

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

13 June 2018

**Sub-Committee of Experts on the  
Transport of Dangerous Goods**

**Fifty-third session**

Geneva, 25 June-4 July 2018

Item 10 (e) of the provisional agenda

**Issues relating to the Globally Harmonized System  
of Classification and Labelling of Chemicals: joint  
work with the GHS Sub-Committee**

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

**Thirty-fifth session**

Geneva, 4-6 July 2018

Item 3 (b) of the provisional agenda

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

**Technical explosives classification and criteria support for an amended  
classification system for explosives in the GHS**

**Submitted by the expert from the United States of America, the  
Institute of Makers of Explosives (IME) and Sporting Arms &  
Ammunition Manufacturers' Institute (SAAMI)**

**Introduction**

1. This informal document augments working document ST/SG/AC.10/C.3/2018/33 ST/SG/AC.10/C.4/2018/7 and informal documents INF.9 (53rd session) and INF.10 (35th session). As the focal point for physical hazards classification, the TDG Sub-Committee via the experts from the Working Group on Explosives (EWG) is supporting the efforts of the GHS Sub-Committee to revise GHS Chapter 2.1. Many explosives experts are supportive of the initiative and are focused on the technical aspects of identifying and developing the explosives classification scheme and the associated criteria in the context of the GHS. Explosives experts have been engaged from the onset of this initiative.

2. Consistent with a request from the expert from Sweden, many explosives experts have dedicated significant time since the November/December 2017 informal correspondence group (ICG) meetings and at the IGUS EPP<sup>1</sup>/CIE<sup>2</sup> meeting in April 2018 (See Annex 1) to discuss and reach consensus on key principles of explosives classification in the context of the GHS. Considerable effort was dedicated to address concerns raised by a number of EU countries regarding the potential impacts to national explosive storage laws and regulations. They also reviewed and prepared constructive input for the referenced working and informal papers. The proposals in this paper reflect this input.

3. The following proposals are the result of the collaborative efforts of ICG and IGUS EPP/CIE explosive experts and warrant further review and discussion. The attached presentation entitled "GHS 2.1 Revision Classification and Criteria" dated April 19, 2018 was the basis for the IGUS EPP/CIE discussion that contributed to these proposals and provides additional technical background and context. This informal document builds on the

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<sup>1</sup> International Group of Experts on the Explosion Risks of Unstable Substances (IGUS), Explosives, Propellants, and Pyrotechnics working group (EPP)

<sup>2</sup> Chief Inspectors of Explosives

work of the ICG and information from the informal documents INF.9 (53rd session) and INF.10 (35th session).

4. The Sub-Committee may recall a similar effort to develop relevant classification criteria to further differentiate the hazards associated with GHS flammable gas Category 1 (extremely flammable gases). Consistent with the effort to modify the classification criteria for flammable gases, the TDG Sub-Committee and the GHS Sub-Committee experts from the United States suggest that the TDG Sub-Committee focus on the criteria for identifying and differentiating hazard amongst the class of explosives. As originally envisioned by the GHS Sub-Committee when establishing the scope of this work, the recommendation from the EWG would then be considered by the joint efforts of the ICG and both Sub-Committees. Once the recommendation on the hazard classification criteria have been finalized, including relevant categorization, the GHS Sub-Committee would then consider assignment of appropriate label elements: (hazard statements, signal words, and pictograms (symbols)) to encourage accurate hazard communication.

## Proposals

5. Category 1 is comprised of substances and articles that are provisionally accepted into Class 1 (per 10.2.1 and Figure 10.2, UN Manual of Tests and Criteria (UNMTC)), which have not been assigned a UN transport division (e.g., processing, manufacturing, etc.). Category 1 does not require further assignment to subcategories, and the following guidance applies:

- (a) The hazard severity of explosives is dependent on key parameters such as configuration, confinement, initiation stimulus, composition, physical state, etc. Explosives found in processing/reprocessing, manufacturing/remanufacturing, and the associated operations may experience significant variations in these key parameters.
- (b) Risk assessment and risk management principles should be applied to identify and manage the risk of such operations in accordance with risk-based best practices, regulations, and laws. Risk-based requirements are not within the scope of the GHS.

6. Category 2 is comprised of substances and articles which have been assigned a Class 1 transport division, regardless of whether the explosives remain in or have been subsequently removed from their transport configuration. Category 2 explosives would revert to Category 1, however, if they are removed from their transport configuration and re-entered into a dynamic reprocessing/remanufacturing environment, in which case the life cycle and classification process start over. Examples of operations considered as remaining within Category 2 are:

- (a) Transport and storage of explosives configured for transport (additional controls, e.g., quantity limits, risk assessment, etc., are typically necessary for large storage amounts, since transport classifications can only be extrapolated to quantities found in transport conditions)
- (b) Handling, unpacking, staging, and display of explosives removed from their transport packaging that remain in their immediate container, or which, due to the construction of the article, do not present a greater hazard severity when unpackaged.

7. Category 2 should have three (3) subcategories (i.e., 2A, 2B, 2C) that correspond to the three (3) hazard severities found in the explosives classification scheme for transport. The transport hazard severity groups are as follows:

- **High hazard:** 1.1, 1.2, 1.3, 1.5, or 1.6

All pose significant hazard levels with similar consequences

- **Medium Hazard:** 1.4 (other than compatibility group S)

Based on the added criteria that must be met in the UNMTC

- **Low Hazard:** 1.4S.

Based on even more added criteria in the UNMTC

8. Category 2 should have a **Transport Division subcategory** that aligns with subcategories 2A, 2B, and 2C as outlined above. (Refer to Table 1 for clarity)

(a) The transport division subcategory should be part of the GHS classification scheme to ensure proper reference by national explosive storage regulations and laws, which require greater granularity than hazard communication. Inclusion of the UN transport division only as “criteria” is insufficient and will likely have an adverse impact on national storage regulations and laws.

