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WORKING PAPER

DANGEROUS GOODS PANEL (DGP)

TWENTY-EIGHTH MEETING

Virtual, 15 to 19 November 2021

Agenda Item 1: Harmonizing ICAO dangerous goods provisions with UN Recommendations on the Transport of Dangerous Goods *(Ref: REC-A-DGS-2023)*

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 2023-2024 Edition

REVISIONS TO THE REQUIREMENTS FOR AEROSOLS AND GAS CARTRIDGES TO ALIGN WITH THE UN RECOMMENDATIONS

(Presented by the Rapporteur of the DGP-WG/UN Harmonization)

SUMMARY

This working paper proposes revisions to the provisions of the Technical Instructions to address inconsistencies between the provisions in the UN Model Regulations and those in the Technical Instructions related to aerosols and gas cartridges (receptacles, small, containing gas).

Action by the DGP: The DGP is invited to consider the changes proposed to:

a) the Technical Instructions as set out in Appendices A and B and this working paper; and

b) the Supplement to the Technical Instructions as set out in Appendix C to this working paper.

1. INTRODUCTION

1.1 It has been identified that a change to Part 6, Chapter 5 — Requirements for the Construction and Testing of Cylinders, Closed Cryogenic Receptacles, Aerosol Dispensers and Small Receptacles Containing Gas (Gas Cartridges) and Fuel Cell Cartridges Containing Flammable Gas arising from the revisions to the 22nd revised edition of the UN Model Regulations will result in the provisions applicable to aerosols containing flammable gases in Packing Instructions 203 and Y203 being less restrictive than the provisions for aerosols in the UN Model Regulations.

1.2 Working paper DGP/28-WP/16 sets out the changes proposed to Part 6 of the Technical Instructions. Included in this working paper it is proposed to adopt a new paragraph 5.4.1 as follows:

> 5.4.1 The internal pressure of aerosol dispensers at 50°C must not exceed 1.2 MPa (12 bar) when using flammable liquefied gases, 1.32 MPa (13.2 bar) when using non-flammable liquefied gases, and 1.5 MPa (15 bar) when using non-flammable compressed or dissolved gases. In case of a mixture of several gases, the stricter limit applies.

1.3 This new provision would limit the pressure in aerosols based on the classification of the aerosol and the form of the gas, liquefied vs. compressed or dissolved. However, in Packing Instruction 203 the pressure limit of 1 500 kPa (1.5 MPa, 15 bar) is applied regardless of the classification or the form of the gas.

1.4 In researching the basis and justification for the change to the UN Model Regulations it was identified that the change originated with the European Aerosol Federation (FEA) following a proposal to the European Commission to amend Aerosol Dispensers Directive 75/324/EEC and subsequently to the Joint Meeting of the RID Committee of Experts and the Working Party on the Transport of Dangerous Goods (Joint Working Group) to amend the provisions in ADR, RID and ADN related to internal pressures in aerosols.

1.5 The changes adopted into the European Aerosol Dispensers Directive and to ADR, RID and ADN were subsequently adopted into the 22nd revised edition of the Model Regulations.

1.6 Further, the very detailed requirements set out in Packing Instructions 203 and Y203 and in Part 6;3.2.7 and 6;3.2.8 for dimensions and manufacture of aerosols do not appear in the UN Model Regulations or in ADR with the exception of specifications for hydraulic pressure testing of aerosols set out in Part 6;3.2.7 and 6;3.2.8, which are similar to those in ADR.

1.7 The provisions in Part 6.3.2.7 and 6;3.2.8 and reference to inner packagings IP.7, IP.7A, IP.7B and IP.7C were developed for the Technical Instructions over 30 years ago. This long predated the development of provisions for aerosols by the UN Subcommittee and we are now in a situation where the detailed provisions for aerosols in the Technical Instructions are out of alignment with the other modal regulations. An example of this is the conditions in Part 6;3.2.7.1.1 and 6;3.2.7.2.1 that include that the diameter of the aerosol must not exceed 76 mm. This limit does not exist in the UN Model Regulations.

