



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

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Item 3 of the provisional agenda

Listing, classification and packing

Amendment of the packing group for UN 2862 VANADIUM PENTOXIDE, non-fused form

Transmitted by the expert from Germany*

I. Introduction

1. In the *Model Regulations*, UN 2862 VANADIUM PENTOXIDE, non-fused form is assigned to packing group III. However, test results indicate that the substance should be assigned to packing group II. Among other things, the amendment is due to an amendment of annex VI to Regulation (EC) No. 1272/2008 on classification, labelling and packaging (CLP) made within the scope of the 18th ATP¹, which will apply from 23 November 2023.

II. Background

2. Vanadium pentoxide, CAS-No. 1314-62-1, is listed in annex VI to Regulation (EC) No. 1272/2008 on classification, labelling and packaging (CLP) under Index No. 023-001-00-8 and was previously (before 18th ATP) assigned the following dangerous goods classifications:

Acute Tox. 4 *, H302

Acute Tox. 4 *, H332

Aquatic Chronic 2, H411

The asterisk describes the minimum classification. In the *Model Regulations*, the substance is currently assigned to packing group III.

3. With the 18th ATP of the CLP Regulation, the classifications regarding toxicity were amended due to new findings on the oral and inhalation toxicity (amendments underlined):

Acute Tox. 3, H301

Acute Tox. 2, H330

Aquatic Chronic 2, H411

* A/77/6 (Sect. 20), table 20.6

¹ ATP = Adaption to Technical Progress



4. According to the “*Opinion proposing harmonized classification and labelling at EU level of Vanadium pentoxide*”, which was published in 2020 by the Committee for Risk Assessment (RAC) of the European Chemicals Agency (ECHA), vanadium pentoxide is acute toxic both via oral and inhalation route.

5. In a reliable acute oral toxicity study (Leuschner et al., 1994) in accordance with the Organization for Economic Cooperation and Development (OECD) Test guidelines 401, performed on Sprague-Dawley rats, an LD₅₀ value of 221.1 mg/kg was determined in females and 313.8 mg/kg in males. The LD₅₀ values from females and from males and females combined justify category 3 for acute oral toxicity for vanadium pentoxide.

6. In an acute inhalation toxicity study (anonymous, 2011) according to OECD Test guideline 436, performed on Fischer 344 rats, an LC₅₀ value of 0.25 mg/l was determined after a 4-hour exposure period. In the same study, an LC₅₀ value of less than 0.056 mg/l in female B6C3F1 mice and more than 0.5 mg/l in male B6C3F1 mice was found after 4 hours exposure. Since the rat is the preferred test species for the evaluation of acute inhalation toxicity (2.6.2.1.3 of the *Model Regulations*), the LC₅₀ value of male and female rats for vanadium pentoxide guarantees category 2.

7. The new inhalation toxicity classification (Acute Tox. 2, H330) corresponds to an assignment to packing group II in accordance with the Model Regulations (2.6.2.2.4.1).

8. According to the *Guiding Principles*, when strengthening the packing group some changes would have to be applied to the Dangerous Goods List. In accordance with tables 3.4 and 3.5.1 of the *Guiding Principles* a smaller amount of limited and excepted quantities is allowed. In accordance with table 4.3 the portable tanks instruction should rather be T3 instead of T1 so that the required test pressure rises from 1.5 bar to 2.65 bar. According to 4.1.4.3 of the *Model Regulations* packing instruction LP02 concerning the use of large packagings is only allowed for packing group III but not for packing group I or II. As vanadium pentoxide is inhalation toxic, the intermediate bulk containers (IBCs) in which it is transported shall be sift-proof or fitted with a sift-proof liner as required by special packing provisions B2 and B4.

9. In addition, this working document supports Sustainable Development Goal 3: Good Health and Well-Being as part of the 2030 Agenda for Sustainable Development by promoting the safe transport of UN 2862.

