

**Committee of Experts on the Transport of Dangerous Goods
and on the Globally Harmonized System of Classification
and Labelling of Chemicals**

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Item 2 (h) of the provisional agenda

**Explosives and related matters:
Review of Chapter 2.1 of the GHS**

**Sub-Committee of Experts on the Globally Harmonized
System of Classification and Labelling of Chemicals**

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Item 2 (b) of the provisional agenda

**Classification criteria and related hazard
communication: review of Chapter 2.1**

Hazard Communication in GHS Chapter 2.1

**Transmitted by the United States of America, the Institute of Makers of
Explosives (IME) and the Sporting Arms and Ammunition
Manufacturer's Institute (SAAMI)**

Introduction

1. The USTF notes with appreciation the proposal of Sweden on behalf of the Informal Correspondence group (ICG) for the upcoming session (ST/SG/AC.10/C.3/2019/32-ST/SG/AC.10/C.4/2019/5). Our paper is offered as a possible basis for starting work on the details of hazard communication in accordance with Item 2 proposed by Sweden. Since we started work, we have also noted Sweden's discussion paper on hazard communication elements (UN/SCETDG/55/INF.20 - UN/SCEGHS/37INF.9). We provide the following information for consideration to build on this work.

Label Elements

2. The current Table 2.1.2 is shown below:

Table 2.1.2: Label elements for explosives

	Unstable Explosive	Division 1.1	Division 1.2	Division 1.3	Division 1.4	Division 1.5	Division 1.6
Symbol	Exploding bomb	Exploding bomb	Exploding bomb	Exploding bomb	Exploding bomb; <i>or</i> 1.4 on orange background ^a	1.5 on orange background ^a	1.6 on orange background ^a
Signal word	Danger	Danger	Danger	Danger	Warning	Danger	<i>No signal word</i>
Hazard statement	Unstable Explosive	Explosive; mass explosion hazard	Explosive; severe projection hazard	Explosive; fire, blast or projection hazard.	Fire or projection hazard	May mass explode in fire	<i>No hazard statement</i>

3. We agree with Sweden that finding agreeable hazard communication elements for the subcategories within Category 2 should not pose too much difficulty. We propose the following table to replace Table 2.1.2 as a basis for discussion and to identify any concerns of the Sub-Committee.

	Category 1	Category 2		
		Sub-Category 2A	Sub-Category 2B	Sub-Category 2C
Symbol	Exploding bomb	Exploding bomb	Exploding bomb;	<i>No symbol</i>
Signal word	Danger	Danger	Warning	Warning
Hazard statement	[Explosive. May be sensitive. Use special precautions.]	Explosive	Fire or projection hazard	Fire or projection hazard

4. Note that for Category 1, explosives of dynamic or unknown hazard and sensitivity may be encountered in an unpackaged state in manufacturing processing equipment, assembly or decommissioning (hereafter referred to as “processing”). The intrinsic hazard of potential explosivity should be communicated, but not a specific level of hazard, as the hazard and probability of accidental functioning are variable depending on the quantity and circumstances exterior to the explosive.

5. Per the discussions of the ICG, we anticipate the creation of new hazard statements for Category 1 (previously “unstable explosives”) and have inserted a placeholder and possible solution in square brackets – “Explosive. May be sensitive / Sensitive, according to Test Series 3 or 4. Use special precautions”. In some Category 1 scenarios the hazard may not be communicated on a label (e.g., while in processing, see GHS 1.4.10.5.5.1). Thus the SDS for a hazardous chemical during processing is particularly important.

6. Sweden’s paper on hazard communication elements (UN/SCETDG/55/INF.20 - UN/SCEGHS/37INF.9) provides information on the possibility of special communications for Categories 1 and 2. We concur with this need, and provide additional insight as follows.

(a) For Category 1, there has been a desire to capture data obtained from Test Series 3 and 4. While these tests are not always performed previous to classification into a division for transport and placing on the market, we sympathize with the desire to capture data indicating heightened sensitivity. We suggest including this information, with the following caveats:

(i) In capturing these results, it should be remembered that for unpackaged explosives, safety is based on the various energies found in a process. In a particular process, Test Series 3 and 4 are not necessarily indicative of the probability of an event. An explosive with passing results may pose a high probability of initiation in certain processes to which the explosives will be exposed.