1.8 To address these issues, it is proposed to revise Packing Instructions 203 and Y203 by removing the detailed requirements that do not appear in the UN Model Regulations or ADR. Reference to compliance with Part 6;5.4 would be included into the two packing instructions as there is nothing currently in either packing instruction that specifies that the provisions of Part 6;5.4 must be met, notwithstanding that the provisions in Part 6;5.4 have been in the Technical Instructions for some time.

1.9 Based on the above, it is proposed to delete the provisions set out in Part 6;3.2.7 and 6;3.2.8. The requirements for hydraulic pressure testing in Part 6;3.2.7 would be retained in a simplified form and moved to the provisions in Part 6;5.4.

1.10 If these changes are agreed, there will also be a need for consequential amendments to Packing Instruction Y963 to delete reference in subparagraphs h) and i) to the specifications for aerosols and to make reference to Part 6;5.4. Reference to IP.7, IP7.A, IP7.B and IP.7C in Table 6-3 would be deleted. There would also need to be an amendment to Packing Instruction 203 in the Supplement to the Technical Instructions to maintain alignment with Packing Instruction 203 of the Technical Instructions.

2. ACTION BY THE DGP

2.1 The DGP is invited to consider the changes proposed to:

a) the Technical Instructions as set out in Appendices A and B to this working paper; and

b) the Supplement to the Technical Instructions as set out in Appendix C to this working paper.

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APPENDIX A

PROPOSED AMENDMENT TO PART 4 OF THE TECHNICAL INSTRUCTIONS

Part 4

PACKING INSTRUCTIONS

Packing Instruction 203

Passenger and cargo aircraft for UN 1950 and 2037 only

The general packing requirements of 4;1 must be met.

For the purposes of this packing instruction, a receptacle is considered to be an inner packaging.

Note.— "Receptacle" has the same meaning as set out in 1;3. Any reference in this packing instruction to receptacle will include "aerosols" of UN 1950 and "receptacles, small, containing gas" and "gas cartridges" of UN 2037.

~~***Metal aerosols (IP.7, IP.7A, IP.7B) and non-refillable receptacles containing gas (gas cartridges)***~~*Aerosols and receptacles, small containing gas (gas cartridges) must meet the requirements of Part 6;5.4.*

The capacity of metal receptacles must not exceed 1 000 mL; plastics receptacles must not exceed 500 mL.

~~Non-refillable metal aerosols and non-refillable receptacles containing gas (gas cartridges) must not exceed 1 000 mL capacity.~~

~~The following conditions must be met:~~

~~a) the pressure in the receptacle must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;~~

~~b) if the pressure in the receptacle exceeds 970 kPa at 55°C but does not exceed 1 105 kPa at 55°C, an IP.7, IP.7A or IP.7B metal receptacle must be used;~~

~~c) if the pressure in the receptacle exceeds 1 105 kPa at 55°C but does not exceed 1 245 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;~~

~~d) if the pressure in the receptacle exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;~~

~~e) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in a), b), c) or d) do not apply to the pressure within the capsule for an aerosol. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into the outer metal receptacle;~~

~~f) the liquid content must not completely fill the closed receptacle at 55°C; and~~

~~g) each receptacle exceeding 120 mL capacity must have been heated until the pressure in the receptacle is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect. For aerosols, non-flammable (tear gas devices), this heat test applies to all aerosols regardless of their capacity.~~

~~***Plastic aerosols (IP.7C)***~~

~~Non-refillable plastic aerosols must not exceed 120 mL capacity, except when the propellant is a non-flammable, non-toxic gas and the contents are not dangerous goods in accordance with the provisions of these Instructions, in which case the quantity must not exceed 500 mL.~~

~~The following conditions must be met:~~

~~a) the contents must not completely fill the closed receptacle at 55°C;~~

~~b) the pressure in the receptacle may not exceed 970 kPa at 55°C; and~~

~~c) each receptacle must be leak tested in accordance with the provisions of 6;3.2.8.1.6.~~

~~Non-flammable aerosols containing medical preparations or biological products~~

~~Aerosols, non-flammable, containing only a non-toxic substance or substances and biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non-refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:~~

