International Civil Aviation Organization

DGP-WG/15-WP/12
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WORKING PAPER

DANGEROUS GOODS PANEL (DGP) WORKING GROUP MEETING (DGP-WG/15)

Montreal, 27 April to 1 May 2015

Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2017-2018 Edition
2.2: Part 2 — Classification

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

(Presented by the Secretary)

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 seventh session (Geneva, 12 December 2014).

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

Part 2

CLASSIFICATION OF DANGEROUS GOODS

INTRODUCTORY CHAPTER

Parts of this Chapter are affected by State Variations DE 5, NL 4; see Table A-1

1. RESPONSIBILITIES

1.1 Classification must be made by the appropriate national authority when so required or may otherwise be made by the shipper.

1.2 A shipper who has identified, on the basis of test data, that a substance listed by name in column 1 of the Dangerous Goods List in Part 3, Chapter 2, Table 3-1 meets classification criteria for a hazard class or division that is not identified in the list, may, with the approval of the appropriate national authority, consign the substance:

a) under the most appropriate generic or not otherwise specified (n.o.s.) entry reflecting all hazards; or

b) under the same UN number and name but with additional hazard communication information as appropriate to reflect the additional subsidiary risk(s) (documentation, label) provided that the primary hazard class remains unchanged and that any other transport conditions (e.g. limited quantity, packaging provisions) that would normally apply to substances possessing such a combination of hazards are the same as those applicable to the substance listed.

Note.— When an appropriate national authority grants such approvals, it should inform the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods accordingly and submit a relevant proposal of amendment to the Dangerous Goods List. Should the proposed amendment be rejected, the competent authority should withdraw its approval.

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3. UN NUMBERS AND PROPER SHIPPING NAMES

3.1 Dangerous goods are assigned to UN numbers and proper shipping names according to their hazard clssification and their composition.

3.2 Dangerous goods commonly carried are listed in Table 3-1. Where an article or substance is specifically listed by name, it must be identified in transport by the proper shipping name in Table 3-1. Such substances may contain technical impurities (for example, those deriving from the production process) or additives for stability or other purposes that do not affect its classification. However, a substance listed by name containing technical impurities or additives for stability or other purposes affecting its classification must be considered a mixture or solution (see 3.5). For dangerous goods not specifically listed by name, “generic” or “not otherwise specified (n.o.s.)” entries are provided (see 3.8) to identify the article or substance in transport. The substances listed by name in column 1 of Table 3-1 must be transported according to their classification in the list or under the conditions specified in 1.2. Each entry in Table 3-1 is characterized by a UN number. Table 3-1 also contains relevant information for each entry, such as hazard class, subsidiary risk(s) (if any), packing group (where assigned), packing requirements, passenger and cargo aircraft requirements, etc. Entries in Table 3-1 are of the following four types:

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Chapter 1

CLASS 1 — EXPLOSIVES

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1.3 DIVISIONS

1.3.1 Class 1 is divided into six divisions:

a) Division 1.1 — Substances and articles which have a mass explosion hazard (a mass explosion is one which affects almost the entire load virtually instantaneously).

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f) Division 1.6 — Extremely insensitive articles which do not have a mass explosion hazard.

This division comprises articles which predominantly contain ~~only~~ extremely insensitive substances and which demonstrate a negligible probability of accidental initiation or propagation.

Note.— The risk from articles of Division 1.6 is limited to the explosion of a single article.

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1.4 COMPATIBILITY GROUPS

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Table 2-2. Classification codes

Description of substance or article to be classified	*Compatibility group*	*Classification code*
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Articles predominantly containing ~~only~~ extremely insensitive substances	N	1.6N
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1.5.3 Classification documentation

1.5.3.1 An appropriate national authority assigning an article or substance into Class 1 should confirm with the applicant that classification in writing.

1.5.3.2 An appropriate national authority classification document may be in any form and may consist of more than one page, provided pages are numbered consecutively. The document should have a unique reference.

