



**WORKING PAPER**

**DANGEROUS GOODS PANEL (DGP)  
WORKING GROUP MEETING (DGP-WG/22)**

**Montréal, 21 to 25 November 2022**

- Agenda Item 2: Managing air-specific safety risks and identifying anomalies (REC-A-DGS-2025)**  
**2.2: 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**

**REVISION OF PACKING INSTRUCTION 952**

(Presented by D. Brennan)

**SUMMARY**

This working paper proposes a clarification to the provision for equipment that could possibly be handled in other than an upright position and the deletion of the word “machine” in Packing Instruction 952.

Action by the DGP-WG is in paragraph 22.

**1. INTRODUCTION**

1.1 Special Provision A214 specifies that the entry UN 3171 — **Battery-powered vehicle or Battery-powered equipment** only applies to vehicles powered by wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries and equipment powered by wet batteries or sodium batteries transported with these batteries installed.

1.2 According to Table 3-1 Dangerous Goods List, wet batteries include UN 2794 — **Batteries, wet, filled with acid**, UN 2795 — **Batteries, wet, filled with alkali** and UN 2800 — **Batteries, wet, non-spillable**.

1.3 Packing Instruction 952 requires that if the vehicle or equipment is installed with spillable batteries and is to be handled in such a way that the batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 492 or 870, as applicable.

1.4 At DGP/25 (see paragraph 2.4.2 of the DGP/25 Report (DGP/25-WP/52)), it was agreed that with the rise of small lithium battery-powered vehicles, which are classified as UN 3171 — **Battery-**

**powered vehicle** but may not provide the equivalent level of protection to the batteries compared to the traditional large robust vehicle, they must be transported in a strong, rigid outer packaging of the types as shown in Packing Instruction 952.

1.5 Since there are indeed vehicles and equipment powered by non-spillable wet batteries and the battery may not meet the conditions as specified in Special Provision A67, they must still be classified as UN 3171. Given that some of them could also possibly be handled in other than an upright position, they must also be bound by the requirement of being prepared for transport in a strong, rigid outer packaging.

1.6 In reviewing Packing Instruction 952, it was also noticed that the provision for vehicles or equipment containing spillable batteries, requiring that the batteries must be removed and packed according to Packing Instruction 492 or 870 when the vehicle or equipment is to be handled in such a way that batteries would not remain in their intended orientation can create confusion. Packing Instruction 492 is for UN 3292 — **Batteries, containing sodium** and UN 3292 — **Cells, containing sodium**, and Packing Instruction 870 is for UN 2794 — **Batteries, wet, filled with acid** and UN 2795 — **Batteries, wet, filled with alkali**. Meanwhile, Packing Instruction 952 includes a requirement on sodium batteries to conform Special Provision A94.

1.7 Currently, sodium batteries are not defined as spillable batteries, and a shipper consigning a vehicle or equipment powered by sodium batteries could have easily missed the requirement in the provision concerning spillable batteries.

1.8 Additionally, the conditions on sodium batteries as well as their casing and shipping requirements are very different from wet spillable batteries.

1.8.1 Packing Instruction 492 indicates that UN 3292 — **Batteries, containing sodium** may be offered for transport and transported unpacked and Special Provision A94 contains some very stringent requirements that they must not be offered for transport at a temperature that liquid elemental sodium is present. Special Provision A94 reads as follows:

A94 (≈239) Batteries or cells containing sodium must not contain dangerous goods other than sodium, sulphur or sodium compounds (e.g. sodium polysulphides and sodium tetrachloroaluminate). Batteries or cells must not be offered for transport at a temperature such that liquid elemental sodium is present in the battery or cell unless approved and under the conditions established by the appropriate national authority.

Cells must consist of hermetically sealed metal casings which fully enclose the dangerous goods and which are so constructed and closed as to prevent the release of the dangerous goods under normal conditions of transport.

Batteries must consist of cells secured within and fully enclosed by a metal casing so constructed and closed as to prevent the release of the dangerous goods under normal conditions of transport.

1.8.2 On the other hand, it is specified in Packing Instruction 870 that wet batteries must be placed in an acid/alkali proof liner of sufficient strength and must be packed such that they are always in an upright position.

1.8.3 If the sodium batteries that are removed from a vehicle or equipment to be handled such that the batteries could not maintain the intended orientation can be transported unpackaged, the provision on these articles may need to be revisited for permitting the batteries to remain in the vehicle or equipment. Subject to the outcome of the discussion, should the requirement be amended, similar amendments may need to be made to Packing Instructions 220, 378, 950, 951 and 972.

