

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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Item 3 (h) of the provisional agenda

**Classification criteria and related hazard communication:
other issues**

Aerosols – Revisions of Chapter 2.3 without inclusion of Chemicals under pressure – Consolidated amendments

Transmitted by the European Aerosol Federation (FEA)

Introduction

1. As requested by the Sub-Committee in plenary session, this document consolidates the different proposed amendments related to Chapter 2.3 *Aerosols*.
2. This document is based on the following documents:
 - (a) ST/SG/AC.10/C.4/2018/9 - (Canada, FEA) *Proposed amendments to chapter 2.3 to convert decision logics into text language.*
 - (b) ST/SG/AC.10/C.4/2018/11-ST/SG/AC.10/C.3/2018/60 - (FEA) *Aerosols – Consequential amendments from proposals in ST/SG/AC.10/C.3/2018/5 - ST/SG/AC.10/C.4/2018/3 and ST/SG/AC.10/C.4/2018/9. Attention: In this document, the text of Table 2.3.1 slightly deviates from document under (a). These editorial changes are mistakes and need to be ignored!*
 - (c) UN/SCEGHS/35/INF.17-UN/SCETDG/53/INF.51 - (Germany) *Amendments to chemicals under pressure and aerosols*
 - (d) UN/SCEGHS/35/INF.26 - (United States of America) *Revisions to proposed amendments to Chapter 2.3 to convert decision logics into text language*
3. As discussed in plenary, document ST/SG/AC.10/C.4/2018/12 - (Sweden) *Amendment of the guidance on calculating specific heats of combustion for composite formulations in Chapter 2.3* was separately adopted, but not included in this consolidated document.

Annex

Proposed consolidated amendments to the GHS Chapter 2.3 (aerosols only)

1. Amend Chapter 2.3 as follows (Additions are underlined, deletions are in strikethrough):

“CHAPTER 2.3 AEROSOLS

Author’s comments

2.3.1 Definition

Aerosols, this means aerosol dispensers, are any non-refillable receptacles made of metal, glass or plastics and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing 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 or in a gaseous state.

2.3.2 Classification criteria

2.3.2.1 Aerosols are classified in one of the three categories of this hazard class, according to Table 2.3.1, depending on:

Based on
ST/SG/AC.10/C.4/2018/9 -
(Canada, FEA)

- their flammable properties, and
- their heat of combustion,
- if applicable, test results from the ignition distance test, the enclosed space ignition test and the aerosol foam flammability test, performed in accordance with sub-sections 31.4, 31.5 and 31.6 of the *UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria*.

They should be considered for classification in Category 1 or 2 if they contain more than 1% components (by mass) which are classified as flammable according to the GHS criteria, i.e.:

- Flammable gases (see Chapter 2.2);
- Flammable liquids (see Chapter 2.6);
- Flammable solids (see Chapter 2.7);

or if their heat of combustion is at least 20 kJ/g.

Table 2.3.1: Criteria for aerosols

Category	Criteria	Based on
<u>1</u>	1) <u>Any aerosol that contains \geq 85% flammable components (by mass) and has a heat of combustion of \geq 30 kJ/g; or</u> 2) <u>Any aerosol that dispenses a spray that, in the ignition distance test, has an ignition distance of \geq 75 cm; or</u> 3) <u>Any aerosol that dispenses a foam that, in the foam flammability test, has</u> (a) <u>a flame height of \geq 20 cm and a flame duration of \geq 2 s, or</u> (b) <u>a flame height of \geq 4 cm and a flame duration of \geq 7 s</u>	ST/SG/AC.10/C.4/2018/9 - (Canada, FEA) and UN/SCEGHS/35/INF.26 - (United States of America) <u>Attention:</u> In document ST/SG/AC.10/C.4/2018/11-ST/SG/AC.10/C.3/2018/60 - (FEA), the text of Table 2.3.1 slightly deviates from document jointly submitted by Canada and FEA. These editorial changes are mistakes and need to be ignored!
<u>2</u>	1) <u>Any aerosol that dispenses a spray that, based on the results of the ignition distance test, does not meet the criteria for Category 1, and which has</u> (a) <u>a heat of combustion of \geq 20 kJ/g, or</u> (b) <u>a heat of combustion of $<$ 20 kJ/g along with an ignition distance of \geq 15 cm, or</u> (c) <u>a heat of combustion of $<$ 20 kJ/g and an ignition distance of $<$ 15 cm along with either, in the enclosed space ignition test,</u> o <u>a time equivalent of \leq 300 s/m³, or</u> o <u>a deflagration density of \leq 300 g/m³; or</u>	

