

**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 of the provisional agenda

**Joint work with the Sub-Committee of Experts on the  
Transport of Dangerous Goods (TDG Sub-Committee)**

## **Review of Chapter 2.1 of the GHS**

**Submitted by the Australian Explosives Industry and Safety Group Inc.  
(AEISG)**

### **Introduction**

1. This informal paper presents draft text for Chapter 2.1 to address practical implementation problems being experienced by jurisdictions and industry as they try to incorporate the requirements of GHS into national legislation. It addresses the issues referred to in document ST/SG/AC.10/C.3/2016/7 - ST/SG/AC.10/C.4/2016/2

2. The application of Chapter 2.1 is a complex issue that will not be resolved in the 2015-16 biennium, however some practical steps can be taken in this biennium to reduce the workload for the 2017-18 biennium. Moreover, this paper is complicated because it proposes to relocate text and delete some flow charts and such changes, though simple in themselves, are difficult to put into a format that flows easily in the document.

### **Overview**

3. Eight issues were identified in ST/SG/AC.10/C.3/2016/7 - ST/SG/AC.10/C.4/2016/2 and these have been addressed in the following manner:

- Issues 1 and 2 – Definitions. Changes proposed to align with Manual of Tests and Criteria.
- Issue 3 – labelling elements proposal to change the label elements in Table 2.1.2
- Issue 4 – classification criteria proposal to use the criteria in the Model Regulations.
- Issue 5 – unstable explosives proposal to delete the phrase from Table 2.1.2 and insert a new clause in the text.
- Issue 6 – criteria for explosives proposal to reformat the current criteria in GHS and align with the criteria in the Model Regulations
- Issue 7 – Hazard communication same as Issue 3. The labelling of Hazard Division 1.4 needs more work.

- Issue 8 – Decision logics proposal to replace the decision logics with a much simpler flow chart and cross refer to the Manual of Tests and Criteria, which is being modified to cater to the GHS.
4. The proposed changes to Table 2.1.2 “Label elements”, will align GHS with the current labelling requirements in all significant explosives regulatory regimes and the proposed changes reflect the wishes of those regulators. The changes reflect the fact that all explosives apart from some in Hazard Division 1.4 present a danger and may explode, so all must be labelled accordingly. This will warn the person immediately exposed to the hazard, be they a user, transporter, storeman or bystander. The nature of the explosion, which may be important when storing explosives, may be described elsewhere, typically in the Safety Data Sheet.
  5. The labelling requirements for Division 1.4 explosives have not been changed. Explosives in Hazard Division 1.4 present a wide variety of properties; they are currently being examined in detail but will probably not be resolved this biennium. The work will continue in 2017-18.
  6. These proposed changes will affect the text in GHS Annexes 1 and 3. No changes will be attempted to those annexes until the proposed changes to Chapter 2.1 have been accepted in principle by the Subcommittees.

## Process

7. It is proposed to consider the amendments to the text in Chapter 2.1 of GHS as shown in the attachment below in the Explosives Working Group. Those changes accepted by the Explosives Working Group and the GHS Subcommittee in principle will be incorporated into a formal paper for consideration in December. Those changes that the Explosives Working Group considers to be more substantive or which require more detailed consideration will be identified for action in the 2017-18 biennium.
8. Where practical, the proposal in attachment 1 below has the original text from GHS Rev.6 with new text underlined and deletions ~~struck through~~. Where this is not practical, (such as where tables or flow charts are deleted or relocated) notes are inserted in the text. Some editorial notes are also added through the text to explain the reasons for some of the changes.

## “Chapter 2.1

### Explosives

#### 2.1.1 Definitions and general considerations

2.1.1.1 An *explosive substance* ~~(or mixture)~~ is a solid or liquid substance (or mixture of substances) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases.

A *pyrotechnic substance* ~~(or mixture)~~ is a substance or mixture of substances designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonative self-sustaining exothermic chemical reactions.

An *explosive article* is an article containing one or more explosive substances or mixtures.

~~A *pyrotechnic article* is an article containing one or more pyrotechnic substances or mixtures.~~

*{Editorial note: these changes to the definitions align with the work to amend the Manual of Tests and Criteria for use to classify for GHS. The deletion of the definition for pyrotechnic article is because the term is not in the Model Regulations and is not used again in this Chapter 2.1. Also, a ‘pyrotechnic article’ is an ‘explosive article’ – no need to repeat.}*

2.1.1.2 The class of explosives comprises:

- (a) Explosive substances and mixtures;
- (b) Explosive articles, except devices containing explosive substances or mixtures in such quantity or of such a character that their inadvertent or accidental ignition or initiation shall not cause any effect external to the device either by projection, fire, smoke, heat or loud noise; and
- (c) Substances, mixtures and articles not mentioned under (a) and (b) above which are manufactured with the view to producing a practical, explosive or pyrotechnic effect.

