPa is measured at a distance of 2.5 m (radial distance from the center of explosion), then the explosive is assigned to Division 1.1. Canada further proposes to add the 6(c) acceptance criteria found in section 16.6.1.4.4 (a) and (b) of the MTC for Division 1.3 to the 6(d) test to determine if tested items should be assigned to Division 1.3.

While there was general sympathy for the problem expressed by Canada, there was little support for the proposed solution. Many in the EWG preferred to have a look at acceptance criteria for the 6(a) and 6(b) tests to determine if there was some gap in them causing the problem expressed by Canada.

Conclusion: No conclusion was reached by the EWG. Canada may consider some revision to acceptance criteria of 6(a) and 6(b) to address the issue and return with a new proposal.

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

6. **Subject:** Use of Minimum Burning Pressure test as a replacement for the 8(c) Koenen Test and 8(d) Vented Pipe Test

Documents: ST/SG/AC.10/C.3/2015/41 (Canada)

Informal documents: UN/SCETDG/48/INF.22 (Spain)

Discussion: Citing dissatisfaction with the current series 8 tests, Canada states that a repeatable, small-scale test that could assess the hazards posed by exposure of ANEs to fire is highly desirable. Canada also believes that the “... attractiveness of the MBP test within Series 8 is based on the fact that, ANEs having a high MBP are harder to ignite, support combustion less readily and show a lower propensity for deflagration-to-detonation behaviour than ANEs having a low MBP. On a more pragmatic basis, the test differentiates between those materials that have historically been considered safe to transport in bulk and those that have not.” In this document, Canada proposes to amend Test Series 8 in order to replace the current Tests 8(c) (Section 18.6.1 Koenen Test) and 8(d) (Section 18.7.1 Vented Pipe Test and Section 18.7.2 Modified Vented Pipe Test) with the CERL MBP Test described in the annex to the paper. They further propose that inclusion in the UN 3375 and Division 5.1 be restricted to those products having a MBP above 5.6 MPa (800 psig).

In 48/INF.22, Spain opposes acceptance of the MBP as either a replacement for, or alternative to, the 8(c) and/or the 8(d) test. Spain claims that no correlation between the MBP and the 8(c) and 8(d) tests has been established, no comparative testing has been reported, and that the MBP may mischaracterize the hazards associated with transporting ANEs as Division 5.1 (UN 3375) dangerous goods. Further, Spain provides a report that shows a clear relationship between modified vented pipe test and Koenen test, however no relationships between MBPT and Koenen tests, or between the MBPT and MVPT were found.

France is of the opinion that the MBP is a valuable test as it can fill a gap for better assessment of ANEs.

Some members of the working group expressed concern over correlation between the MBP test and the present 8(c) and 8(d) tests while others felt that correlation wasn't the issue, instead preferring to be assured that any and all of the tests examine appropriate effects and give reliable results. As noted at the last session, the working group again acknowledged that the 8(c) test could give both false positives and false negatives, but the general feeling was that the possibility

of false negatives was the more important issue. The working group still favors refinement of the current tests or development of new tests to more reliably determine the classification of ANEs and to judge their suitability for transportation in tanks. Some felt that the MBP might be a possible solution, but there was no clear consensus on this. After a lengthy, complex discussion, the EWG could not agree on acceptance of the proposal in 2015/41. Nevertheless, several members felt that the MBP test could be useful as a possible additional or alternative test.

Conclusion: Canada plans to establish an informal correspondence group to amend the current proposal. EWG members should expect an invitation to participate in this informal correspondence group sometime in January.

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

7. No documents were submitted

Agenda Item 2(f) – Classification of fireworks

8. No documents were submitted

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

9. No documents were submitted; however, see discussion of *ST/SG/AC.10/C.3/2015/47 under item 2(i)*

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

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

Documents: *ST/SG/AC.10/C.3/94, paras 21-22 and annex 1*
ST/SG/AC.10/C.4/58, paras 8-10

Informal documents: *UN/SCETDG/48/INF.32 (UN/SCGHS/30/INF.9) (Sweden)*

Discussion: 48/INF.32 reports on the status of work of the informal correspondence group (ICG) that is conducting a review of GHS Chapter 2.1 (explosives). The leader of the ICG reports his hope that the work can be completed during the current biennium and list the following fundamentals within which the ICG hope to complete this work:

- No classification of new substances, mixtures or articles as explosives
- No new classification procedures or new mandatory tests
- Assigned GHS-labelling elements for all explosives
- Keep it as simple as possible

Comments have been received and reviewed by the ICG leader, an updated proposal has been circulated to ICG members and comments are pending.

