



WORKING PAPER

**DANGEROUS GOODS PANEL (DGP)
MEETING OF THE WORKING GROUP OF THE WHOLE**

Atlantic City, United States, 4 to 8 April 2011

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 2013-2014 Edition

2.3: Part 3 — Dangerous Goods List, Special Provisions and Limited and Excepted Quantities

TABLE 3-1 REQUIREMENT FOR GROSS MASS

(Presented by D. Brennan)

SUMMARY

This paper proposes that the requirements for gross mass for certain articles be reviewed to remove the unnecessary complications in completion of the dangerous goods transport document.

Action by the DGP-WG is in paragraph 2.

1. INTRODUCTION

1.1 At DGP-WG/10 a working paper (DGP-WG/10-WP/39) was submitted that sought some consideration regarding the removal of gross mass either as a specific annotation against the quantity shown for the article in column 11 and/or 13 in Table 3-1 or as a requirement for the addition of “G” following the unit of measurement on the dangerous goods transport document where the article has a packing instruction reference or has “No Limit” in Table 3-1.

1.2 In the discussion of the removal of gross weight at the last working group meeting there was a strong opinion that limited quantities should not be considered, and for that reason this paper excludes any articles listed with a “G” for the limited quantity entry.

1.3 Gross mass initially appeared only against entries for batteries, e.g. UN 3028, batteries, dry, containing potassium hydroxide, solid, UN 2794, batteries, wet filled with acid. But over time the number of entries with a “G” in Table 3-1 have grown and now include lithium batteries, UN 3090 and UN 3480 and also UN 3468, Hydrogen in a metal hydride storage system, including when packed with or contained in equipment.

1.4 In considering the issue of limiting the quantity of a substance or article based on the gross mass of the completed package, the question becomes what is the purpose, or advantage from a safety perspective of doing so. It is believed that the original adoption of gross mass for wet batteries was based on the potential confusion with just what constituted the “net” quantity of dangerous goods, i.e. is it the net quantity of the acid or alkali contained in the battery, or is it the net quantity of the battery itself.

1.5 To clarify this issue it is believed that the definition of “net quantity” could be revised to make it clear the difference between substances and articles for the purposes of what constitutes the net quantity.

1.6 Another concern with limiting per package quantities by gross mass rather than by net mass is that there may be an incentive for the shipper to seek to have the lightest packaging materials possible to maximise the quantity of dangerous goods that a package can contain. An example of where gross mass became a significant impediment was in the United States domestic regulations where the requirement for an enhanced packaging for chemical oxygen generators meant that limiting by package gross mass became impractical and the limit was changed to one of net mass per package. The limit in the Technical Instructions was as shown in Table 3-1 was subsequently also changed to remove the “G” following the unit of measurement.

1.7 Finally, declaring gross mass on the dangerous goods transport document is inconsistent with multi-modal harmonization as no other mode uses gross mass. All other modes require the dangerous goods transport document to show the net mass or volume, as appropriate. Deleting reference to a gross mass limit would further harmonize the provisions of the Technical Instructions with the other modal regulations.

2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to amend the entries in Table 3-1 for the applicable UN numbers as shown:

| Name | UN No. | Class or division | Subsidiary risk | Labels | State variations | Special provisions | UN packing group | Excepted quantity | Passenger aircraft | | Cargo aircraft | |
|---|--------|-------------------|-----------------|---------------|------------------|---------------------|------------------|-------------------|---------------------|-------------------------------|---------------------|-------------------------------|
| | | | | | | | | | Packing instruction | Max. net quantity per package | Packing instruction | Max. net quantity per package |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 9 | 10 | 11 | 12 |
| Batteries, dry, containing potassium hydroxide, solid, electric storage † | 3028 | 8 | | Corrosive | | A183 | | E0 | 871 | 25 kg G | 871 | 230 kg G |
| Batteries, wet, filled with acid, electric storage † | 2794 | 8 | | Corrosive | | A51 A164 A183 | | E0 | 870 | 30 kg G | 870 | No limit |
| Batteries, wet, filled with alkali, electric storage † | 2795 | 8 | | Corrosive | | A51 A164 A183 | | E0 | 870 | 30 kg G | 870 | No limit |
| Cells, containing sodium † | 3292 | 4.3 | | Danger if wet | | A94 | II | E0 | 492 | 25 kg G | 492 | No limit |
| Hydrogen in a metal hydride storage system | 3468 | 2.1 | | Gas flammable | | A1 A143 A176 | | E0 | FORBIDDEN | | 214 | 100 kg G |
| Hydrogen in a metal hydride storage system contained in equipment | 3468 | 2.1 | | Gas flammable | | A1 A143 A176 | | E0 | FORBIDDEN | | 214 | 100 kg G |

| | | | | | | | | | | | | |
|--|------|-----|--|---------------|--------------|------------------------------------|----|----|-----------|----------|----------|---------|
| Hydrogen in a metal hydride storage system packed with equipment | 3468 | 2.1 | | Gas flammable | | A1 A143 A176 | | E0 | FORBIDDEN | 214 | 100 kg G | |
| Lithium ion batteries (including lithium ion polymer batteries) | 3480 | 9 | | Miscellaneous | | A88 A99 A154 A164 A183 | II | E0 | 965 | 5 kg G | 965 | 35 kg G |
| Lithium metal batteries (including lithium alloy batteries) | 3090 | 9 | | Miscellaneous | US 2 US 3 | A88 A99 A154 A164 A183 | II | E0 | 968 | 2.5 kg G | 965 | 35 kg G |

