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## 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 Transport of Dangerous Goods

#### Sixty-first session

Geneva, 28 November–6 December 2022

Item 10 (c) of the provisional agenda

**Issues relating to the Globally Harmonized System:  
Miscellaneous**

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

#### Forty-third session

Geneva, 7–9 December 2022

Item 3 (a) of the provisional agenda

**Work on the Globally Harmonized System of  
Classification and Labelling of Chemicals:  
Work of the Sub-Committee of Experts on the Transport  
of Dangerous Goods on matters of interest to the Sub-  
Committee<sup>1</sup>**

## Metal powders and powders of metals or metal alloys in Test N.1

Transmitted by the expert from China\*

### Introduction

1. There exist two different classification criteria for flammability of powdered, granular or pasty substances or mixtures based on the results of Test N.1. It is stated, in 2.4.2.2.2.1 of the Model Regulations, 2.7.2 of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and 33.2.4.4.1 of the Manual of Tests and Criteria, that the two criteria are for “powders of metals or metal alloys” and other substances or mixtures respectively. Powders of metals or metal alloys need special consideration when determining flammability.
2. However, some other paragraphs related to Test N.1 and the relevant classification criteria indicate that only metal powders should be considered separately, e.g., 33.2.4.3.2.3 in the Manual of Tests and Criteria.
3. The reason why two different criteria are set is explained in 2.4.2.2.1.2 of the Model Regulations:  

“...Metal powders are especially dangerous because of the difficulty of extinguishing a fire since normal extinguishing agents such as carbon dioxide or water can increase the hazard.”
4. Although 2.4.2.2.1.2 only refers to metal powders, powders of metal alloys also share these characteristics. Thus, it is more reasonable for powders of metal alloys to be classified using the criteria for metal powders instead of that for other substances or mixtures.

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\* A/75/6 (Sect.20), para. 20.51

5. It should be harmonized throughout the regulations that, to determine flammability of solids, the two different criteria are applied to powders of metals or metal alloys and substances or mixtures other than powders of metals or metal alloys respectively.
6. Therefore, the expert from China proposes to replace the phrase “metal powders” with “powders of metals or metal alloys” in texts related to Test N.1 and the relevant classification criteria.
7. We would also like to express our gratitude to the Chair of the Explosives Working Group for his help in the development of this proposal.

### **Proposal 1: Amendments to the Manual of Tests and Criteria**

8. In all proposed amendments, the deleted text appears in ~~strike through~~ and new text in **bold underlined**.
9. Amend the title of Figure 33.2.3 in the Manual of Tests and Criteria as follows:  
*“Figure 33.2.3: Flow chart for the classification of flammable solids, except ~~metal powders~~ **powders of metals or metal alloys**”*
10. Amend 33.2.4.3.1 as follows:  
“33.2.4.3.1 The substance in its commercial form, should be formed into an unbroken strip or powder than about 250 mm long by 20 mm wide by 10mm high on a cool, impervious, low heat-conducting base plate. A hot flame (minimum temperature 1 000 °C) from a gas burner (minimum diameter 5 mm) should be applied to one end of the powder train until the powder ignites or for a maximum of 2 minutes (5 minutes for powders of metals or ~~metal alloys~~ **metal alloys**). It should be noted whether combustion propagates along 200 mm of the train within the 2 minute test period (or 20 minutes for ~~metal powders~~ **powders of metals or metal alloys**). If the substance does not ignite and propagate combustion either by burning with flame or smouldering along 200 mm of powder train within the 2 minute (or 20 minute) test period, then the substance should not be classified as a flammable solid and no further testing is required. If the substance propagates burning of a 200 mm length of the powder train in less than 2 minutes or less than 20 minutes for ~~metal powders~~ **powders of metals or metal alloys**, the full test programme in 33.2.4.3.2 should be carried out.”.
11. Amend the first sentence of 33.2.4.3.2.2 as follows:  
“33.2.4.3.2.2 For substances other than ~~metal powders~~ **powders of metals or metal alloys**, 1 ml of a wetting solution should be added to the pile 30-40 mm beyond the 100 mm timing zone.”.
12. Amend the third sentence of 33.2.4.3.2.3 as follows:  
“For substances other than ~~metal powders~~ **powders of metals or metal alloys**, note whether or not the wetted zone stops propagation of the flame for at least 4 minutes.”.
13. Amend the first sentence in 33.2.4.4.2 as follows:  
“33.2.4.4.2 For flammable solids (other than ~~metal powders~~ **powders of metals or metal alloys**), packing group II/ Category 1 should be assigned if the burning time is less than 45 s and the flame passes the wetted zone.”
14. Amend 33.2.4.4.3 as follows:  
“33.2.4.4.3 For flammable solids (other than ~~metal powders~~ **powders of metals or metal alloys**), packing group III/ Category 2 should be assigned if the burning time is less than 45 s and wetted zone stops the flame propagation for at least four minutes. Packing group III/ Category 2 should be assigned to ~~metal powders~~ **powders of metals or metal alloys** if the reaction spreads over the whole length (100mm) of the sample in more than five minutes but not more than ten minutes.”.