~~a) the pressure in the aerosol must not exceed 970 kPa at 55°C;~~

~~b) the liquid contents must not completely fill the closed receptacle at 55°C;~~

~~c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect; and~~

~~d) the valves must be protected by a cap or other suitable means during transport.~~

UN number and name		*Net quantity per package*	
		Passenger	*Cargo*
UN 1950	**Aerosols**, flammable	75 kg	150 kg
UN 1950	**Aerosols**, flammable (engine starting fluid)	Forbidden	150 kg
UN 1950	**Aerosols**, non-flammable	75 kg	150 kg
UN 1950	**Aerosols**, non-flammable (tear gas devices)	Forbidden	50 kg
UN 2037	**Gas cartridges**	1 kg	15 kg
UN 2037	**Receptacles, small, containing gas**	1 kg	15 kg

ADDITIONAL PACKING REQUIREMENTS

— Packagings must meet Packing Group II performance requirements.
— Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of the contents during normal conditions of air transport.
— Receptacles must be packed so as to prevent excessive movement and inadvertent discharge during normal conditions of transport.

~~UN 1950 Aerosols, non-flammable (tear gas devices) — Cargo Aircraft Only~~

~~— Only metal receptacles, IP.7, IP.7A, IP.7B are permitted. The aerosols must be individually placed into spiral wound tubes fitted with metal ends or a double-faced fibreboard box with suitable padding before being packed into the outer packaging.~~

OUTER PACKAGINGS (see 6;3.1)

Boxes	*Drums*
Aluminium (4B)	Aluminium (1B2)
Fibreboard (4G)	Fibre (1G)
Natural wood (4C1, 4C2)	Other metal (1N2)
Other metal (4N)	Plastics (1H2)
Plastics (4H1, 4H2)	Plywood (1D)
Plywood (4D)	Steel (1A2)
Reconstituted wood (4F)	
Steel (4A)	

Packing Instruction Y203

Passenger and cargo aircraft for UN 1950 and 2037 only

The requirements of 3;4 must be met.

For the purposes of this packing instruction, a receptacle is considered to be an inner packaging.

Note.— "Receptacle" has the same meaning as set out in 1;3. Any reference in this packing instruction to receptacle will include "aerosols" of UN 1950 and "receptacles, small, containing gas" and "gas cartridges" of UN 2037.

~~***Metal aerosols (IP.7, IP.7A, IP.7B) and non-refillable receptacles containing gas (gas cartridges)***~~*Aerosols and receptacles, small containing gas (gas cartridges) must meet the requirements of Part 6;5.4.*

The capacity of metal receptacles must not exceed 1 000 mL; plastics receptacles must not exceed 500 mL.

Non-refillable ~~metal~~ aerosols and non-refillable receptacles containing gas (gas cartridges) containing toxic substances must not exceed 120 mL capacity.

~~All other non-refillable metal aerosols and non-refillable receptacles containing gas (gas cartridges) must not exceed 1 000 mL capacity.~~

~~The following conditions must be met:~~

~~a) the pressure in the receptacle must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;~~

~~b) if the pressure in the receptacle exceeds 970 kPa at 55°C but does not exceed 1 105 kPa at 55°C, an IP.7, IP.7A or IP.7B metal receptacle must be used;~~

~~c) if the pressure in the receptacle exceeds 1 105 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;~~

~~d) if the pressure in the receptacle exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;~~

~~e) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in a), b), c) or d) do not apply to the pressure within the capsule for an aerosol. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into the outer metal receptacle;~~

~~f) the liquid content must not completely fill the closed receptacle at 55°C;~~

~~g) each receptacle exceeding 120 mL capacity must have been heated until the pressure in the receptacle is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect.~~

~~***Plastic aerosols** (IP.7C)~~

~~Non-refillable plastic aerosols must not exceed 120 mL capacity, except when the propellant is a non-flammable, non-toxic gas and the contents are not dangerous goods in accordance with the provisions of these Instructions, in which case the quantity must not exceed 500 mL.~~