*{Editorial note: deletion of this troubling comma after ‘practical’ is to correct an error which appears in 2.1.1.1(c) of the Model Regulations and is therefore repeated here. However it doesn’t appear elsewhere in the Model Regulations (refer 2.1.3.3.1 and Figures 10.2, 10.3, 10.5, 10.6, 10.7, 10.8). And it doesn’t appear elsewhere in this Chapter 2.1. It means that anything that produces a ‘practical’ effect is an explosive eg hammer, car, clock, pressure release valve, etc. – an obvious error that has not yet been corrected.}*

#### 2.1.2 Classification criteria

*{Editorial Notes: the original Table 2.1.1 has been deleted because it simply defines the category of explosives only in terms of a core set of tests which are incomplete and changing, and it adds only confusion to the criteria contained in the definitions. The proposed new table 2.1.1 repeats the criteria currently in 2.1.2.1 of GHS, in tabular form and with one minor change: Unstable explosives, previously mentioned as a footnote to Table 2.1.1 are now addressed in new paragraph 2.1.2.2. All of the original 2.1.2.2 that has not been relocated to 2.1.2.1 has been deleted.}*

2.1.2.1 Explosives ~~Substances, mixtures and articles of this class~~, which are not classified as an unstable explosive, are assigned to one of the following six divisions in table 2.1.1 in accordance with the procedures and test criteria described in the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, Part I, and depending on the type of hazard they present.

**Table 2.1.1: Classification criteria for explosives**

Division	Criteria
1.1	Substances, mixtures and articles which have a mass explosion hazard (a mass explosion is one which affects almost the entire <del>quantity</del> <u>load</u> present virtually instantaneously)
1.2	Substances, mixtures and articles which have a projection hazard but not a mass explosion hazard
1.3	Substances, mixtures and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard: (i) combustion of which gives rise to considerable radiant heat; or (ii) which burn one after another, producing minor blast or projection effects or both;
1.4	Substances, mixtures and articles which present no significant hazard: substances, mixtures and articles which present only a small hazard in the event of ignition or initiation. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package;
1.5	Very insensitive substances or mixtures which have a mass explosion hazard: substances and mixtures which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions;
1.6	Extremely insensitive articles which do not have a mass explosion hazard: articles which predominantly contain extremely insensitive substances or mixtures and which demonstrate a negligible probability of accidental initiation or propagation.

**NOTE 1:** Explosive substances or mixtures in packaged form and articles may be classified under divisions 1.1 to 1.6 and, for some regulatory purposes, are further subdivided into compatibility groups A to S ~~to distinguish technical requirements~~ (see UN Recommendations on the Transport of Dangerous Goods, Model Regulations, Chapter 2.1).

**NOTE 2:** Some explosive substances and mixtures are wetted with water or alcohols, diluted with other substances or dissolved or suspended in water or other liquid substances to suppress or reduce their explosives properties. These may not be included in the class of explosives (See Chapter 2.17). They may be a candidate for classification as desensitized explosives (see Chapter 2.17) or may be treated differently from explosive substances and mixtures (as desensitized explosives) for some regulatory purposes (e.g. transport), see 1.3.2.4.5.2.

**NOTE 3:** For classification tests on solid substances or mixtures, the tests should be performed on the substance or mixture as presented. If for example, for the purposes of supply or transport, the same chemical is to be presented in a physical form different from that which was tested and which is considered likely to materially alter its performance in a classification test, the substance or mixture must also be tested in the new form.

2.1.2.2 Unstable explosives (those which are thermally unstable and/or too sensitive for normal handling, transport and use) [are outside the scope of GHS] and shall be managed through a risk assessment process.

### 2.1.3 Hazard communication

General and specific considerations concerning labelling requirements are provided in *Hazard communication: Labelling* (Chapter 1.4). Annex 1 contains summary tables about classification and labelling. Annex 3 contains examples of precautionary statements and pictograms which can be used where allowed by the competent authority.

**Table 2.1.2: Label elements for explosives**

	<b>Unstable Explosive Explosive not in transport configuration</b>	<b>Division 1.1</b>	<b>Division 1.2</b>	<b>Division 1.3</b>	<b>Division 1.4</b>	<b>Division 1.5</b>	<b>Division 1.6</b>
<b>Symbol</b>	Exploding bomb	Exploding bomb	Exploding bomb	Exploding bomb	Exploding bomb; <i>or</i> 1.4 on orange background <sup>a</sup>	Exploding bomb 1.5 on orange background <sup>a</sup>	Exploding bomb 1.6 on orange background <sup>a</sup>
<b>Signal word</b>	Danger	Danger	Danger	Danger	Warning	Danger	Danger <i>No signal word</i>
<b>Hazard statement</b>	Unstable Explosive	Explosive; <del>mass explosion hazard</del>	Explosive; <del>severe projection hazard</del>	Explosive; <del>fire, blast or projection hazard</del>	Fire or projection hazard	Explosive May mass explode in fire	Explosive <i>No hazard statement</i>

<sup>a</sup> Applies to substances, mixtures and articles subject to some regulatory purposes (e.g. transport).

**NOTE 1:** Unpackaged explosives or explosives repacked in packagings other than the original or similar packaging shall have the following label elements:

- (a) *Symbol:* exploding bomb;
- (b) *Signal word:* “Danger”; and
- (c) *Hazard statement:* “Explosive;~~mass explosion hazard~~”

unless the hazard is shown to correspond to one of the hazard categories in table 2.1.2, in which case the corresponding symbol, signal word and/or the hazard statement shall be assigned.