	2) <u>Any aerosol that dispenses a foam that, based on the results of the aerosol foam flammability test, does not meet the criteria for Category 1, and which has a flame height of ≥ 4 cm and a flame duration of ≥ 2 s.</u>
<u>3</u>	1) <u>Any aerosol that contains $\leq 1\%$ flammable components (by mass) and that has a heat of combustion < 20 kJ/g; or</u> 2) <u>Any aerosol that contains $> 1\%$ (by mass) flammable components or which has a heat of combustion of ≥ 20 kJ/g but which, based on the results of the ignition distance test, the enclosed space ignition test or the aerosol foam flammability test, does not meet the criteria for Category 1 or Category 2.</u>

NOTE 1: *Flammable components do not cover pyrophoric, self-heating or water-reactive substances and mixtures because such components are never used as aerosol contents.*

NOTE 2: Aerosols containing more than 1% flammable components or with a heat of combustion of at least 20 kJ/g, which are not submitted to the flammability classification procedures in this chapter should be classified as aerosols, Category 1.

NOTE 3: *Aerosols 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, aerosols may however fall within the scope of other hazard classes, including their labelling elements.*

2.3.2.2 ~~An aerosol is classified in one of the three categories for this Class on the basis of its components, of its chemical heat of combustion and, if applicable, of the results of the foam test (for foam aerosols) and of the ignition distance test and enclosed space test (for spray aerosols). See decision logic in 2.3.4.1. Aerosols which do not meet the criteria for inclusion in Category 1 or Category 2 (extremely flammable or flammable aerosols) should be classified in Category 3 (non-flammable aerosols).~~

Based on ST/SG/AC.10/C.4/2018/9 - (Canada, FEA) and UN/SCEGHS/35/INF.17-UN/SCETDG/53/INF.51 - (Germany)

When the section on Chemicals under pressure will be adopted, the reference to the correct section related to Chemicals under pressure will need to be included in Note 3.

~~**NOTE:** Aerosols containing more than 1% flammable components or with a heat of combustion of at least 20 kJ/g, which are not submitted to the flammability classification procedures in this chapter should be classified as aerosols, Category 1.~~

2.3.3 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 2.3.12: Label elements for aerosols

	Category 1	Category 2	Category 3
Symbol	Flame	Flame	<i>No symbol</i>
Signal word	Danger	Warning	Warning
Hazard statement	Extremely flammable aerosol Pressurized container: May burst if heated	Flammable aerosol Pressurized container: May burst if heated	Pressurized container: May burst if heated

Based on
ST/SG/AC.10/C.4/2018/9 -
(Canada, FEA)

2.3.4 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.

Based on
ST/SG/AC.10/C.4/2018/11-
ST/SG/AC.10/C.3/2018/60
- (FEA)

