

## **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 Globally Harmonized  
System of Classification and Labelling of Chemicals**

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### **Thirty-first session**

Geneva, 5–8 July 2016

Item 3 (f) of the provisional agenda

**Classification criteria and related hazard communication:**

**Miscellaneous**

## **Proposal for a new chapter for chemicals under pressure**

**Submitted by the European Industrial Gases Association (EIGA) and  
the European Chemical Industry Council (CEFIC)**

### **Introduction**

1. Some years ago the Sub-Committee of Experts on the Transport of Dangerous Goods (TDG Sub-committee) implemented new UN-numbers for chemicals under pressure (UN3500 - UN3505). These products are similar to aerosols, but they are not packed in aerosol cans but in pressure receptacles (refillable and non-refillable). With the implementation of GHS in more and more countries, the question came up, how these products need to be classified and labelled according to GHS.
2. Current GHS chapters do not appropriately cover the hazards associated with this product type, leading to confusion and possibly resulting in over- or under-classification of products. An assignment to existing chapters on flammable gases, liquids, or solids would potentially miss to communicate important hazards. For example, Chapter 2.3 does not recognize pressure receptacles like gas cylinder, it only describes aerosol cans.
3. Therefore EIGA and CEFIC propose to introduce a new chapter into GHS to cover these type of products.
4. The attached proposal contains 3 categories, 2 for extremely flammable and flammable chemicals under pressure and 1 for non-flammable chemicals under pressure. With that it follows the structure, which is available for aerosols. The same applies for the labelling requirements, although new hazard statements need to be implemented as well.
5. To determine the classification a flow chart has been developed, as it is quite complex to handle, gases, solids and liquids in one hazard class. This includes also the limits of this class, e.g. mixtures with less than 50% liquid should be classified as gases under pressure. Also the pressure needs to be > 200 kPa to apply the new hazard class.
6. As this is a practical issue and this type of products is handled differently in different regions, EIGA and CEFIC would welcome the introduction of the new hazard class “Chemicals under Pressure” as follows (the wording and the classification criteria are in close alignment with chapter 2.3):

## Proposal

### “Chapter 2.XX CHEMICALS UNDER PRESSURE

#### 2.XX.1 Definitions

*Chemicals under pressure* are substances or mixtures, containing 50% or more by mass of liquids, pastes or powders, pressurized with a propellant in a receptacle at a pressure of 200 kPa (gauge) or more at 20°C. The propellant (gas) can be a compressed, liquefied or dissolved gas under pressure.

Mixtures, containing less than 50% by mass of liquids, pastes or powders, shall be classified as gas mixtures or liquids depending on the pressure in the receptacles – see flowchart in 2.XX.4.

Chemicals under pressure are typically used for spray applications. The receptacle needs to be connected to spray application equipment such as a hose and a wand assembly to allow the contents to be ejected as solid or liquid particles in suspension in a gas; as a foam, paste, or powder; or in a liquid state.

A chemical under pressure in an aerosol dispenser shall be covered under Chapter 2.3 (Aerosols).

*Flammable component* means flammable solid, liquid or gas.

#### 2.XX.2 Classification criteria

The chemical under pressure shall be classified based on the hazard characteristics of the components in the receptacle:

- Propellant;
- Liquid; and/or
- Solid.

Flammable components are flammable liquids and liquid mixtures, flammable solids and solid mixtures, or flammable gases or gas mixtures meeting the following criteria:

- (a) A flammable gas is a gas which meets the criteria in Chapter 2.2;
- (b) A flammable solid is a solid which meets the criteria in Chapter 2.7;
- (c) A flammable liquid is a liquid which meets the criteria in Chapter 2.6.

The category of the chemical under pressure is determined by the flammability of the components and the heat of combustion of the whole mixture.

**Note:** *Chemicals under pressure do not fall additionally within the scope of chapters 2.2 (flammable gases), 2.5 (gases under pressure), 2.6 (flammable liquids) and 2.7 (flammable solids). Depending on their contents, chemicals under pressure may however fall within the scope of other hazard classes, including their labelling elements.*

**2.XX.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 authorities.

**Table 2.XX: Label elements for chemical under pressure**

	Flammability		
	Category 1	Category 2	Category 3
<b>Symbol</b>	Flame Gas cylinder	Flame Gas cylinder	Gas cylinder
<b>Signal word</b>	Danger	Warning	Warning
<b>Hazard statement</b>	Extremely flammable. Chemical under pressure	Flammable. Chemical under pressure	Chemical under pressure