(ii) TS3 and 4 assess initiation energies which may be encountered in transport. A passing result in these tests, does not mean that an unpackaged explosive will be non-reactive to energy levels encountered during processing, which exceed normal transport stimuli and don’t have the benefit of packaging protection. For example, energies in grinding operations may exceed the pass/fail transport energy levels used in the commonly used BAM impact and friction test equipment.

(iii) Test Series 3 and 4 do not assess all initiation scenarios, for example electrostatic discharge (ESD) sensitivity. Different ignition sensitivities may

vary disparately from each other in an explosive, i.e. good thermal stability does not indicate a similar safety factor for friction, impact or ESD initiation.

(iv) Therefore these test results should be caveated that they are an indicator of additional hazard, but absence of test failures does not provide a basis for assuming a certain level of safety in engineering design or procedural controls, and such a basis could be dangerous.

We suggest a new hazard statement [H2XX: May be sensitive / Sensitive, according to Test Series 3 or 4]. One or the other phrase would be used, not both. An explosive may still be subject to accidental initiation in processing even if it passes Test Series 3 or 4.

(b) Also for Category 1, one sector protected by GHS is the workplace, including processing which is not part of the supply sector. In the workplace, unpackaged explosives in processing are intentionally subjected to impact, friction or elevated temperatures, for example, pulverization in a hammer or corning mill. We believe that a suitable warning would be to follow the special precautions normally required for these operations. For this purpose we suggest the hazard statement [H2YY: Use Special Precautions]

(c) For Category 2, there has been a desire to communicate the division classification. We believe this could be done for Category 2 explosives, but should be suitably caveated, e.g., “H2ZZ: Division 1.X as configured for transport”. The “1.X” would be replaced by 1.1, 1.2, 1.3, 1.4, 1.4S, 1.5 or 1.6. Optionally, this could be incorporated in a precautionary statement. Either way, this would accommodate the division information while being mindful of the following facts:

(i) The division classification appears on the outermost layer of packaging only. Storage and supply requirements may be based on this information. The GHS label will appear on the inner packaging, and in some jurisdictions is also placed on intermediate packagings, but not on the outer packaging unless there is only one layer.

(ii) A main purpose of this programme of work has been to identify if the explosive hazard increases when packaging is partially removed. The division is accurate as long as the full configuration as presented for classification is retained. However, communication of the division in a GHS label, on packaging which by default will only be seen when packaging has been removed, is problematic, or is redundant if there is only one layer.

7. To address the endpoints desired, we offer the following hazard statements used in combination:

a. For Category 1:

- [H2WW: Explosive]
- [H2XX: May be sensitive / Sensitive, according to Test Series 3 or 4]
- [H2YY: Use special precautions]

b. For Category 2, we suggest the following additional hazard statement (or precautionary statement):

- [H2ZZ: Division 1.X as configured for transport]

8. For Category 2 in Table 2.1.2, Sub-category 2A would mirror the current approach of Divisions 1.1, 1.2 and 1.3, but with the hazard statement condensed to “Explosive” (please note that Divisions 1.5 and 1.6 present similar hazards and have been included in the sub-category). Sub-category 2B would retain the current approach for Division 1.4. Sub-category 2C is proposed for discussion using the approach of Sub-category 2B, but with no symbol.

9. Note 1 under the current Table 2.1.2 concerning repackaged explosives dealt with issues that resulted in the current rewrite of the chapter, and has been obviated by the new classification system. It would be deleted in a revised GHS Chapter 2.1.