**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 user should be informed of these intrinsic explosive properties because they have to be considered for handling – especially if the substance or mixture is removed from its packaging or is repackaged – and for storage. For this reason, the explosive properties of the substance or mixture should be communicated in Section 2 (Hazard identification) and Section 9 (Physical and chemical properties) of the Safety Data Sheet in accordance with Table 1.5.2, and other sections of the Safety Data Sheet, as appropriate.

#### 2.1.4 Decision logic and guidance

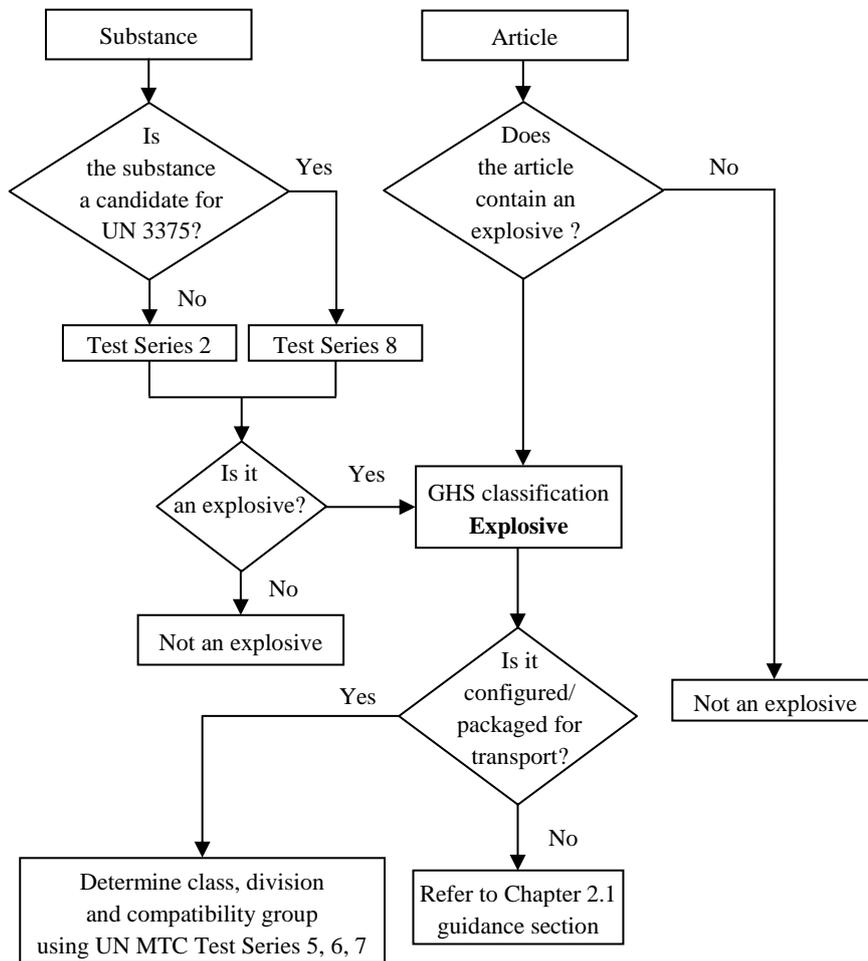
The decision logic and guidance, which follow, are not part of the harmonized classification system, but have been provided here as additional guidance. It is strongly recommended that the person responsible for classification studies the criteria before and during use of the decision logic.

##### 2.1.4.1 Decision logic

The classification of substances, mixtures and articles in the class of explosives and further allocation to a division is a very complex, three step procedure. Reference to Part I of the *UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria*, is necessary. The first step is to ascertain whether the substance or mixture has explosive ~~properties~~ effects (Test Series 2 ~~4~~). This step may be avoided if the substance or mixture has been manufactured with a view to producing a practical explosive or pyrotechnic effect. The second step is to continue the acceptance procedure (Test Series ~~3 and 4~~ ~~2 to 4~~) and the third step is the assignment to a hazard division (Test Series 5 to 7). The assessment whether a candidate for “ammonium nitrate emulsion or suspension or gel, intermediate for blasting explosives (ANE)” is insensitive enough for inclusion as an oxidizing liquid (Chapter 2.13) or an oxidizing solid (Chapter 2.14) is answered by Test Series 8 tests. The classification procedure is shown in ~~according to the following decision logics (see Figures 2.1.1 to 2.1.4).~~

*[Editorial Note: It is proposed that all the existing figures 2.1.1 – 2.1.4 are to be deleted and replaced with the following.]*

**Figure 2.1.1: Overall scheme of the procedure for classifying a substance, mixture or article in the class of explosives (Class 1 for transport)**



{ **Editorial Note:** No changes are proposed in the text beyond this point, however, it needs to be noted that the current figures 2.1.2, 2.1.3 and 2.1.4 are NOT consistent with the current UN MTC, and if retained, need to be revised.}