## Proposal 2: Amendments to the Model Regulations

15. In all proposed amendments, the deleted text appears in ~~strike through~~ and new text in **bold underlined**.
16. Amend 2.4.2.2.1.2 as follows:  
 “2.4.2.2.1.2 Readily combustible solids are powdered, granular, or pasty substances which are dangerous if they can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly. The danger may come not only from the fire but also from toxic combustion products. ~~Metal powders~~ **Powders of metals or metal alloys** are especially dangerous because of the difficulty of extinguishing a fire since normal extinguishing agents such as carbon dioxide or water can increase the hazard.”
17. Amend 2.4.2.2.3.1 as follows:  
 “2.4.2.2.3.1 Packing groups are assigned on the basis of the test methods referred to in 2.4.2.2.2.1. For readily combustible solids (other than ~~metal powders~~ **powders of metals or metal alloys**), Packing group II shall be assigned if the burning time is less than 45 s and the flame passes the wetted zone. Packing group II shall be assigned to powders of ~~metal~~ metals or metal alloys if the zone of reaction spreads over the whole length of the sample in five minutes or less.”
18. Amend 2.4.2.2.3.2 as follows:  
 “2.4.2.2.3.2 Packing groups are assigned on the basis of the test methods referred to in 2.4.2.2.2.1. For readily combustible solids (other than ~~metal powders~~ **powders of metals or metal alloys**), Packing group III shall be assigned if the burning time is less than 45 s and the wetted zone stops the flame propagation for at least four minutes. Packing group III shall be assigned to ~~metal powders~~ **powders of metals or metal alloys** if the reaction spreads over the whole length of the sample in more than five minutes but not more than ten minutes.”

## Proposal 3: Amendments to the Globally Harmonized System of Classification and Labelling of Chemicals

19. In all proposed amendments, the deleted text appears in ~~strike through~~ and new text in **bold underlined**.
20. Amend Table 2.7.1 in the GHS as follows:

“Table 2.7.1: Criteria for flammable solids

Category	Criteria
1	Burning rate test: Substances or mixtures other than <del>metal powders</del> <b><u>powders of metals or metal alloys</u></b> : (a) wetted zone does not stop fire; and (b) burning time < 45 s or burning rate > 2.2 mm/s <del>Metal powders</del> <b><u>Powders of metals or metal alloys</u></b> : burning time ≤ 5 min
2	Burning rate test: Substances or mixtures other than <del>metal powders</del> <b><u>powders of metals or metal alloys</u></b> : (a) wetted zone stops the fire for at least 4 min; and (b) burning time < 45 s or burning rate > 2.2 mm/s <del>Metal powders</del> <b><u>Powders of metals or metal alloys</u></b> : burning time > 5 min and ≤ 10 min

21. Amend the third and fourth text boxes in decision logic 2.7 as follows:

- Text in the third box from the top:
  - “Burning rate test:
    - (a) For substances or mixtures other than ~~metal powders~~ **powders of metals or metal alloys**:  
Burning time < 45 s or burning rate > 2.2 mm/s?
    - (b) For ~~metal powders~~ **powders of metals or metal alloys**:  
Burning time ≤ 10 min?”
- Text in the fourth box from the top:
  - “(a) For substances or mixtures other than ~~metal powders~~ **powders of metals or metal alloys**:  
Does the wetted zone stop propagation of the flame?
  - (b) For ~~metal powders~~ **powders of metals or metal alloys**:  
Burning time > 5 min?”

22. Amend as follows the row for Chapter 2.7, Table A4.3.9.2 in Annex 4::

2.7	Flammable solids	- indicate the burning rate (or burning time for <del>metal powders</del> <b><u>powders of metals or metal alloys</u></b> ), generally determined by Test N.1 (section 33.2.1 of the Manual of Test and Criteria) - indicate whether the wetted zone has been passed or not
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