



WORKING PAPER

**DANGEROUS GOODS PANEL (DGP)
WORKING GROUP MEETING (DGP-WG/23)**

Rio de Janeiro, Brazil, 15 to 19 May 2023

- Agenda Item 1: Harmonizing ICAO dangerous goods provisions with UN Recommendations on the Transport of Dangerous Goods (REC-A-DGS-2025)**
- 1.2: Develop proposals, if necessary, for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2025-2026 Edition**

**DRAFT AMENDMENTS TO PART 2 OF THE TECHNICAL INSTRUCTIONS TO ALIGN
WITH THE UN RECOMMENDATIONS**

(Presented by the DGP Working Group on UN Harmonization)

SUMMARY

This working paper contains draft amendments to Part 2 of the Technical Instructions to reflect the decisions taken by the UN Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals at its ninth session (Geneva, 9 December 2022).

Action by the DGP-WG: The DGP-WG is invited to agree to the draft amendments in this working paper.

Part 2

CLASSIFICATION OF DANGEROUS GOODS

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INTRODUCTORY CHAPTER

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6. CLASSIFICATION OF ARTICLES AS ARTICLES CONTAINING DANGEROUS GOODS N.O.S.

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UN Model Regulations, Chapter 2.0, 2.0.5.2 (see ST/SG/AC.10/50/Add.1)

6.2 Such articles may in addition contain cells or batteries. Lithium cells and batteries that are integral to the article must be of a type proven to meet the testing requirements of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3, ~~except when otherwise specified by these Instructions (e.g. for pre-production prototype articles containing lithium batteries or for a small production run, consisting of not more than 100 such articles).~~ For articles containing pre-production prototype lithium cells or batteries transported for testing, or for articles containing lithium cells or batteries manufactured in production runs of not more than 100 cells or batteries, the requirements of Special Provision A88 apply.

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Chapter 1

CLASS 1 — EXPLOSIVES

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UN Model Regulations, Chapter 2.1, 2.1.1.3 (see ST/SG/AC.10/50/Add.1)

1.2 DEFINITIONS

For the purposes of these Instructions, the following definitions apply:

- a) **Explosive substance** is a solid or liquid substance (or a 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.
- b) **Pyrotechnic substance** ~~is a substance or a mixture of substances~~ an explosive substance 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.
- c) **Explosive article** is an article containing one or more explosive substances.
- d) **Phlegmatized** means that a substance (or “phlegmatizer”) has been added to an explosive to enhance its safety in handling and transport. The phlegmatizer renders the explosive insensitive, or less sensitive, to the following actions: heat, shock, impact, percussion or friction. Typical phlegmatizing agents include, but are not limited to: paper, wax, water, polymers (such as chlorofluoropolymers), alcohol and oils (such as petroleum jelly and paraffin).
- e) **Explosive or pyrotechnic effect** means, in the context of 1.1 c), an effect produced by self-sustaining exothermic chemical reactions including shock, blast, fragmentation, projection, heat, light, sound, gas and smoke.

Note.— Explanations for a number of other terms used in connection with explosives can be found in Attachment 2 to these Instructions.

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UN Model Regulations, Chapter 2.3, 2.3.1.4 (see ST/SG/AC.10/50/Add.1)

Chapter 3

CLASS 3 — FLAMMABLE LIQUIDS

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3.1.4 Liquid desensitized explosives are explosive substances which are dissolved or suspended in water or other liquid substances, to form homogeneous liquid mixture to suppress their explosive properties (see 1.5.2.3). Entries in the Dangerous Goods List (Table 3-1) for liquid desensitized explosives are: UN 1204, UN 2059, UN 3064, UN 3343, UN 3357 and [UN 3379 and UN 3555](#).

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Chapter 4

CLASS 4 — FLAMMABLE SOLIDS; SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION; SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

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4.2 FLAMMABLE SOLIDS, SELF-REACTIVE SUBSTANCES, DESENSITIZED EXPLOSIVES AND POLYMERIZING SUBSTANCES

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4.2.2 Division 4.1 — Flammable solids

4.2.2.1 Definitions and properties

4.2.2.1.1 Flammable solids are readily combustible solids and solids which may cause fire through friction.

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 not only come from the fire but also from toxic combustion products. 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.

UN Model Regulations, Chapter 2.4, 2.4.2.2.1 (see ST/SG/AC.10/50/Add.1)

[4.2.2.1.3 Metal powders are powders of metals or metal alloys.](#)

4.2.2.2 Classification of flammable solids

UN Model Regulations, Chapter 2.4, 2.4.2.2.1 (see ST/SG/AC.10/50/Add.1)

4.2.2.2.1 Powdered, granular or pasty substances must be classified as readily combustible solids of Division 4.1 when the time of burning of one or more of the test runs, performed in accordance with the test methods and criteria in the *UN Manual of Tests and Criteria*, Part III, subsection 33.2.1, is less than 45 seconds or the rate of burning is more than 2.2 mm/s. ~~Powders of metals or metal alloys~~ [Metal powders](#) must be classified in Division 4.1 when they can be ignited and the reaction spreads over the whole length of the sample in 10 minutes or less.