Conclusion: There was wide support within the EWG for the four basic principles identified in this report (and listed above). In regards the three work streams identified by the leader of the ICG, feedback by the ICG is still pending (due 10 January 2016). Once collected and reviewed,

the goal is to complete the work in this biennium. The EWG identified some work complementary to the three work streams that should also be addressed, recognizing that the priority is to resolve the work streams. Intersessionally, the EWG chairman will better define this additional work and the review will progress during the current, and possibly the next, biennium.

Agenda Item 2(i) – Miscellaneous

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

Documents: ST/SG/AC.10/C.3/2015/42 (Canada)

Informal documents: None

Discussion: In addition to the eight 1.4S entries to which SP 347 and the UN 6(d) test currently apply, Canada proposes to expand the application of the 6(d) test to those articles and substances whose classification as 1.4S is normally package dependent or that are generic by applying SP 347 to the following additional entries:

- UN 0337 – FIREWORKS
- UN 0349 – ARTICLES, EXPLOSIVE, N.O.S.
- UN 0367 – FUZES, DETONATING
- UN 0376 – PRIMERS, TUBULAR
- UN 0384 – COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
- UN 0404 – FLARES, AERIAL
- UN 0432 – ARTICLES, PYROTECHNIC for technical purposes
- UN 0460 – CHARGES, BURSTING, PLASTIC BONDED
- UN 0481 – SUBSTANCES, EXPLOSIVE, N.O.S.
- UN 0506 – SIGNALS, DISTRESS, ship

It was noted that UN 0460 already has SP 347 assigned. In general, it was felt that the problem with the 6(d) test is the absence of a clear definition of “hazardous effect”, which is what the test is supposed to be evaluating. Related to that, it was suggested that the four acceptance criteria of the 6(d) test might be unclear and in some cases, too strict. There was little support for acceptance of all the entries proposed by Canada for application of SP 347 (i.e., subject to 6(d) test). However, most of the EWG did support applying SP 347 to the NOS entries cited by Canada and to UN 0367 (Fuzes, detonating). The EWG expressed concerns about retroactivity and/or implementation date for these entries and felt that more time is needed to evaluate potential guidance. The EWG also noted that some guidance should be provided to avoid overzealous implementation of the 6(d) test.

Conclusion: Canada plans to develop a new proposal to apply SP 347 to the NOS entries and UN 0367 and may take on the issue of clarifying the meaning of “hazardous effects”. This work may also be conducted in consultation with an informal correspondence group consisting of interested EWG members.

12. **Subject:** Classification by Analogy

Documents: ST/SG/AC.10/C.3/2015/43 (SAAMI)

Informal documents: None

Discussion: SAAMI proposes addition of an appendix on analogy classification in the MTC. The appendix includes the purpose, scope, parameters and an example. SAAMI stated that Section 1 of the draft appendix (the purpose) was intended to explain that explosives are not self-classified

and to describe the complexities of obtaining a classification of explosives, many of which are package specific. In this situation, analogies to tested products are commonly necessary, which still provides a level of control beyond that required for other dangerous goods. Some of the working group felt that this was already understood by the experts and therefore unnecessary. The working group noted however, that although this information was already understood by the experts, it could be useful for the intended audience of the MTC (i.e., those who have to obtain explosives classifications).

Many of the Competent Authorities in the EWG use classification by analogy on a regular basis, and agreed that this was a valid principle. There was general agreement that the concept of classification by analogy needed to be explicitly mentioned in the Model Regulations. Also, some form of guidance similar to that provided in Sections 1 and 2 of the proposed appendix was supported, although it should be somewhat less detailed. There was very little support for a checklist of parameters described in Section 3 of the proposed appendix, preferring to leave that to Competent Authorities.

The working group noted that, in section 1.1.2 of the MTC, a reference to “testing authority” should really be “competent authority”.