1.5.3.3 The information provided must be easy to identify, legible and durable.

1.5.3.4 Examples of the information that may be provided in the classification documents are as follows:

a) the name of the appropriate national authority and the provisions in national legislation under which it is granted its authority;

b) the modal or national regulations for which the classification document is applicable;

c) confirmation that the classification has been approved, made or agreed in accordance with the United Nations Recommendations on the Transport of Dangerous Goods or these Instructions;

d) the name and address of the person in law to which the classification has been assigned and any company registration which uniquely identifies a company or other body corporate under national legislation;

e) the name under which the explosives will be placed onto the market or otherwise supplied for transport;

f) the proper shipping name, UN number, class, hazard division and corresponding compatibility group of the explosives;

g) where appropriate, the maximum net explosive mass of the package or article;

h) the name, signature, stamp, seal or other identification of the person authorized by the appropriate national authority to issue the classification document is clearly visible;

i) where safety in transport or the hazard division is assessed as being dependent upon the packaging, the packaging mark or a description of the permitted:

i) inner packagings;

ii) intermediate packagings; and

iii) outer packagings;

j) the classification document states the part number, stock number or other identifying reference under which the explosives will be placed onto the market or otherwise supplied for transport;

k) the name and address of the person in law who manufactured the explosives and any company registration which uniquely identifies a company or other body corporate under national legislation;

l) any additional information regarding the applicable packing instruction and special packing provisions where appropriate;

m) the basis for assigning the classification, i.e. whether on the basis of test results, default for fireworks, analogy with classified explosive, by definition from the Dangerous Goods List etc.;

n) any special conditions or limitations that the appropriate national authority has identified as relevant to the safety for transport of the explosives, the communication of the hazard and international transport;

o) the expiry date of the classification document is given where the appropriate national authority considers one to be appropriate.

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Chapter 2

CLASS 2 — GASES

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2.6 Gases not accepted for transport

2.6.1 Chemically unstable gases of Class 2 must not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see Special Provision A208. To this end particular care must be taken to ensure that receptacles do not contain any substances liable to promote these reactions.

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Chapter 3

CLASS 3 — FLAMMABLE LIQUIDS

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3.2 ASSIGNMENT OF PACKING GROUPS

3.2.1 Table 2-4 should be used for the determination of the packing group of a liquid that presents a risk due to flammability. For liquids whose only hazard is flammability, the packing group for the material is the packing group shown in Table 2-4. For a liquid possessing an additional hazard(s), the packing group, determined by using Table 2-4, and the packing group based on the severity of the additional hazard(s), must be considered. In such cases, the table of precedence of hazard characteristics appearing in Table 2-1 should be used to determine the correct classification of the liquid.

3.2.2 Viscous flammable liquids such as paints, enamels, lacquers, varnishes, adhesives and polishes having a flash point of less than 23°C may be assigned to Packing Group III in conformity with the procedures prescribed in Part III,

subsection 32.3 of the UN *Manual of Tests and Criteria* provided that:

a) the viscosity[1] ~~expressed as the flowtime in seconds~~ and flash point are in accordance with Table 2-5;

b) less than 3 per cent of the clear solvent layer separates in the solvent separation test;

c) the mixture or any separated solvent does not meet the criteria for Division 6.1 or Class 8;

d) the net quantity per package does not exceed 30 L for passenger aircraft or 100 L for cargo aircraft.

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Table 2-5. Viscosity and flashpoints

Kinematic viscosity (extrapolated) v (at near-zero shear rate) mm^2/s at 23°C	*Flow time t in seconds*	*Jet diameter in mm*	*Flash point in °C (closed-cup)*
20 < *v* ≤ 80	20 < t ≤ 60	4	above 17
80 < *v* ≤ 135	60 < t ≤100	4	above 10
135 < *v* ≤ 220	20 < t ≤32	6	above 5
220 < *v* ≤ 300	32 < t ≤44	6	above –1
300 < *v* ≤ 700	44 < t ≤100	6	above –5
700 < *v*	100 < t	6	–5 and below

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3.5 Substances not accepted for transport

3.5.1 Chemically unstable substances of Class 3 must not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see Special Provision A208. To this end particular care must be taken to ensure that receptacles do not contain any substances liable to promote these reactions.