4.2.2.2.2 Solids which may cause fire through friction must be classified in Division 4.1 by analogy with existing entries (e.g. matches) until definitive criteria are established.

UN Model Regulations, Chapter 2.4, 2.4.2.2.3.1 (see ST/SG/AC.10/50/Add.1)

4.2.2.3 Assignment of packing groups

4.2.2.3.1 Packing groups are assigned on the basis of the test methods referred to in 4.2.2.2.1. For readily combustible solids (other than metal powders), Packing Group II must be assigned if the burning time is less than 45 seconds and the flame passes the wetted zone. Packing Group II must be assigned to ~~powders of metal or metal alloys~~ metal powders if the zone of reaction spreads over the whole length of the sample in 5 minutes or less.

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Chapter 5

CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

Table 2-7. List of currently assigned organic peroxides in packagings

Note.— Peroxides to be transported must fulfil the classification and the control and emergency temperatures (derived from the self-accelerating decomposition temperature (SADT)) as listed.

Organic peroxide	Concentration (per cent)	Diluent type A (per cent)	Diluent type B (per cent) (Note 1)	Inert solid (per cent)	Water (per cent)	Control tempera- ture (°C)	Emergency tempera- ture (°C)	UN generic entry	Sub- sidiary hazards and notes
tert-Butyl peroxybenzoate	≤52			≥48				3106	
UN Model Regulations, permitted in IBC520, see 2.5.3.2.4									
<u>tert-Butyl peroxybenzoate</u>	<u>≤32</u>		<u>≥68</u>					<u>3109</u>	
tert-Butyl peroxybutyl fumarate	≤52		≥48					3105	
...									
Dibenzoyl peroxide	≤42 as a stable dispersion in water							3109	
UN Model Regulations, Chapter 2.5, 2.5.3.2.4 (see ST/SG/AC.10/50/Add.1)									
<u>Dibenzoyl peroxide</u>	<u>≤42</u>		<u>≥38</u>		<u>>13</u>			<u>3109</u>	
Dibenzoyl peroxide	≤35			≥65				Exempt	29
Di-(4-tert-butylcyclohexyl) peroxydicarbonate	≤100					+30	+35	3114	
...									
Di-2,4-dichlorobenzoyl peroxide	≤77				≥23			FORBIDDEN	3
Di-2,4-dichlorobenzoyl peroxide	≤52 as a paste with silicon oil							3406 <u>3104</u>	
Di-2,4-dichlorobenzoyl peroxide	≤52 as a paste					+20	+25	3118	
...									
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane	≤47 as a paste							3108	
<u>2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane</u>	<u>≤22</u>		<u>≥78</u>					<u>Exempt</u>	<u>29</u>
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3	>86-100							FORBIDDEN	3

<i>Organic peroxide</i>	<i>Concentration (per cent)</i>	<i>Diluent type A (per cent)</i>	<i>Diluent type B (per cent) (Note 1)</i>	<i>Inert solid (per cent)</i>	<i>Water (per cent)</i>	<i>Control tempera- ture (°C)</i>	<i>Emergency tempera- ture (°C)</i>	<i>UN generic entry</i>	<i>Sub- sidiary hazards and notes</i>
...									
Methylcyclohexanone peroxide(s)	≤67		≥33			+35	+40	3115	
<u>Methyl ethyl ketone peroxide(s)</u>	<u>See remark 33</u>	<u>≥ 41</u>			<u>> 9</u>			<u>3105</u>	<u>33</u> <u>34</u>
Methyl ethyl ketone peroxide(s)	see remark 8)	≥48						FORBIDDEN	3,8,13
...									

Notes:

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32. Active oxygen ≤4.15 per cent.

33. Available oxygen ≤ 10 per cent.

34. Sum of diluent type A and water ≥ 55 per cent, and in addition methyl ethyl ketone.

Chapter 6

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

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6.3 DIVISION 6.2 — INFECTIOUS SUBSTANCES

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6.3.2 Classification of infectious substances

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Table 2-10. Indicative examples of infectious substances included in Category A in any form unless otherwise indicated (6.3.2.2.1 a))

UN Model Regulations, Chapter 2.6, 2.6.3.2.2.1 (see ST/SG/AC.10/50/Add.1)

UN Number and Proper Shipping Name	Micro-organism
UN 2814 Infectious substances affecting humans	...
	Monkeypox virus <u>(cultures only)</u>
	...

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Chapter 7

CLASS 7 — RADIOACTIVE MATERIAL

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7.1.3 Definitions of specific terms

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UN Model Regulations, Chapter 2.7, 2.7.1.3 (see ST/SG/AC.10/50/Add.1)

Specific activity of a radionuclide. The activity per unit mass of that nuclide. The specific activity of a material must mean the activity per unit mass of the material in which the radionuclides are essentially uniformly distributed.

Note.— The terms "activity concentration" and "specific activity" are synonymous for the purpose of these Instructions.