Conclusion: SAAMI plans, in consultation with interested EWG members, to further refine the proposal for the 49th Session. IME plans to submit a proposal for the 49th Session to correct the “testing authority” reference described above.

13. **Subject:** Application of security provisions to Explosives, N.O.S.

Documents: ST/SG/AC.10/C.3/2015/47 (United Kingdom)

Informal documents: UN/SCETDG/48/INF.17 (United Kingdom)
UN/SCETDG/48/INF.25 (Sweden)
UN/SCETDG/48/INF.44 (Italy)

Discussion: 2015/47 Discusses the potential for explosives (specifically n.o.s. entries) that, as a consequence of being repackaged and reclassified, cease to be considered as high consequence dangerous goods and therefore do not attract the security provisions of Chapter 1.4 of the Model Regulations. Three options are provided as possible solutions and the UK suggests preference to option 2, an amendment of SP 178 (applies to all Class 1 n.o.s. entries) to require that the competent authority, when issuing approval, specify whether the provisions of Chapter 1.4.3.2 are to be applied if not already required. When so specified, the information provided in accordance with Chapter 5.4 would be required to clearly identify the article or substance as a ‘High Consequence Dangerous Goods’. 48/INF.17 revises para. 6 of 2015/47 by adding the option numbers referred to in subsequent paragraphs of 2015/47. 48/INF.17 makes no other changes. 48/INF.17 served as the basis of this discussion.

The UK also proposed that Division 1.6 explosives should be included on the list.

In 48/INF.25, Sweden, supporting the initiative by the UK in 2015/47, proposes to also add the following explosives to the high consequence list: UN 0276, 0278, 0323, 0444, 0445, 0459, 0460 and 0491.

In 48/INF.44, Italy discusses its objections to the proposals from the UK in 2015/47 as amended by 48/INF.17 and proposes an updated version of their proposal from 2014/86.

With the exception of the proposal regarding Division 1.6 explosives, the working group did not support the solution proposed by the UK, the proposed expansion by Sweden, or the Italian

proposal. Instead, it noted that there was some disconnect between the term “high consequence dangerous goods” and the items actually listed in the indicative list. It also noted that classifications in the list other than class 1 are “indicative” only when transported in bulk, whereas some explosives entries are included independent of quantity consideration.

The EWG requests guidance from the Sub-Committee whether the term ‘High Consequence’ in 1.4.3.1.1:

- should be taken to include only dangerous goods which may be used directly to cause mass casualties and mass destruction (e.g., a tanker of petrol); or
- includes “security sensitive” dangerous goods, which, by themselves, would not cause mass casualties but which may be used as components for making such things (for example, detonators of 1.4S (UN 0456)).

Depending on the answer to this, the working group sees two options for the treatment of explosives in the indicative list:

- **Option 1** – “High Consequence” means dangerous goods that can cause mass casualties and/or mass destruction:

If chapter 1.4 applies only to those dangerous goods that can cause mass casualties and/or mass destruction, then the EWG recommends the following revisions to section 1.4.3 of the Model Regulations:

1.4.3 Provisions for high consequence dangerous goods

1.4.3.1 Definition of high consequence dangerous goods

1.4.3.1.1 High consequence dangerous goods are those which [\(as transported\)](#) have the potential for misuse in a terrorist event and which may, as a result, produce serious consequences such as mass casualties, mass destruction or, particularly for Class 7, mass socio-economic disruption.

1.4.3.1.2 An indicative list of high consequence dangerous goods in classes and divisions other than Class 7 is given in Table 1.4.1 below. [It should also be noted that certain dangerous goods, particularly explosives of Class 1, Division 1.4, may not produce high consequence effects, but they may be diverted for terrorist purposes. These goods are not High consequence dangerous goods as defined in Section 1.4.3.1.1, but they do present security threats.](#)

Table 1.4.1: Indicative list of high consequence dangerous goods

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
Class 1, Division 1.5	explosives

(no changes proposed below this point)

- **Option 2** – “High Consequence” includes “security sensitive” dangerous goods:

If Chapter 1.4 applies to all dangerous goods that present a security risk (such as most class 1 dangerous goods), then the EWG proposes to redraft the definition of “high consequence” and the list of high consequence dangerous goods. This redraft will probably take the form of a framework that includes all class 1 dangerous goods as high consequence dangerous goods with an associated list of exceptions. The working group has not evaluated the effect of this approach upon the other dangerous goods, other than Class 1, shown in the indicative list.