2.2 The DGP-WG is invited to amend the meaning of the abbreviation “G” as shown:

ABBREVIATIONS AND SYMBOLS

The abbreviations and symbols in the following table are used throughout the Instructions, or in the particular sections indicated, and have the meanings shown below.

| Abbreviation or symbol | Meaning |
|------------------------|--|
| ... | |
| G | gross mass as prepared for transport (as used in columns 11 and 13 of Table 3-1) |

2.3 The DGP-WG is invited to amend the definition of “net quantity” as shown:

Net quantity. The mass or volume of the dangerous goods contained in a package excluding the mass or volume of any packaging material. For the purposes of this definition, “dangerous goods” means the substance or article as described by the proper shipping name shown in Table 3-1, e.g. for “Fire extinguishers”, the net quantity is the mass of the fire extinguisher, except in the case of explosive articles and of matches where the net mass is the mass of the finished article excluding packaging.

2.4 The DGP-WG is invited to amend the text in Part 3;2.1.1, Column 11 and Column 13 as shown:

| | |
|-----------|--|
| Column 11 | “Passenger aircraft — Maximum net quantity per package” — this column shows the maximum net quantity (mass or volume) of the article or substance allowed in each package for transport on a passenger aircraft. The mass quoted is the net mass unless otherwise indicated by a letter “G”. Where a maximum net quantity appears beside a packing instruction prefixed by the letter “Y”, this indicates it is the maximum net quantity permitted in a packaging containing limited quantities of dangerous goods <u>unless indicated by a letter “G” where the mass quoted is the total mass of the package.</u> The maximum quantity per package may be further limited by the type of packaging used. The maximum net quantities indicated may be exceeded only as permitted in the Supplement to these Instructions in S-3;2 with the approval of the appropriate national authority of the State of Origin and the State of the Operator. |
| Column 12 | “Cargo aircraft — Packing instruction” — this column provides information similar to that in column 10, but for articles or substances which may be transported on a cargo aircraft only. |
| Column 13 | “Cargo aircraft — Maximum net quantity per package” — this column provides information similar to that in column 11, but for articles or substances which may be transported on a cargo aircraft only. The mass quoted is the net mass unless otherwise indicated by a letter “G”. The maximum quantity per package may be further limited by |

the type of packaging used. The maximum net quantities indicated do not apply to transport in portable tanks, as permitted in the Supplement to these Instructions, Part S-4, Chapter 12, with the approval of the appropriate authority of the State of Origin and the State of the Operator. The maximum net quantities indicated may be exceeded only as permitted in the Supplement to these Instructions in S-3;2 with the approval of the appropriate national authority of the State of Origin and the State of the Operator.

...

| Abbreviation | Column | Meaning |
|--------------|--------|---------|
|--------------|--------|---------|

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| | | |
|---|-----------|---|
| G | 11 and 13 | Gross mass of package as prepared for transport |
|---|-----------|---|

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2.5 The DGP-WG is invited to revise Special Provision A51 as follows:

A51 Irrespective of the limit specified in column 11 of Table 3-1, aircraft batteries up to a limit of 100 kg ~~gross~~ net mass per package may be transported. Transport in accordance with this special provision must be noted on the dangerous goods transport document.

2.6 The DGP-WG is invited to revise Part 4;1.1.9 as follows:

1.1.9 Subject to 1.1.8 an outer packaging may contain more than one item of dangerous goods provided that:

- the inner packaging used for each item of dangerous goods and the quantity contained therein complies with the relevant part of the packing instruction applicable to that item;
- the outer packagings used are permitted by all the packing instructions applicable to each item of dangerous goods;
- the package as prepared for shipment meets the specification performance tests for the most restrictive packing group of a substance or article contained in the package;
- the dangerous goods do not require segregation according to Table 7-1, unless otherwise provided for in these Instructions; and
- the quantities of different dangerous goods contained in one outer packaging must be such that "Q" does not exceed the value of 1, where "Q" is calculated using the formula:

$$Q = \frac{n_1}{M_1} + \frac{n_2}{M_2} + \frac{n_3}{M_3} + \dots$$

where n_1 , n_2 , etc. are the net quantities of the different dangerous goods and M_1 , M_2 , etc. are the maximum net quantities for these different dangerous goods according to Table 3-1 for passenger or cargo aircraft as applicable. However, the following dangerous goods do not need to be taken into account in the calculation of the "Q" value:

- carbon dioxide, solid (dry ice), UN 1845;
- those where columns 11 and 13 of Table 3-1 indicate "No limit";
- those with the same UN number, packing group, and physical state (i.e. solid or liquid), providing they are the only dangerous goods in the package and the total net quantity does not exceed the maximum net quantity according to Table 3-1.
- ~~those where columns 11 and 13 of Table 3-1 indicate a maximum gross mass per package.~~
- ~~for packages containing dangerous goods where the letter "G" follows the quantity shown in column 11 or 13 of Table 3-1, the gross mass of the completed package does not exceed the lowest applicable gross mass.~~

An outer packaging containing Division 6.2 (Infectious Substances) may contain material for refrigeration, or freezing or packaging material such as absorbent material.