~~The following conditions must be met:~~

~~a) the contents must not completely fill the closed receptacle at 55°C;~~

~~b) the pressure in the receptacle may not exceed 970 kPa at 55°C; and~~

~~c) each receptacle must be leak tested in accordance with the provisions of 6;3.2.8.1.6.~~

~~***Non-flammable aerosols containing medical preparations or biological products***~~

~~Aerosols, non-flammable, containing only a non-toxic substance or substances and biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non-refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:~~

~~a) the pressure in the aerosol must not exceed 970 kPa at 55°C;~~

~~b) the liquid contents must not completely fill the closed receptacle at 55°C;~~

~~c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect; and~~

~~d) the valves must be protected by a cap or other suitable means during transport.~~

UN number and name		*Total gross mass per package*
UN 1950	***Aerosols**, flammable*	30 kg G
UN 1950	***Aerosols**, flammable (engine starting fluid)*	30 kg G
UN 1950	***Aerosols**, non-flammable*	30 kg G
UN 1950	***Aerosols**, non-flammable (tear gas devices)*	30 kg G
UN 2037	***Gas cartridges***	1 kg
UN 2037	***Receptacles, small, containing gas***	1 kg

ADDITIONAL PACKING REQUIREMENTS

— Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of the contents during normal conditions of air transport.
— Receptacles must be packed so as to prevent excessive movement and inadvertent discharge during normal conditions of transport.

OUTER PACKAGINGS (see 6;3.1)

Boxes	*Drums*
Aluminium	Aluminium
Fibreboard	Fibre
Natural wood	Other metal
Other metal	Plastics
Plastics	Plywood
Plywood	Steel
Reconstituted wood	
Steel	

Part 6

PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

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Chapter 3

REQUIREMENTS FOR PACKAGINGS

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3.2 REQUIREMENTS FOR INNER PACKAGINGS

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~~**3.2.7 Metal receptacles (aerosols), non-refillable (IP.7, IP.7A, IP.7B)**~~

~~3.2.7.1 *Receptacles (aerosols) IP.7 and IP.7A*~~

~~3.2.7.1.1 *Materials and construction.* Uniform quality steel plate or non-ferrous metal of uniform drawing quality must be used:~~

~~— IP.7 receptacles must have a minimum wall thickness of 0.18 mm;~~
~~— IP.7A receptacles must have a minimum wall thickness of 0.20 mm.~~

~~The receptacles may be seamless or with seams welded, soldered, brazed, double-seamed or swaged. The ends must be of pressure design. Maximum capacity must not exceed 1 L and the maximum inner diameter must not exceed 76 mm.~~

~~3.2.7.1.2 *Performance test.* One out of each lot of 25 000 or less receptacles successively produced per day must be pressure-tested to destruction:~~

~~— IP.7 receptacles must not burst below 1 650 kPa gauge pressure;~~
~~— IP.7A receptacles must not burst below 1 860 kPa gauge pressure.~~

~~3.2.7.2 *Receptacles (aerosols) IP.7B*~~

~~3.2.7.2.1 *Materials and construction.* Uniform quality steel plate or non-ferrous metal of uniform drawing quality must be used. The receptacles may be seamless or with seams welded, soldered, brazed, double-seamed or swaged. The ends must be of pressure design. Maximum capacity must not exceed 1 000 mL and the maximum inner diameter must not exceed 76 mm. The aerosol, including its valve, must be virtually hermetically sealed under normal conditions of transport and the valve must be suitably protected to prevent actuation during transport.~~

~~3.2.7.2.2 Performance tests required:~~

~~— hydraulic pressure test;~~
~~— bursting test;~~
~~— leakage test.~~

~~3.2.7.2.3 *Hydraulic pressure test.* Number of samples: six receptacles.~~

~~Method of testing and pressure applied: the pressure must be applied slowly. The test pressure must be 50 per cent higher than the internal pressure at 50°C but at least 1 000 kPa. The test pressure must be applied for 25 seconds.~~

~~Criteria for passing the test successfully: the receptacle must not show major distortions, leaks or similar faults, but a slight symmetrical distortion of the base, or one affecting the profile of the top end shall be allowed, provided that the receptacle passes the bursting test.~~