Chapter 4

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

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4.1 DEFINITIONS AND GENERAL PROVISIONS

4.1.1 Class 4 is divided into three divisions as follows:

a) Division 4.1 — Flammable solids.

Solids which, under conditions encountered in transport, are readily combustible or may cause or contribute to fire

[1] Viscosity determination: Where the substance concerned is non-Newtonian, or where a flow cup method of viscosity determination is otherwise unsuitable, a variable shear-rate viscometer must be used to determine the dynamic viscosity coefficient of the substance, at 23°C, at a number of shear rates. The values obtained are plotted against shear rate and then extrapolated to zero shear rate. The dynamic viscosity thus obtained, divided by the density, gives the apparent kinematic viscosity at near-zero shear rate.

through friction; self-reactive substances and polymerizing substances which are liable to undergo a strongly exothermic reaction; desensitized explosives which may explode if not diluted sufficiently.

b) Division 4.2 — Substances liable to spontaneous combustion.

Substances which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up in contact with air, and being then liable to catch fire.

c) Division 4.3 — Substances which, in contact with water, emit flammable gases.

Substances which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

4.1.2 As referenced in this Chapter, test methods and criteria, with advice on application of the tests, are given in the current edition of the UN *Manual of Tests and Criteria*, for the classification of the following types of substances of Class 4:

a) Flammable solids (Division 4.1);

b) Self-reactive substances (Division 4.1);

c) Polymerizing substances (Division 4.1);

~~c~~d) Pyrophoric solids (Division 4.2);

~~d~~e) Pyrophoric liquids (Division 4.2);

~~e~~f) Self-heating substances (Division 4.2); and

~~f~~g) Substances which, in contact with water, emit flammable gases (Division 4.3).

Test methods and criteria for self-reactive substances and polymerizing substances are given in Part II of the UN *Manual of Tests and Criteria*, and test methods and criteria for the other types of substances of Class 4 are given in Part III, section 33 of the UN *Manual of Tests and Criteria*.

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

4.2.1 General

Division 4.1 includes the following types of substances:

a) flammable solids (see 4.2.2);

b) self-reactive substances (see 4.2.3); ~~and~~

c) solid desensitized explosives (see 4.2.4); and

d) polymerizing substances (see 4.2.5).

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4.2.5 Division 4.1 — Polymerizing substances and mixtures (stabilized)

4.2.5.1 Definitions and properties

4.2.5.1.1 Polymerizing substances are substances which, without stabilization, are liable to undergo a strongly exothermic reaction resulting in the formation of larger molecules or resulting in the formation of polymers under conditions normally encountered in transport. Such substances are considered to be polymerizing substances of Division 4.1 when:

a) their self-accelerating polymerization temperature (SAPT) is 75°C or less under the conditions (with or without chemical stabilization as offered for transport) and in the packaging in which the substance or mixture is to be transported;

b) they exhibit a heat of reaction of more than 300 J/g; and

c) they do not meet any other criteria for inclusion in Classes 1 to 8.

4.2.5.1.2 A mixture meeting the criteria of a polymerizing substance must be classified as a polymerizing substance of Division 4.1.

4.2.5.1.3 Polymerizing substances are subject to temperature control in transport if their self-accelerating polymerization temperature (SAPT) is, when offered for transport in a packaging, 50 °C or less in the packaging in which the substance is to be transported.

4.2.5.1.4 Polymerizing substances that also meet the criteria of 2.9.3 of the UN Model Regulations must be consigned under the appropriate polymerizing substance entry.