2.7 The DGP-WG is invited to revise the following packing instructions as indicated:

| Packing Instruction 492 | | | | |
|---|---|---|---|------------------------------|
| Passenger and cargo aircraft for UN 3292 only | | | | |
| ... | | | | |
| COMBINATION PACKAGINGS | | | | SINGLE PACKAGINGS |
| <i>UN number and proper shipping name</i> | <i>Packing conditions</i> | <i>Total quantity per package — passenger</i> | <i>Total quantity per package — cargo</i> | |
| UN 3292 Batteries, containing sodium | Batteries may be offered for transport and transported unpacked or in protective enclosures such as fully enclosed or wooden slatted crates that are not subject to the requirements of Part 6 of these Instructions. | Forbidden | No limit | No limit |
| UN 3292 Cells, containing sodium | | 25 kg Ⓞ | No limit | No |
| ... | | | | |

| Packing Instruction 870 | | | | |
|--|--|---|---|-------------------------------|
| Passenger and cargo aircraft for UN 2794 and 2795 only | | | | |
| ... | | | | |
| COMBINATION PACKAGINGS | | | | SINGLE PACKAGINGS |
| <i>UN number and proper shipping name</i> | <i>Packing conditions</i> | <i>Total quantity per package — passenger</i> | <i>Total quantity per package — cargo</i> | |
| UN 2794 Batteries, wet, filled with acid UN 2795 Batteries, wet, filled with alkali | Batteries must be placed in an acid/alkali-proof liner of sufficient strength and adequately sealed to positively preclude leakage in the event of spillage. The batteries must be packed so that the fill openings and vents, if any, are upward; they must be incapable of short-circuiting and be securely cushioned in the packagings. | 30 kg Ⓞ | No limit | Unpackaged batteries No |
| | <i>Batteries installed in equipment</i> If batteries are shipped as an integral component of assembled equipment, they must be securely installed and fastened in an upright position and protected against contact with other articles so as to prevent short circuits. Batteries must be removed and packed according to this packing instruction if the assembled equipment is likely to be carried in other than an upright position. | | | |
| ... | | | | |

| Packing Instruction 871 | | | | |
|---|--|---|---|------------------------------|
| Passenger and cargo aircraft for UN 3028 only | | | | |
| ... | | | | |
| COMBINATION PACKAGINGS | | | | SINGLE PACKAGINGS |
| <i>UN number and proper shipping name</i> | <i>Packing conditions</i> | <i>Total quantity per package — passenger</i> | <i>Total quantity per package — cargo</i> | |
| UN 3028 Batteries, dry, containing potassium hydroxide solid | The batteries must be securely cushioned in the packagings. | 25 kg G | 230 kg G | No |
| ... | | | | |

| Packing Instruction 965 | | |
|--|-------------------------------------|--------------|
| Passenger and cargo aircraft for UN 3480 | | |
| ... | | |
| <i>Contents</i> | <i>Package quantity (Section I)</i> | |
| | <i>Passenger</i> | <i>Cargo</i> |
| Lithium ion cells and batteries | 5 kg G | 35 kg G |
| ... | | |

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| Packing Instruction 968 | | |
|--|-------------------------------------|--------------|
| Passenger and cargo aircraft for UN 3090 | | |
| ... | | |
| <i>Contents</i> | <i>Package quantity (Section I)</i> | |
| | <i>Passenger</i> | <i>Cargo</i> |
| Lithium metal cells and batteries | 2.5 kg G | 35 kg G |
| ... | | |

2.8

The DGP-WG is invited to revise Part 5;4.1.5.1 as follows:

4.1.5.1 *Quantity of dangerous goods, number and type of packagings*

The number of packages, type of packaging (e.g. steel drum, fibreboard box, etc.) and net quantity of dangerous goods in each package (by volume or mass, as appropriate) must be indicated for each item of dangerous goods bearing a different proper shipping name, UN number or packing group. Abbreviations may be used to specify the unit of measurement for the quantity. For packages containing the same dangerous goods and quantity per package a multiple of the quantity may be used. For example:

UN 1263, Paint, 3, PG II, 5 fibreboard boxes x 5 L

Consignment comprising packages of different quantities of the same dangerous good must be clearly identified. For example:

UN 1263, Paint, 3, PG II, 5 fibreboard boxes x 5 L, 10 fibreboard boxes x 10 L

UN packaging codes may only be used to supplement the description of the kind of package (e.g. one fibreboard box (4G)). Where the letter "G" follows the quantity in column 11 ~~or 13~~ of Table 3-1 the gross mass of each package must be indicated, rather than the net quantity; and:

— END —