Conclusion: No formal conclusion was reached by the EWG; however, it proposes to consider the matter further after it receives the requested guidance from the TDG Sub-Committee.

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

14. **Subject:** Use of the Manual of Tests and Criteria in the context of the GHS

Documents: ST/SG/AC.10/C.3/2015/50 (Explosives Working Group Chair)

Background documents: ST/SG/AC.10/C.3/2014/61 (Secretariat)
UN/SCETDG/45/INF.8 and Add.1, Add.2, Add.3, Add.4, & Add.5 (45th session) (Secretariat)

Informal documents: UN/SCETDG/48/INF.46 (UN/SCEGHS/30/INF.13) (Canada)
UN/SCETDG/48/INF.47 (UN/SCEGHS/30/INF.14) (Canada)

Discussion: 2015/50 reports on reviews being conducted related to the introduction of GHS context into the MTC. SAAMI and the Chairman of the Working Group performed the review of Part I and the Introduction and Germany, CEFIC and the Chairman reviewed Part II and, on a more general level, Part III. These reviews have led to several proposals to the EWG as the overall project to introduce GHS context continues. The EWG reviewed these proposals as follows:

- References to substances and mixtures: Rather than adjusting all references in the MTC, the working group accepted the recommendation to add a note to para. 1.1.1 of the MTC explaining that, where the term “substance” appears, it includes substances and mixtures, unless specified otherwise.
- Expansion of references to transport to include other sectors: after considerable debate, the EWG decided that the EWG chair should distribute a marked up draft so that it can determine whether each reference to transport is necessary or if no sector mention would be appropriate.
- Regarding replacement of transport specific classification flowcharts in the MTC with the more generic ones that appear in the GHS: No consensus could be reached. This will be considered further during the review mentioned above to try to determine an acceptable solution.
- Regarding the proposal to add guidance about how to address changes in physical state: In general, the EWG agreed with the text previously suggested by the Secretariat; however, some clarification is needed and will be addressed by the working group.

- Removal of class references when describing dangerous goods (for example Explosives of Class 1): The EWG agreed that references to the class (i.e., “of Class 1) were unnecessary (i.e., “Explosives” is descriptive enough).
- References to packing group and/or category in Part III of the MTC: The EWG concurred with the recommendation.

In 48/INF.46, Canada makes proposals related to the introduction of GHS context into Section 31 of Part III of the MTC. During the discussion at the EWG, Canada acknowledged the previous determination by the EWG related to references to “mixtures” in association to references to “substances” and agreed to that solution being applied to Chapter 31 as well. The mention of pyrophoric substances was considered and the EWG recommended leaving that reference out for the time being. Other than as noted, in general, the EWG accepted the recommendations in 48/INF.46 and the review will continue.

In 48/INF.47, Canada makes proposals related to the introduction of GHS context into Section 32 of Part III of the MTC. During the discussion at the EWG, Canada acknowledged the previous determination by the EWG related to references to “mixtures” in association to references to “substances” and agreed to that solution being applied to Chapter 32 as well. The working group noted that references in Table 32.1 were inconsistent with the comparable tables in the Model Regulations and the GHS and that review should be undertaken to ensure that all the tables are consistent. Other than as noted, in general, the EWG accepted the recommendations in 48/INF.46 and the review will continue.

Conclusion: The EWG appreciated the work done thus far by those reviewing the MTC to determine appropriate introduction of GHS context and, with some adjustments, endorsed the recommendations made. Given acceptance of those recommendations, the review will continue with a goal to complete the work during the current biennium.

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

15. **Subject:** Use of the Manual of Tests and Criteria in the context of the GHS

Documents: ST/SG/AC.10/C.4/2015/9 (Sweden)

Informal documents: UN/SCETDG/48/INF.36 (UN/SCEGHS/30/INF.11) (France)

Discussion: Based upon discussions at the 29th Session of the GHS, Sweden has submitted 2015/9 to the GHS. In this document, Sweden proposes expansion of GHS precautionary statement P502, which currently applies to ozone depleting substances, to also include precautionary statements regarding disposal of explosives. Since this proposal affects explosives, France has requested in 48/INF.36 that the proposal also be reviewed for comments by the EWG.