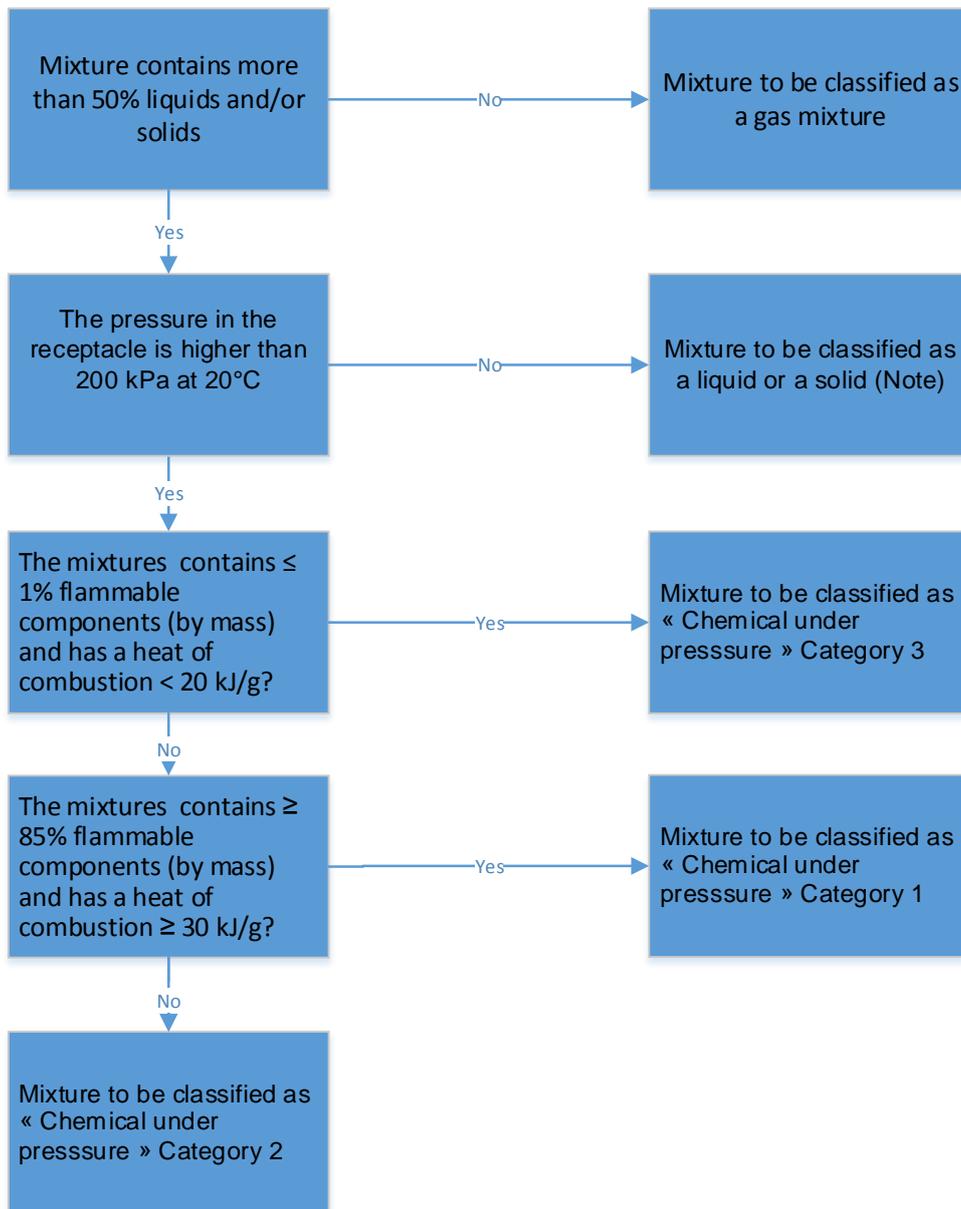
**2.XX.4 Decision logic and guidance**

Mixture of liquids, pastes or powders under pressure may potentially be classified as Chemical under pressure, gas mixtures or liquids

For “*Chemicals under pressure*” their classification for flammability shall be based on the concentration in mass of the flammable components (gaseous, liquids or solids) and/or on the heat of combustion.

**2.XX.4.1 Decision logic**

Decision logic 2.XX for mixture made of one or more solids and/or liquids and one or more compressed or liquefied gases



**Note:** Liquid mixtures containing components, which are all classified as flammable liquids and flammable gases, should be classified as flammable liquid, Category 1, if the content of liquefied flammable gases is  $\geq 5\%$ .

**2.XX.4.2 Guidance (based on Chapter 2.6 – flammable liquids)**

The chemical heat of combustion ( $\Delta H_c$ ), in kilojoules per gram (kJ/g) is the product of the theoretical heat of combustion ( $\Delta H_{comb}$ ) and the combustion efficiency, usually less than 1.0 (a typical efficiency is 0.95 or 95%).

For a composite formulation, the chemical heat of combustion is the summation of the weighted heats of combustion for the individual components, as follows:

$$\Delta H_c(\text{product}) = \sum_i^n [w_i\% \times \Delta H_c(i)]$$

Where:

$\Delta H_c$  = chemical heat of combustion (kJ/g);

$w_i\%$  = mass fraction of component I in the product;

$\Delta H_c(i)$  = specific heat of combustion (kJ/g) of component I in the product

The chemical heat of combustion can be found in the literature, calculated or determined by tests (see ASTM D 240, ISO/FDIS 13943:1999 (E/F) 86.1 to 86.3 and NFPA 30B.”

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