10. The existing Note 2 would be retained and complemented with an additional note, or a merged version. In our proposal for a new classification system, we avoided the creation of a Category 3 that would have contained explosives which leave Class 1 for transport but still could present explosive hazards. We wish to retain some information in the safety data sheet for these situations. The new note would be similar to the current note 2 which covers unintentional explosives leaving the class which no longer present explosive hazards. It would cover intentional explosives which have exited the class of explosives but still present explosive hazards:

NOTE: Explosives configured for transport and excluded from classification within Class 1, based on the Dangerous Goods List of the UN Recommendations of the Transport of Dangerous Goods, Model Regulations, and still present explosive hazards. Re-manufacturers, suppliers and users should be informed of such explosive hazards because they have to be considered for handling, especially if the explosive article is dismantled or decommissioned. For this reason, the explosive hazards presented by such explosive articles should be communicated in Section 2(c) (Hazard identification of hazards which do not result in classification) and Section 10 (Stability and reactivity) of the Safety Data Sheet in accordance with Table 1.5.2, and other sections of the Safety Data Sheet, as appropriate.

Or Merged with the existing Note 2:

NOTE 2: Substances and mixtures, as supplied, with a positive result in Test Series 2 in Part I, Section 12, of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, which are exempted from classification as explosives (based on a negative result in Test Series 6 in Part I, Section 16 of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria,) still have explosive properties. The same is true of explosives configured for transport and excluded from classification within Class 1, based on the Dangerous Goods List of the UN Recommendations of the Transport of Dangerous Goods, Model Regulations. ~~The user~~ Re-manufacturers, suppliers and users should be informed of these intrinsic explosive properties because they have to be considered for handling – especially if the ~~substance or mixture~~ explosive is removed from its packaging or is repackaged ~~packaging is altered from that presented for~~ classification – and for storage. For this reason, the explosive properties of the substance or mixture should be communicated in ~~Section 2 (Hazard identification)~~ Section 2(c) (Hazard identification of hazards which do not result in classification) and ~~Section 9 (Physical and chemical properties)~~ and Section 10 (Stability and reactivity) of the Safety Data Sheet in accordance with Table 1.5.2, and other sections of the Safety Data Sheet, as appropriate.

Precautionary Statements

11. The main focus in this work may be the refinement occurring in Category 1 – changing it from the current hazard communication for “unstable explosives”. For purposes of discussion, we propose the following changes to the P-statements for unstable explosives to make them appropriate for Category 1:

- Add new P-statement: P2XX Apply engineering and procedural controls derived from a process hazards analysis. Rationale: Specific engineering controls may be specified when applying stimuli to explosives during processing. Procedural controls also likely apply, e.g., remaining out of the building or out of the room where processing occurs.
- Delete current P-statement: ~~P201 Obtain special instructions before use~~. Rationale: This category deals with creation of an explosive, rather than use.
- Delete current P-statement: ~~P250 Do not subject to grinding/shock/friction/... if the explosive is mechanically sensitive ...Manufacturer/supplier or the competent authority to specify applicable~~ rough handling. Rationale: The explosive may be purposely subjected to these stimuli.
- Retain current P-statement P280: Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/... Manufacturer/supplier or the competent authority to specify the appropriate personal protective equipment.

12. While the existing precautionary statements for explosives may be adequate for the most part, additional minor changes have been discussed. Here are a few:

(a) In P280 concerning personal protective equipment (PPE), the PPE needs to be appropriate for use with a particular explosive. PPE has been the cause of accidents, and for example, clothing is often specified to be cotton rather than polyester, which can cause ESD initiations. This could be reviewed under conditions of use. A possible clarifying statement could be added at the end of P280, such as “...appropriate for use with the explosive.” Some explosives may require more restrictions than others based on their ignition thresholds, which are variable and not intrinsic (e.g., particle size plays a large role in ESD sensitivity).

(b) In P375, “Fight fire remotely due to the risk of explosion”, the intent of the word “remotely” could be clarified. Does that mean automated deluge systems in buildings, or certain firefighting methods or equipment, or both, and how might differing interpretations impact operations and infrastructure?

13. Currently, no changes are proposed for Sub-category 2A from how they are currently presented for Divisions other than 1.4, other than referring to the primary packaging, which occurs throughout Category 2.

14. Division 1.4 will now be assigned to the appropriate Sub-category primarily 2B and 2C, and the existing differentiations for 1.4S will now be incorporated into an assigned Sub-category instead of an explanatory conditional note in Annex 3.

Proposal

15. We hope that this paper will be helpful, and propose to refer to it in the discussions of the ICG.