Conclusion: The working group found the options proposed in C.4/2015/9 to be very difficult to comprehend and it recommends that a separate precautionary statement for explosives be developed, as originally proposed by Sweden (UN/SCEGHS/25/INF.18).

Annex 1**Working Group on Explosives (30 November – 4 December 2015)****List of Participants**

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Annex 2

Working Group on Explosives (30 November – 4 December 2015)

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

Amendment 1.

Section 2.1.3.5.1(a) – amend as shown below:

- (a) waterfalls ~~giving a positive result when tested in one of the HSL Flash composition tests in Appendix 7 of the Manual of Tests and Criteria~~ **containing flash composition (see Note 2 of 2.1.3.5.5)** shall be classified as 1.1G regardless of the results of Test Series 6;

Source: ST/SG/AC.10/C.3/2015/34, Para. 11 (as amended by the EWG) and Para. 4 of this report.

Amendment 2.

Section 2.1.3.5.5 – amend Note 2 to as shown below

NOTE 2: “Flash composition” in this table refers to pyrotechnic substances in powder form or as pyrotechnic units as presented in the firework that are used in waterfalls, or to produce an aural effect or used as a bursting charge, or propellant charge unless:

(a) ~~The time taken for the pressure rise in the HSL Flash Composition Test in Appendix 7 of the Manual of Tests and Criteria is demonstrated to be more than 6 ms for 0.5 g of pyrotechnic substance; or~~

(b) The pyrotechnic substance gives a negative “-” result in the ~~HSL~~ US Flash Composition Test in Appendix 7 of the Manual of Tests and Criteria.

Source: ST/SG/AC.10/C.3/2015/34, Para. 12 (as amended by the EWG) and Para. 4 of this report

Amendment 3.

Section 2.1.3.5.5 – amend the waterfall entry in the default fireworks classification table as shown below:

Type	Includes: / Synonym:	Definition	Specification	Classification
Waterfall	cascades, showers	pyrotechnic fountain intended to produce a vertical cascade or curtain of sparks	containing flash composition a pyrotechnic substance which gives a positive result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria regardless of the results of Test Series 6 (see 2.1.3.5.1 (a))	1.1G
			not containing flash composition a pyrotechnic substance which gives a negative result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria	1.3G

Source: ST/SG/AC.10/C.3/2015/34, Para. 13 (as amended by the EWG) and Para. 4 of this report

Annex 3

Working Group on Explosives (30 November – 4 December 2015)

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.

Appendix 7 – Revise title and add new subheading as shown below:

APPENDIX 7

~~HSL~~-FLASH COMPOSITION TESTS

A. HSL Flash Composition Test

Source: ST/SG/AC.10/C.3/2015/34, Para. 6 and Para. 4 of this report

Amendment 2.

Appendix 7 (A. HSL Flash Composition Test), Section 1 – Amend as shown below:

1. Introduction

This test is used to determine whether 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 ~~lifting-propellant~~ charge, are considered to be flash compositions for the purposes of determining the classification of fireworks using the UN default fireworks classification table in 2.1.3.5.5 of the Model Regulations.

Source: ST/SG/AC.10/C.3/2015/34, Para. 7 (as amended by the EWG) and Para. 4 of this report

Amendment 3.

Appendix 7 (A. HSL Flash Composition Test), Section 2.2 – Amend as shown below:

2.2 The end of the pressure vessel furthest from the side-arm is closed with a cone in firing plug which is fitted with two electrodes, one insulated from, and the other earthed to, the plug body. The other end of the pressure vessel is closed by ~~an~~ brass or aluminium bursting disc 0.2 mm thick (bursting pressure approximately 2 200 kPa) held in place with a retaining plug which has a 20 mm bore. A soft lead washer or a washer of a suitable deformable material (for example, polyoxymethylene) is used with both plugs to ensure a good seal.

Source: ST/SG/AC.10/C.3/2015/34, Para. 8 and Para. 4 of this report

Amendment 4.