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4.4 SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES (DIVISION 4.3)

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4.4.3 Assignment of packing groups

4.4.3.1 Packing Group I must be assigned to any substance which reacts vigorously with water at ambient temperatures and demonstrates generally a tendency for the gas produced to ignite spontaneously, or which reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10 L/kg of substance over any one minute.

4.4.3.2 Packing Group II must be assigned to any substance which reacts readily with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 20 L/kg of substance per hour, and which does not meet the criteria for Packing Group I.

4.4.3.3 Packing Group III must be assigned to any substance which reacts slowly with water at ambient temperatures such that the maximum rate of evolution of flammable gas is ~~equal to or~~ greater than 1 L/kg of substance per hour, and which does not meet the criteria for Packing Groups I or II.

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Chapter 5

CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

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

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*	*Notes*
. . .									
tert-Butyl cumyl peroxide	>42-100							~~3107~~3109	
. . .									
tert-Butyl peroxy-3,5,5- trimethylhexanoate	>~~32~~37-100							3105	
tert-Butyl peroxy-3,5,5- trimethylhexanoate	≤42			≥58				3106	

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*	*Notes*
tert-Butyl peroxy-3,5,5- trimethylhexanoate	~~≤32~~37		≥~~68~~63					3109	
. . .									
Dibenzoyl peroxide	>~~51~~52-100			≤48				FORBIDDEN	3
. . .									
Dicetyl peroxydicarbonate	≤100					+30	+35	~~3116~~3120	
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Chapter 6

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

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6.2 DIVISION 6.1 — TOXIC SUBSTANCES

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6.2.5 Substances not accepted for transport

6.2.5.1 Chemically unstable substances of Division 6.1 must not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see Special Provision A208. To this end particular care must be taken to ensure that receptacles do not contain any substances liable to promote these reactions.

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Chapter 7

CLASS 7 — RADIOACTIVE MATERIAL

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7.2.4 Classification of packages

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7.2.4.1.1.3 Radioactive material which is enclosed in or is included as a component part of an instrument or other manufactured article may be classified under UN 2911 — **Radioactive material, excepted package — instruments** or **articles** provided that:

a) the radiation level at 10 cm from any point on the external surface of any unpackaged instrument or article is not greater than 0.1 mSv/h; and

b) each instrument or article bears the mark~~ing~~ “RADIOACTIVE” on its external surface except for the following:

i) radioluminescent time-pieces or devices;

ii) consumer products that either have received regulatory approval in accordance with 1;6.1.4 c) or do not individually exceed the activity limit for an exempt consignment in Table 2-12 (column 5), provided such products are transported in a package that bears the mark~~ing~~ “RADIOACTIVE” on an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; and

iii) other instruments or articles too small to bear the mark~~ing~~ “RADIOACTIVE”, provided that they are transported in a package that bears the mark~~ing~~ “RADIOACTIVE” on its internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package;

c) the active material is completely enclosed by non-active components (a device performing the sole function of containing radioactive material must not be considered to be an instrument or manufactured article); and

d) the limits specified in columns 2 and 3 of Table 2-14 are met for each individual item and each package, respectively.

7.2.4.1.1.4 Radioactive material in forms other than as specified in 7.2.4.1.1.3 and with an activity not exceeding the limits specified in column 4 of Table 2-14 may be classified under UN 2910 — **Radioactive material, excepted package — limited quantity of material**, provided that:

a) the package retains its radioactive contents under routine conditions of transport; and

b) the package bears the mark~~ing~~ “RADIOACTIVE” on either:

i) an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; or

ii) the outside of the package, where it is impractical to mark an internal surface.

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Chapter 8

CLASS 8 — CORROSIVE SUBSTANCES

8.3 Substances not accepted for transport

Chemically unstable substances of Class 8 must not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see Special Provision A208. To this end particular care must be taken to ensure that receptacles do not contain any substances liable to promote these reactions.

— END —