III. Proposal

10. Given that the GHS classification and the dangerous goods provisions are harmonized, Germany proposes that the entry for UN 2862 *VANADIUM PENTOXIDE, non-fused form* in the Model Regulations be amended as follows (amendments are underlined, entries to be deleted are ~~stricken through~~):

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
						5-kg 500 g	E1 E4	Packing instruction	Special packing provisions	Instructions	Special provisions
2862	VANADIUM PENTOXIDE, non-fused form	6.1		III <u>II</u>				P002 IBC08 <u>LP02</u>	B3 <u>B2, B4</u>	T1 <u>T3</u>	TP33

11. Regarding the proposed change of the portable tank instruction, the introduction of a transitional measure is adequate. At the end of 4.2.6, add the following new paragraph:

“UN 2862 VANADIUM PENTOXIDE, non-fused form may be transported in portable tanks under portable tank instruction T1 until 31 December 2028.”

Annex

Data sheet to be submitted to the United Nations for new or amended classification of substances

Submitted by Germany

Date 25 August 2023

Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions - If necessary, state "not known" or "not applicable" - If data is not available in the form requested, provide what is available with details. Delete inappropriate words.

Section 1. SUBSTANCE IDENTITY

- 1.1 Chemical name: Vanadium pentoxide
- 1.2 Chemical formula: V_2O_5
- 1.3 Other names/synonyms: Vanadium(V)-oxide, Divanadium pentaoxide
- 1.4.1 UN number: UN 2862
 - 1.4.2 CAS number: 1314-62-1
- 1.5 Proposed classification for the Recommendations: CLASS 6.1
 - 1.5.1 Proper shipping name (3.1.2¹)
VANADIUM PENTOXIDE, non-fused form
 - 1.5.2 Class/division: 6.1 subsidiary hazard(s): -
 - 1.5.3 Proposed special provisions, if any: none
 - Limited and excepted quantities: 500 g, E4
 - Special packing provisions: B2, B4
 - Portable tanks and bulk containers:
 - Instructions: T3
 - Special provisions: TP33
 - 1.5.4 proposed packing instruction(s): P002, IBC08

Section 2. PHYSICAL PROPERTIES

- 2.1 Melting point or range 690 °C
- 2.2 Boiling point or range: does not have a boiling point, it decomposes at 1750 °C
- 2.3 Relative density at: 3,654 at 21.7 °C
- 2.4 Vapour pressure at:
- 2.5 Viscosity at 20 °C² ___ m²/s
- 2.6 Solubility in water at 20 °C: slightly soluble, 0.92 g/l
- 2.7 Physical state at 20°C (2.2.1.1¹) solid/liquid/gas²
- 2.8 Appearance at normal transport temperatures, including colour and odour: yellow/orange to red/brown, solid, crystalline powder, with a characteristic odour
- 2.9 Other relevant physical properties: stable, incompatible with chlorine, chlorates, acids, alkali metals, interhalogens. Soluble in concentrated acids and alkalis, and insoluble in ethanol.

Section 3. FLAMMABILITY

- 3.1 Flammable vapour
 - 3.1.1 Flash point (2.3.3¹) °C oc/cc
 - 3.1.2 Is combustion sustained? (2.3.1.3¹) yes/no
 - 3.2 Autoignition temperature °C
 - 3.3 Flammability range (LEL/UEL) ___ %
 - 3.4 Is the substance a flammable solid? (2.4.2¹) yes/no
 - 3.4.1 If yes, give details ___

Section 4. CHEMICAL PROPERTIES

- 4.1 Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity? yes/no
If yes, state:

- 4.1.1 Inhibitor/stabilizer used ____
- 4.1.2 Alternative method ____
- 4.1.3 Time effective at 55 °C ____
- 4.1.4 Conditions rendering it ineffective ____
- 4.2 Is the substance an explosive according to paragraph 2.1.1.1? (2.1¹) yes/no
- 4.2.1 If yes, give details ____
- 4.3 Is the substance a desensitized explosive? (2.4.2.4¹) yes/no
- 4.3.1 If yes, give details ____
- 4.4 Is the substance a self-reactive substance? (2.4.1¹) yes/no
- If yes, state:
- 4.4.1 exit box of flow chart ____
- What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? °C
- Is the temperature control required? (2.4.2.3.4¹) yes/no
- 4.4.2 proposed control temperature for a 50 kg package ____ °C
- 4.4.3 proposed emergency temperature for a 50 kg package ____ °C
- 4.5 Is the substance pyrophoric? (2.4.3¹) yes/no
- 4.5.1 If yes, give details ____
- 4.6 Is the substance liable to self-heating? (2.4.3¹) yes/no
- 4.6.1 If yes, give details ____
- 4.7 Is the substance an organic peroxide (2.5.1¹) yes/no
- If yes state:
- 4.7.1 exit box of flow chart ____
- What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? ____ °C
- Is temperature control required? (2.5.3.4.1¹) yes/no
- 4.7.2 proposed control temperature for a 50 kg package ____ °C
- 4.7.3 proposed emergency temperature for a 50 kg package ____ °C
- 4.8 Does the substance in contact with water emit flammable gases? (2.4.4¹) yes/no
- 4.8.1 If yes, give details ____
- 4.9 Does the substance have oxidizing properties (2.5.1¹) yes/no
- 4.9.1 If yes, give details ____
- 4.10 Corrosivity (2.8¹) to:
- 4.10.1 mild steel ____ mm/year at ____ °C
- 4.10.2 aluminium ____ mm/year at ____ °C
- 4.10.3 other packaging materials (specify)
____ mm/year at ____ °C
____ mm/year at ____ °C
- 4.11 Other relevant chemical properties ____

Section 5. HARMFUL BIOLOGICAL EFFECTS

- 5.1 LD₅₀, oral (2.6.2.1.1¹) 221 mg/kg for female Sprague-Dawley rats
314 mg/kg for male Sprague-Dawley rats
- 5.2 LD₅₀, dermal (2.6.2.1.2¹) no signs of toxicity (> 2500 mg/kg)
- 5.3 LC₅₀, inhalation (2.6.2.1.3¹) 0.056 mg/l, dust and mist, 4 h, female B6C3F1 mice
> 0.5 mg/l, dust and mist, 4 h, male B6C3F1 mice
0.25 mg/l, 4 h, dust and mist, male and female Fischer
344 rats
- 5.4 Saturated vapour concentration at 20 °C (2.6.2.2.4.3¹) ____ ml/m³
- 5.5 Skin exposure (2.8¹)
- 5.6 Other data ____
- 5.7 Human experience ____

Section 6. SUPPLEMENTARY INFORMATION

- 6.1 Recommended emergency action
- 6.1.1 Fire (include suitable and unsuitable extinguishing agents) ____
- 6.1.2 Spillage ____
- 6.2 Is it proposed to transport the substance in:
- 6.2.1 Bulk Containers (6.8¹) yes/no
- 6.2.2 Intermediate Bulk Containers (6.5¹)? yes/no

- 6.2.3 Portable tanks (6.7¹)? yes/no
If yes, give details in Sections 7, 8 and/or 9.

Section 7. BULK CONTAINERS (only complete if yes in 6.2.1)

- 7.1 Proposed type(s)

Section 8. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.2)

- 8.1 Proposed type(s) IBC08

Section 9. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.3)

- 9.1 Description of proposed tank (including IMO tank type if known)
9.2 Minimum test pressure 2.65 bar
9.3 Minimum shell thickness see 6.7.2.4.2
9.4 Details of bottom openings, if any see 6.7.2.6.2
9.5 Pressure relief arrangements normal (see 6.7.2.8)
9.6 Degree of filling ____
9.7 Unsuitable construction materials ____
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