(b) UN transport divisions do not apply to explosives removed from their transport configuration. Therefore, unpackaged explosives (i.e., not in their complete transport configuration) or explosives repacked in packagings other than the originally classed transport packaging configuration must be considered as “High hazard” (subcategory 2A) unless their hazard is known to correspond to “Medium hazard” (subcategory 2B) or “Low hazard” (subcategory 2C) based on the proposed additional criteria below.

9. Subcategory 2A classification criteria includes:

- (a) Explosives classified as 1.1, 1.2, 1.3, 1.5 or 1.6 in their transport configuration.

Subcategory 2A does not include explosives configured for transport and classified 1.4 (other than S) or 1.4S since they meet the added criteria required to qualify as a medium or low hazard respectively as reflected in the UNMTC. They do not present a high hazard in that configuration.

- (b) Explosives removed from 1.4 (other than S) or 1.4S transport configurations respectively, that **do not meet** the proposed additional criteria listed below.

In anticipation of a change in hazard severity occurring during unpackaging, explosives on this path should be labelled as “High hazard” (subcategory 2A) when they are manufactured and packaged.

- (c) Explosives removed from 1.1, 1.2, 1.3, 1.5, or 1.6 transport configurations.

The hazard communication is already the most severe and does not need to be changed if there is an increase in hazard.

- (d) Explosives that a manufacturer classifies as “High hazard” (subcategory 2A) based on other data or considerations

10. Subcategory 2B or 2C classification criteria includes the following and warrants further discussion by the EWG.

- (a) Explosives classified as 1.4 (other than S) or 1.4S in their transport configuration respectively.

- (b) Explosives that are removed from 1.4 (other than S) or 1.4S transport configurations respectively (Prerequisite), yet still qualify for “Medium Hazard” (subcategory 2B) or “Low Hazard” (subcategory 2C), (either by remaining in their immediate container or due to the article construction providing equivalent protection), based on meeting additional criteria.

- (i) No violent reaction based on TS-6(a) and TS-6(b) indicators and/or meets TS-6(d) criteria and,
  - (ii) The packaging is not designed to provide a mitigating effect:
    - No special design (e.g., packing instructions 101, 137, other) and,
    - No use of dividers or spacers separation required to achieve classification (e.g., packaging components such as dividers or spacers used for mitigation rather than containment)
  - (c) The use of Compatibility Group designation as potential criteria for determining GHS subcategory 2A, 2B, and 2C assignment has been considered and discarded. The following conclusions regarding Compatibility Groups have been reached to date:
    - (a) Compatibility Groups describe which *types* of explosives are in each group, although each group may span a broad range of *hazard severity*. Compatibility Groups are to facilitate segregation during shipment (and often during storage) and such information should be included by the appropriate hazard communication mechanism, which is the transport hazard label.
    - (b) Compatibility Groups cannot be effectively used to assess hazard severity for the purpose of GHS subcategory 2A, 2B, or 2C classification.
11. The proposed GHS 2.1 Classification scheme and criteria in the context of GHS is viable since:
- (a) The hazard and severity of explosives are dependent on the configuration of the explosive.
  - (b) The intrinsic property of an explosive is an explosion, and all classification is based on packaging and/or incorporation into articles.
  - (c) The technical information derived from the UNMTC Series 6 related activities can provide an indication of the hazard severity of explosives when removed from the transport configuration for Category 2 operations as defined above.
  - (d) Explosives will not require reclassification or relabelling since appropriate GHS classification, labelling and SDS information will be determined and applied to the explosive in the immediate container by the manufacturer prior to transport.
12. Table 1 provides a tabular representation of the listed proposal items related to GHS 2.1 classification and criteria from explosives experts.

**Table I: GHS 2.1 Revision proposed classification and criteria (17 May 2018)**

Category	1	2						
Subcategory		2A					2B	2C
Transport Division subcategory	NA	1.1	1.2	1.3	1.5	1.6	1.4	1.4S
<b>Criteria:</b>	Candidates provisionally accepted into Class 1, which have not been assigned a UN transport division (e.g., processing, manufacturing, ...)*	1.1, 1.2, 1.3, 1.5, or 1.6 Transport Classification configuration <b>OR</b> Explosives removed from 1.1, 1.2, 1.3, 1.5, or 1.6 transport configurations <b>OR</b> Explosives removed from 1.4 or 1.4S transport configurations that <u>do not meet Additional Criteria</u> ** <b>OR</b> Assign High Hazard based on other data or considerations					1.4 (Other than S) Transport Classification configuration <b>OR</b> Explosives Removed from a 1.4 (Other than S) Transport configuration <b>AND</b> Remain in the immediate container <b>AND</b> Meet <b>Additional Criteria</b> **	1.4S Transport Classification configuration <b>OR</b> Explosives Removed from a 1.4S Transport configuration <b>AND</b> Remain in the immediate container <b>AND</b> Meet <b>Additional Criteria</b> **

\* **Note:** Explosives that are reconfigured into a different hazard severity (e.g., reprocessing, remanufacturing, etc.) restart the life cycle and the classification process, i.e., they are in Category 1 until they qualify for Category 2 via assignment of a Class 1 transport division.

\*\***Additional Criteria:** No violent reaction based on Test 6a/6b indicators and/or meets TS-6(d) criteria and/or packaging specific information (further discussion needed)

## Annex

### GHS 2.1 Revision classification and criteria



GHS 2.1 Revision  
IGUS 19 April 2018.p