~~3.2.7.2.4 *Bursting test.* Number of samples: six receptacles; these may be the same receptacles used in the hydraulic pressure test.~~

~~Method of testing and pressures applied: a hydraulic pressure at least 20 per cent higher than the test pressure as mentioned in 3.2.7.2.3 must be applied.~~

~~Criteria for passing the test successfully: no receptacle may leak.~~

~~3.2.7.2.5 *Leakage test.* Number of samples: every aerosol.~~

~~Method of testing: each aerosol must be immersed in a bath of water. The temperature of the water and the duration of the test must be such that the internal pressure reaches that which would be reached at 55°C, or 50°C if the liquid phase does not exceed 95 per cent of the capacity of the aerosol at 50°C. When an aerosol is sensitive to heat, the temperature of the bath may be set at between 20°C and 30°C in which case one receptacle in 2 000 must be tested at the higher temperature.~~

~~Equally effective methods of testing may also be used.~~

~~Criteria for passing the test successfully: the aerosol must not show visible permanent distortions or any leakage.~~

~~3.2.8 Plastic receptacles (aerosols) non-refillable (IP.7C)~~

~~3.2.8.1 *Receptacles (aerosols) IP.7C*~~

~~3.2.8.1.1 *Materials and construction.* The receptacle must be of polyethylene terephthalate (PET), polyethylene napthalate (PEN), polyamide (Nylon), or a blend containing some combination of PET, PEN, ethyl vinyl alcohol (EVOH) and Nylon. Thermoplastic processes ensuring uniformity of the completed container shall be applied. No used material other than production residues or re-grind from the same manufacturing process may be used. The packaging shall be adequately resistant to aging and to degradation caused either by the substance contained or by ultraviolet radiation. Maximum capacity must not exceed 500 mL.~~

~~3.2.8.1.2 Performance tests required:~~

~~— drop test;~~
~~— hydraulic pressure test;~~
~~— bursting test;~~
~~— leakage test.~~

~~3.2.8.1.3 *Drop test.* Method of testing: to ensure that creep does not affect the ability of the receptacle type to retain the contents the receptacles shall be dropped as follows: three groups of twenty-five filled receptacles shall be dropped from 1.8 m on to a rigid, non-resilient, flat and horizontal surface. One group must be conditioned at 38°C for 26 weeks, the second group for 100 hours at 50°C and the third group for 18 hours at 55°C, prior to the drop test.~~

~~Criteria for passing the test successfully: the receptacle must not break or leak.~~

~~3.2.8.1.4 *Hydraulic pressure test.* Number of samples: six receptacles.~~

~~Method of testing: receptacles must resist a test pressure equal to at least 1 200 kPa.~~

~~Criteria for passing the test successfully: the receptacle must not show major distortions, leaks or similar faults, but a slight symmetrical distortion of the base, or one affecting the profile of the top end, shall be allowed, provided that the receptacle passes the bursting test.~~

~~3.2.8.1.5 *Bursting test.* Number of samples: six. These may be the same receptacles used in the hydraulic pressure test.~~

~~Method of testing and pressures applied: a hydraulic pressure at least 20 per cent higher than the test pressure as mentioned in 3.2.8.1.4 must be applied.~~

~~Criteria for passing the test successfully: the receptacle must not leak.~~

~~3.2.8.1.6 *Leakage test.* Every aerosol. A leakage test in accordance with 6;5.4.1.2 or 6;5.4.3 approved by the competent authority must be used.~~

3.2.~~9~~.7 Metal or plastic flexible tubes

The materials of construction of flexible tubes and their closures must, where in contact with the organic peroxide, not affect the thermal stability.