1.9 Furthermore, during the review of Packing Instruction 952, it was also identified that the word “machine” is used; however, “machine” is not used in the proper shipping name that this packing instruction is applicable to.

**2. ACTION BY THE DGP-WG**

2.1 The DGP-WG is invited to consider requiring equipment containing batteries that could be handled in other than an upright position to be secured in a strong, rigid outer packaging, deleting the word “machine” so as to align Packing Instruction 952 to the applicable proper shipping names, and revisiting the shipping requirement of vehicle or equipment installed with sodium batteries as shown in the appendix to this working paper.

-----



APPENDIX

PROPOSED AMENDMENT TO PART 4 OF THE TECHNICAL INSTRUCTIONS

Part 4

PACKING INSTRUCTIONS

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

Packing Instruction 952

Passenger and cargo aircraft for UN 3171 only  
(See Packing Instruction 220 for flammable gas-powered engines and machinery, Packing Instruction 378 for flammable liquid-powered engines and machinery, Packing Instruction 950 for flammable liquid-powered vehicles, Packing Instruction 951 for flammable gas-powered vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels)

ADDITIONAL PACKING REQUIREMENTS

This entry applies to vehicles and equipment, including machines which are powered by wet batteries, sodium batteries or lithium batteries and which are transported with these batteries installed. Examples of such vehicles and equipment are electrically-powered cars, lawn mowers, wheelchairs and other mobility aids. Vehicles that also contain an internal combustion engine must be consigned under the entry UN 3166 Vehicle (flammable gas powered) (See Packing Instruction 951) or Vehicle (flammable liquid powered) (See Packing Instruction 950), as appropriate.

Where vehicles or equipment could possibly be handled in other than an upright position, the vehicle or equipment must be secured in a strong, rigid outer packaging of the type below. The vehicle or equipment must be secured and restrained in the outer packaging to prevent any movement during transport which could change the orientation or cause the vehicle or equipment to be damaged. ~~The vehicle must be secured by means capable of restraining the vehicle in the outer packaging to prevent any movement during transport which would change the orientation or cause the vehicle to be damaged.~~

**BATTERY-POWERED VEHICLES, ~~MACHINES~~ OR EQUIPMENT MUST MEET THE FOLLOWING REQUIREMENTS:**

*Batteries*

All batteries must be installed and securely fastened in the battery holder of the vehicle, ~~machine~~ or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

- 1) If spillable batteries are installed, and it is possible for the vehicle, ~~machine~~ or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction ~~492 or~~ 870 as applicable.
- 2) If lithium batteries are installed:

- i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and
  - ii) lithium batteries must meet the provisions of Part 2;9.3, unless otherwise approved by the appropriate authority of the State of Origin, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs of lithium batteries or cells that have not been tested to the requirements in Part III, subsection 38.3 of the UN *Manual of Tests and Criteria* may be transported aboard cargo aircraft if approved by the appropriate authority of the State of Origin and the State of the Operator. A copy of the document of approval must accompany the consignment.
  - iii) Where the lithium battery is removed from the vehicle and is packed separate from the vehicle in the same outer packaging, the package must be consigned as UN 3481— **Lithium ion batteries packed with equipment** or UN 3091 — **Lithium metal batteries packed with equipment** and packed according to Packing Instruction 966 or 969, as applicable.
- 3) If sodium batteries are installed, they must conform to the requirements of Special Provision A94.

#### Other operational equipment

1) Dangerous goods required for the operation or safety of the vehicle, ~~machine~~ or equipment, such as fire extinguishers, tire inflation canisters or safety devices, must be securely mounted in the vehicle, ~~machine~~ or equipment. Aircraft may also contain other articles and substances which would otherwise be classified as dangerous goods but which are installed in that aircraft in accordance with the pertinent airworthiness requirements and operating regulations. If fitted, life-rafts, emergency escape slides and other inflation devices must be protected such that they cannot be activated accidentally. Vehicles [or equipment] containing dangerous goods identified in Table 3-1 as forbidden on passenger aircraft may only be transported on cargo aircraft. Replacements for the dangerous goods permitted must not be carried under this packing instruction.

2) Vehicles equipped with theft-protection devices, installed radio communications equipment or navigational systems must have such devices, equipment or systems disabled.

#### Strong outer packagings [~~—vehicles~~] [~~— vehicles and equipment~~]

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

...