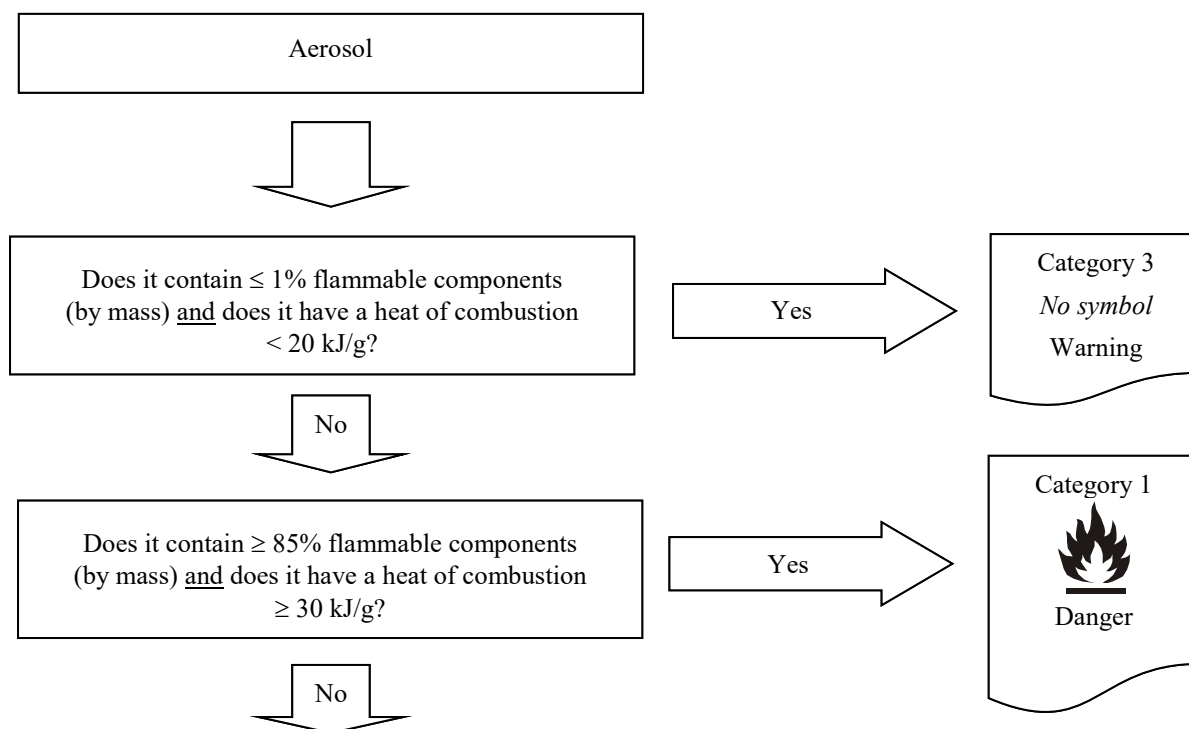
2.3.4.1 Decision logic

To classify an aerosol data on its flammable components, on its chemical heat of combustion and, if applicable, the results ~~of the foam test (for foam aerosols) and~~ of the ignition distance test and enclosed space test (for spray aerosols) and of the foam test (for foam aerosols) are required. Classification should be made according to decision logics 2.3 (a) to 2.3 (c).

These amendments were discussed within the correspondence group on Chemicals under pressure.

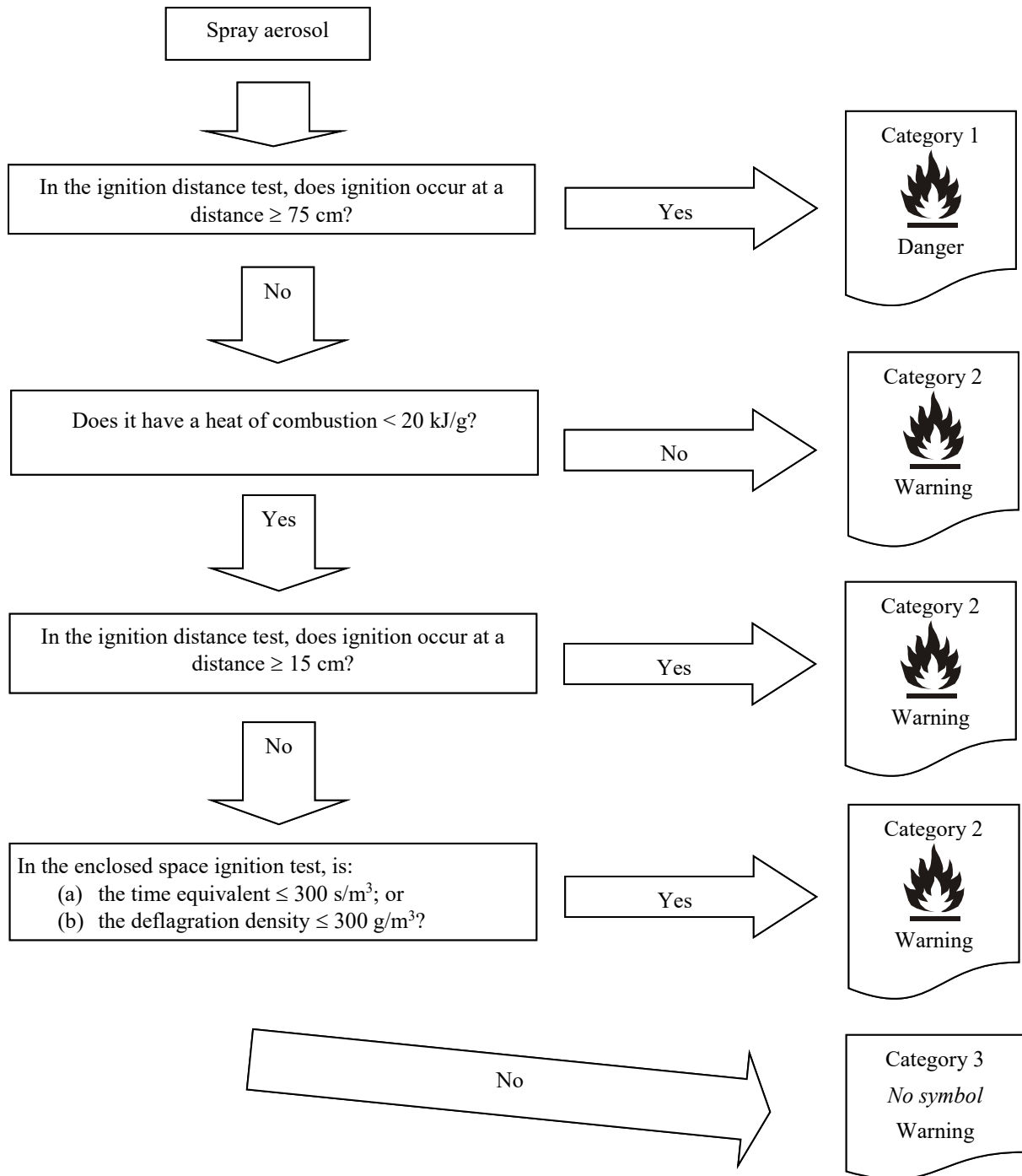
The “guidance” is kept for the time being because not included yet in a joint section for both aerosols and chemicals under pressure.