Appendix 7 (A. HSL Flash Composition Test), Section 4 – Amend as shown below:

4. Test criteria and method of assessing results

The test results are interpreted in terms of whether a gauge pressure of 2 070 kPa is reached and, if so, the time taken for the pressure to rise from 690 kPa to 2 070 kPa gauge. 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 ~~lifting-propellant~~ charge, is to be considered as flash composition if the minimum time taken for the pressure rise is shown to be less than, or equal to, 6 ms for 0.5 g of pyrotechnic substance.

Examples of results:

Substance	Maximum pressure rise (kPa)	Mean time for a pressure rise from 690 to 2 070 kPa (ms)	Result
1	>2 070	0.70	Flash composition
2	>2 070	4.98	Flash composition
4	>2 070	1.51	Flash composition
5	>2 070	0.84	Flash composition
6	>2 070	11.98	Not flash composition

<u>Composition (wt. %)</u>	<u>Use or effect</u>	<u>Minimum time for a pressure rise from 690 to 2 070 kPa (ms)</u>	<u>Result</u>
<u>Potassium perchlorate/Aluminum = 77/23</u>	<u>Aural (report)</u>	<u>0.48</u>	<u>Flash composition</u>
<u>Potassium perchlorate/ Barium nitrate/ Aluminum /Magnalium = 20/20/45/15</u>	<u>Aural (report)</u>	<u>2.15</u>	<u>Flash composition</u>
<u>Potassium perchlorate /Potassium benzoate = 71/29</u>	<u>Aural (whistle)</u>	<u>0.89</u>	<u>Flash composition</u>
<u>Potassium perchlorate /Potassium terebiphthalate /Titanium = 62/25/13</u>	<u>Aural (whistle)</u>	<u>1.67</u>	<u>Flash composition</u>
<u>Potassium perchlorate /Aluminum (P2000)/Aluminum (P50) = 53/16/31</u>	<u>Waterfall</u>	<u>2.73</u>	<u>Flash composition</u>
<u>Potassium perchlorate /Aluminum (P2000)/Aluminum (P50)/ Antimony Sulfide = 50/15/30/5</u>	<u>Waterfall</u>	<u>1.19</u>	<u>Flash composition</u>
<u>Potassium perchlorate/Charcoal = 80/20</u>	<u>Bursting</u>	<u>0.85</u>	<u>Flash composition</u>
<u>Potassium perchlorate/Charcoal = 60/40</u>	<u>Bursting</u>	<u>2.80</u>	<u>Flash composition</u>
<u>Potassium perchlorate/Charcoal = 50/50</u>	<u>Bursting</u>	<u>9.26</u>	<u>Not flash composition</u>
<u>Potassium perchlorate/ Potassium nitrate /Charcoal = 53/26/21</u>	<u>Bursting</u>	<u>1.09</u>	<u>Flash composition</u>
<u>Potassium perchlorate/ Potassium nitrate /Charcoal = 53/26/21 (Cottonseed core)</u>	<u>Bursting</u>	<u>7.39</u>	<u>Not flash composition</u>
<u>Potassium perchlorate/Charcoal /Aluminum = 59/23/18</u>	<u>Bursting</u>	<u>1.14</u>	<u>Flash composition</u>

Source: ST/SG/AC.10/C.3/2015/34, Para. 9 (as amended by the EWG) and Para. 4 of this report

Amendment 5.

Appendix 7 – After Figure A7.9, insert new US Flash Composition Test as shown below:

B. US Flash Composition Test**1. Introduction**

This test may be used to determine if pyrotechnic substances in powder form or as pyrotechnic units as presented in fireworks that are used in waterfalls, or to produce an aural effect or used as a bursting charge or propellant charge, may be considered a “flash composition” for the purposes of the default fireworks classification table in 2.1.3.5.5 of the Model Regulations.