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Chapter 9

CLASS 9 — MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES, INCLUDING ENVIRONMENTALLY HAZARDOUS SUBSTANCES

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UN Model Regulations, Chapter 2.9, 2.9.2 (see ST/SG/AC.10/50/Add.1)

9.2 ASSIGNMENT TO CLASS 9

The substances and articles of Class 9 are subdivided as shown in Table 2-16.

Table 2-16. Substances and articles of Class 9

<i>UN number</i>	<i>Name</i>	<i>Notes</i>
...		
<i>Lithium batteries</i>		
3090	Lithium metal batteries (including lithium alloy batteries)	See 2.9.3
3091	Lithium metal batteries contained in equipment (including lithium alloy batteries)	
3091	Lithium metal batteries packed with equipment (including lithium alloy batteries)	
3480	Lithium ion batteries (including lithium ion polymer batteries)	
3481	Lithium ion batteries contained in equipment (including lithium ion polymer batteries)	
3481	Lithium ion batteries packed with equipment (including lithium ion polymer batteries)	

<i>UN number</i>	<i>Name</i>	<i>Notes</i>
3536	Lithium batteries installed in cargo transport unit	
<i>Sodium ion batteries</i>		
<u>3551</u>	Sodium ion batteries with organic electrolyte	<u>See 9.4</u>
<u>3552</u>	Sodium ion batteries contained in equipment with organic electrolyte	
<u>3552</u>	Sodium ion batteries packed with equipment with organic electrolyte	
...		
<i>Life-saving appliances</i>		
2990	Life-saving appliances, self-inflating	
3072	Life-saving appliances, not self-inflating containing dangerous goods as equipment	
3268	Safety devices , electrically initiated	
<u>3559</u>	Fire suppressant dispersing devices	
...		
<i>Genetically modified micro-organisms (GMMOs) and genetically modified organisms (GMOs)</i>		
3245	Genetically modified micro-organisms	GMMOs or GMOs which do not meet the definition of toxic substances (see 6.2) or infectious substances (see 6.3) must be assigned to UN 3245. GMMOs or GMOs are not subject to these Instructions when authorized for use by the appropriate national authorities of the States of Origin, Transit and Destination. <u>Pharmaceutical products (such as vaccines) that are packed in a form ready to be administered, including those in clinical trials, and that contain GMMOs or GMOs are not subject to these Instructions.</u> Genetically modified live animals must be transported under terms and conditions of the appropriate national authorities of the States of Origin and Destination. [COVID-19 vaccines containing GMOs or GMMOs, including those in clinical trials, are not subject to these Instructions.]
3245	Genetically modified organisms	
...		
<i>Other substances or articles presenting a danger during transport, but not meeting the definitions of another class</i>		
...		
3548	Articles containing miscellaneous dangerous goods, n.o.s.	
<u>3556</u>	Vehicle, lithium ion battery powered	
<u>3557</u>	Vehicle, lithium metal battery powered	
<u>3558</u>	Vehicle, sodium ion battery powered	

9.3 LITHIUM BATTERIES

Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, containing lithium in any form must be assigned to UN Nos. 3090, 3091, 3480 or 3481, as appropriate. They may be transported under these entries if they meet the following provisions:

- a) each cell or battery is of the type proved to meet the requirements of each test of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3;

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UN Model Regulations, Chapter 2.9, 2.9.4 (g) (see ST/SG/AC.10/50/Add.1)

- g) except for button cells installed in equipment (including circuit boards), manufacturers and subsequent distributors of cells or batteries manufactured after 30 June 2003 must make available the test summary as specified in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3, paragraph 38.3.5.

Note.— The term “make available” means that manufacturers and subsequent distributors ensure that the test summary for lithium cells or batteries or equipment with installed lithium cells or batteries is accessible so that the shipper or other persons in the supply chain can confirm compliance.

UN Model Regulations, Chapter 2.9, 2.9.5 (see ST/SG/AC.10/50/Add.1)

9.4 SODIUM ION BATTERIES

Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment containing sodium ion, which are a rechargeable electrochemical system where the positive and negative electrode are both intercalation or insertion compounds, constructed with no metallic sodium (or sodium alloy) in either electrode and with an organic non aqueous compound as electrolyte, must be assigned to UN Nos. 3551 or 3552, as appropriate.

Note.— Intercalated sodium exists in an ionic or quasi-atomic form in the lattice of the electrode material.

They may be transported under these entries if they meet the following provisions:

- a) each cell or battery is of the type proved to meet the requirements of applicable tests of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3;
- b) each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under conditions normally encountered during transport;
- c) each cell and battery is equipped with an effective means of preventing external short circuits;
- d) each battery containing cells or a series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (e.g. diodes, fuses, etc.);
- e) cells and batteries must be manufactured under a quality management program as prescribed under 9.3 e) 1 to 9;
- f) manufacturers and subsequent distributors of cells or batteries must make available the test summary as specified in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3, paragraph 38.3.5.

Note.— The term “make available” means that manufacturers and subsequent distributors ensure that the test summary for lithium cells or batteries or equipment with installed lithium cells or batteries is accessible so that the shipper or other persons in the supply chain can confirm compliance.

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