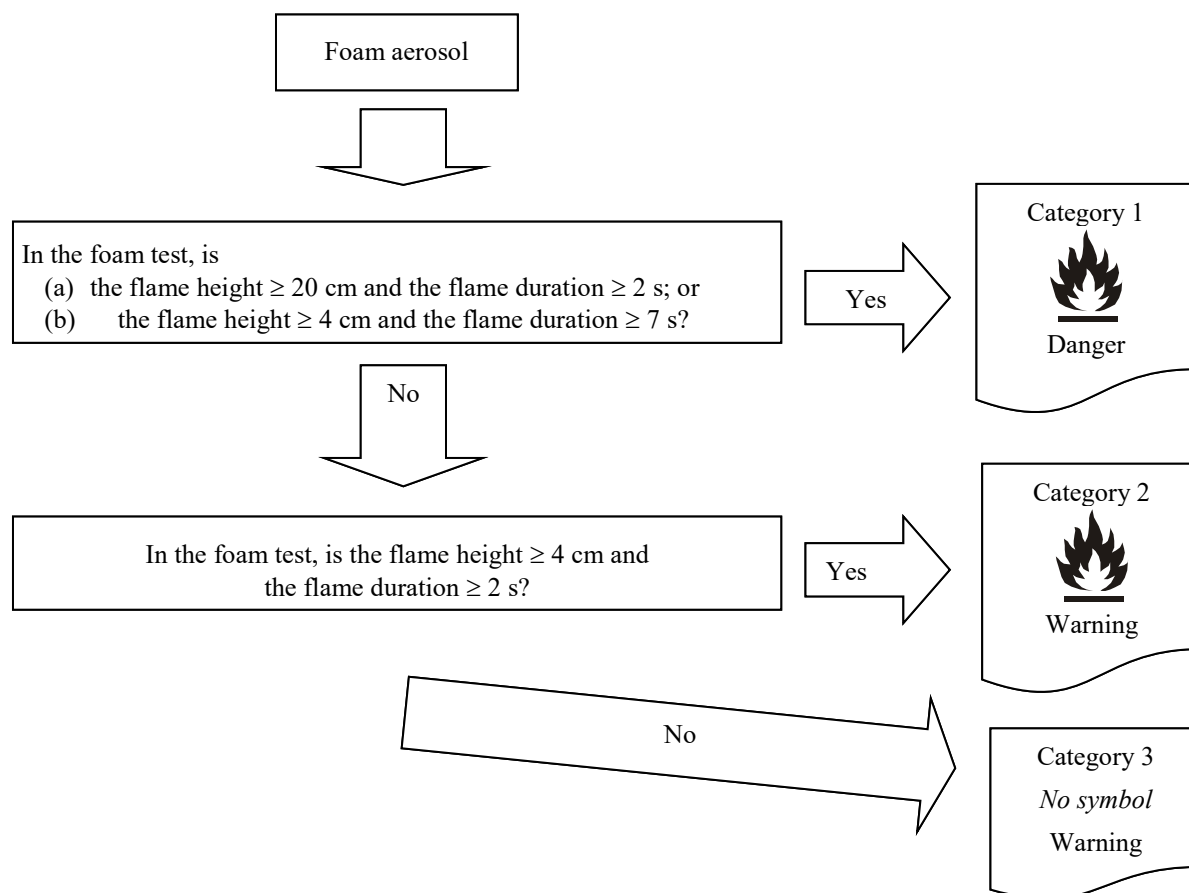
The editorial change in 2.3.4.1 is only to follow the order of the different decision logics here under.

Decision logic 2.3 (a) for aerosols

For spray aerosols, go to decision logic 2.3 (b);

For foam aerosols, go to decision logic 2.3 (c);

Decision logic 2.3 (b) for spray aerosols

Decision logic 2.3 (c) for foam aerosols**2.3.4.2 Guidance**

2.3.4.2.1 The chemical heat of combustion (ΔH_c), in kilojoules per gram (kJ/g) is the product of the theoretical heat of combustion (ΔH_{comb}) and a 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:

- ΔH_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;

It was decided by the Subcommittee that the “heat of combustion” is a separate issue, so ST/SG/AC.10/C.4/2018/12 - (Sweden) was not taken into account.

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).

~~2.3.4.2.2 See sub sections 31.4, 31.5 and 31.6 of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, for Ignition distance test, Enclosed space ignition test, and Aerosol foam flammability test.~~

Now included under
2.3.2.1