2. Apparatus and materials

The experimental set up consists of:

A cardboard or fibreboard sample tube with a minimum inside diameter of 25 mm and a maximum height of 154 mm with a maximum wall thickness of 3.8 mm, closed at the base with a thin cardboard or paperboard disk, plug or cap just sufficient to retain the sample;

A 1.0 mm thick 160 × 160 mm witness plate consisting of steel conforming to specification S235JR (EN10025) or ST37-2 (DIN17100) or SPCC (JIS G 3141) or equivalent having a stretch limit (or rupture strength) of 185-355 N/mm², an ultimate tensile strength of 336-379 N/mm² and a percentage elongation after fracture of 26-46% ;

An electric igniter, e.g. a fuse head, with lead wires of at least 30 cm in length;

A mild steel confinement sleeve (weighing approximately 3 kg) having an outside diameter of 63 mm and a minimum length of 165 mm with a flat-bottomed round bore whose interior dimensions for diameter and depth are 38 mm and 155 mm, respectively, and a notch or groove cut into one radius of the open end sufficient to allow the igniter lead wires to pass through (the steel sleeve might be provided with a rugged steel handle for easier handling);

A steel ring of approximately 50 mm height with an inner diameter of 95 mm; and

A solid metal base, e.g. a plate of approximately 25 mm in thickness and 150 mm square.

3. Procedure

3.1 Prior to testing, the pyrotechnic substance is stored for at least 24 hours in a desiccator at a temperature of 20-30 °C. Twenty-five (25) g net mass of the pyrotechnic substance to be tested as a loose powder or granulated or coated onto any substrate, is pre-weighed and then poured carefully into a fibreboard sample tube with the bottom end closed with a cardboard or paperboard disk, cap or plug. After filling, the top cardboard or paperboard disk, cap or plug might be inserted lightly to protect the sample from spillage during transport to the test stand. The height of the sample substance in the tube will vary depending on its density. The sample should be first consolidated by lightly tapping the tube on a non-sparking surface. The final density of the pyrotechnic substance in the tube should be as close as possible to the density achieved when contained in a fireworks device.

3.2 The witness plate is placed on the supporting ring. If present, the paperboard or cardboard top disk, cap or plug of the fibreboard sample tube is removed and the electric igniter is inserted into the top of the pyrotechnic substance to be tested and visually

positioned to an approximate depth of 10 mm. The paperboard or cardboard top disk, cap or plug is then inserted or re-inserted, fixing the igniter's position in the fibreboard sample tube and the depth of its match head. The lead wires are bent over and down along the sidewall and bent away at the bottom. The sample tube is placed vertically and centred on the witness plate. The steel sleeve is placed over the fibreboard sample tube. The igniter lead wires are positioned to pass through the slotted groove in the bottom edge of the steel confining sleeve and will be ready to attach to the firing circuit apparatus. Finally, the alignment of the steel sleeve and the witness plate is corrected so that their centres are aligned with the centre of the steel ring. See Figure A7.10 as an example of the test set-up. The cardboard or paperboard disk, cap or plug at the bottom end of the sample tube should be placed properly to avoid air gap between the witness plate and the bottom end of the substance to be tested.

3.3 The electric igniter is then initiated from a safe position. After initiation and a suitable interval the witness plate is recovered and examined. The test should be performed 3 times unless a positive result is obtained earlier.

4. Test criteria and method of assessing results

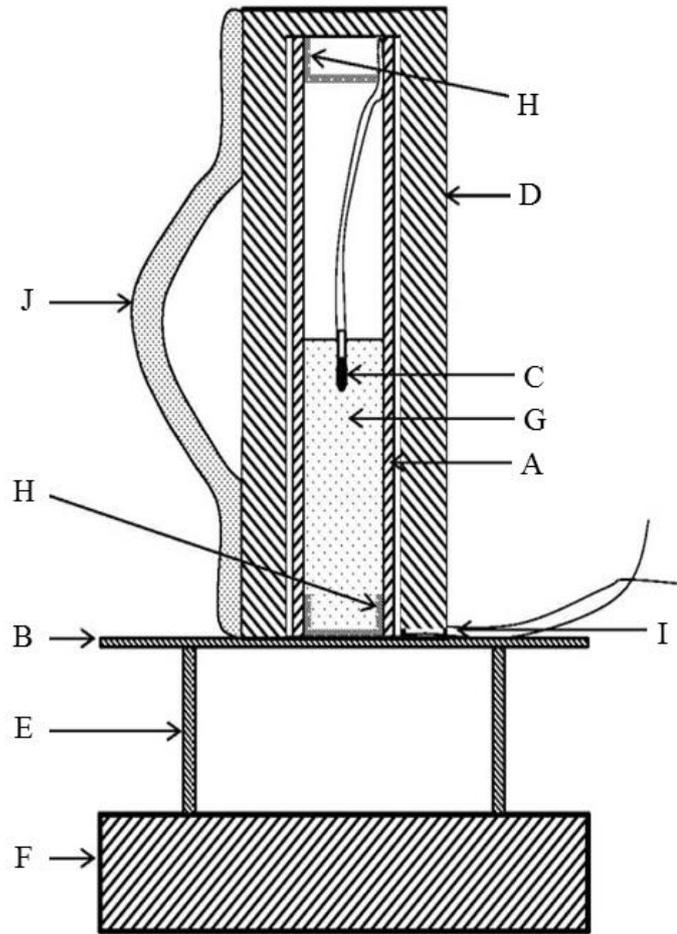
The result is considered positive "+" and the pyrotechnic substances in powder form or as pyrotechnic units as presented in the fireworks, that are used in waterfalls, or to produce an aural effect, or used as a bursting charge or propellant charge, is to be considered as flash composition if:

- In any trial the witness plate is torn, perforated, pierced or penetrated; or;
- The average of the maximum depths of indented witness plates from all three trials exceeds 15 mm.

Examples of results

<i>Composition (wt. %)</i>	<i>Use or effect</i>	<i>Observation of witness plate or averaged depth of indentation (mm)</i>	<i>Result</i>
<i>Potassium perchlorate/Aluminum = 77/23</i>	<i>Aural (report)</i>	<i>Pierced</i>	<i>Flash composition</i>
<i>Potassium perchlorate/ Barium nitrate/ Aluminum /Magnalium = 20/20/45/15</i>	<i>Aural (report)</i>	<i>11.3</i>	<i>Not flash composition</i>
<i>Potassium perchlorate /Potassium benzoate = 71/29</i>	<i>Aural (whistle)</i>	<i>Pierced</i>	<i>Flash composition</i>
<i>Potassium perchlorate /Potassium terebipthalate /Titanium = 62/25/13</i>	<i>Aural (whistle)</i>	<i>Pierced</i>	<i>Flash composition</i>
<i>Potassium perchlorate /Aluminum (P2000)/Aluminum (P50) = 53/16/31</i>	<i>Waterfall</i>	<i>Pierced</i>	<i>Flash composition</i>
<i>Potassium perchlorate /Aluminum (P2000)/Aluminum (P50)/ Antimony Sulfide = 50/15/30/5</i>	<i>Waterfall</i>	<i>Pierced</i>	<i>Flash composition</i>
<i>Potassium perchlorate/Charcoal = 80/20</i>	<i>Bursting</i>	<i>Pierced</i>	<i>Flash</i>

<u>Composition (wt. %)</u>	<u>Use or effect</u>	<u>Observation of witness plate or averaged depth of indentation (mm)</u>	<u>Result</u>
			<u>composition</u>
<u>Potassium perchlorate/Charcoal = 60/40</u>	<u>Bursting</u>	<u>17.7</u>	<u>Flash composition</u>
<u>Potassium perchlorate/Charcoal = 50/50</u>	<u>Bursting</u>	<u>6.7</u>	<u>Not flash composition</u>
<u>Potassium perchlorate/ Potassium nitrate /Charcoal = 53/26/21</u>	<u>Bursting</u>	<u>Torn</u>	<u>Flash composition</u>
<u>Potassium perchlorate/ Potassium nitrate /Charcoal = 53/26/21 (Cottonseed core)</u>	<u>Bursting</u>	<u>12.7</u>	<u>Not flash composition</u>
<u>Potassium perchlorate/Charcoal /Aluminum = 59/23/18</u>	<u>Bursting</u>	<u>Pierced</u>	<u>Flash composition</u>



- | | |
|---|---|
| (A) Cardboard or fibreboard sample tube | (B) Steel witness plate |
| (C) Electric igniter | (D) Mild steel confinement sleeve |
| (E) Steel ring | (F) Solid metal base |
| (G) Substance to be tested | (H) Cardboard or paperboard disk, cap or plug |
| (I) Groove in sleeve for igniter wires | (J) Handle welded on (optional) |

Figure A 7.10

Source: ST/SG/AC.10/C.3/2015/34, Para. 10 (as amended by the EWG) and Para. 4 of this report