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Chapter 5

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF CYLINDERS AND CLOSED CRYOGENIC RECEPTACLES, AEROSOL DISPENSERS AND SMALL RECEPTACLES CONTAINING GAS (GAS CARTRIDGES) AND FUEL CELL CARTRIDGES CONTAINING LIQUEFIED FLAMMABLE GAS

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5.4 REQUIREMENTS FOR AEROSOL DISPENSERS, SMALL RECEPTACLES CONTAINING GAS (GAS CARTRIDGES) AND FUEL CELL CARTRIDGES CONTAINING LIQUEFIED FLAMMABLE GAS

5.4.1 The internal pressure of aerosol dispensers at 50°C must not exceed 1.2 MPa (12 bar) when using flammable liquefied gases, 1.32 MPa (13.2 bar) when using non-flammable liquefied gases, and 1.5 MPa (15 bar) when using non-flammable compressed or dissolved gases. In case of a mixture of several gases, the stricter limit applies.

5.4.2 For Aerosol dispensers, the liquid content must not completely fill the closed receptacle at 55°C.

5.4.3 The capacity of metal receptacles must not exceed 1 000 mL; plastics receptacles must not exceed 500 mL

5.4.4 Each model of receptacles (aerosol dispensers or cartridges) must, before being put into service, satisfy a hydraulic pressure test:

5.4.4.1 The internal pressure to be applied (test pressure) must be 1.5 times the internal pressure at 50°C, with a minimum pressure of 1 MPa (10 bar).

5.4.4.2 The hydraulic pressure tests must be carried out on at least five empty receptacles of each model:

a) until the prescribed test pressure is reached, by which time no leakage or visible permanent deformation must have occurred; and

b) until leakage or bursting occurs; the dished end, if any, must yield first and the receptacle must not leak or burst until a pressure 1.2 times the test pressure has been reached or passed.

5.4.5 Each filled aerosol dispenser or gas cartridge or fuel cell cartridge must be subjected to a test in a hot water bath in accordance with 5.4.5.1 or an approved water bath alternative in accordance with 5.4.5.2.

Renumber the paragraphs shown in DGP/28-WP/16 under the headings "5.4.2.1 HOT WATER BATH TEST" and "5.4.2.2 ALTERNATIVE METHODS" as "5.4.5.1" and "5.4.5.2" respectively and all the paragraphs under those headings accordingly.

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APPENDIX B

CONSEQUENTIAL AMENDMENTS TO THE TECHNICAL INSTRUCTIONS AS A RESULT OF THE AMENDMENTS PROPOSED IN APPENDIX A TO THIS WORKING PAPER

Part 4

PACKING INSTRUCTIONS

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Packing Instruction Y963

Limited quantities
Passenger and cargo aircraft for ID 8000 only

Consumer commodities are materials that are packaged and distributed in a form intended or suitable for retail sale for the purposes of personal care or household use. These include items administered or sold to patients by doctors or medical administrations. Except as otherwise provided below, dangerous goods packed in accordance with this packing instruction do not need to comply with 4;1 or Part 6 of these Instructions; they must, however, comply with all other applicable requirements. Other dangerous goods not classified as ID 8000 must not be packed in the same outer packaging with ID 8000.

a) Each packaging must be designed and constructed to prevent leakage that may be caused by changes in altitude and temperature during air transport.

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h) Class 2 substances must be further limited to aerosol products containing non-toxic compressed or liquefied gas(es) that are necessary to expel liquids, powders or pastes~~, packed in inner non-refillable non-metal receptacles not exceeding 120 mL capacity each, or in inner non-refillable metal receptacles not exceeding 820 mL capacity each (except that flammable aerosols must not exceed 500 mL capacity each), subject in either case to the following provisions~~. Aerosols must meet the requirements of Part 6;5.4. The valves must be protected by a cap or other suitable means during transport.~~:~~

~~1) the pressure in the aerosol must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding, without bursting, a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;~~

~~2) if the pressure in the aerosol exceeds 970 kPa at 55°C but does not exceed 1 105 kPa at 55°C, an inner IP.7, IP.7A or IP.7B metal receptacle must be used;~~

~~3) if the pressure in the aerosol exceeds 1 105 kPa at 55°C but does not exceed 1 245 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;~~

~~4) if the pressure in the aerosol exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;~~

~~5) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in 1), 2), 3) or 4) do not apply to the pressure within the capsule. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into an aerosol;~~

~~6) the liquid contents must not completely fill the closed receptacle at 55°C;~~

~~7) each aerosol exceeding 120 mL capacity must have been heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect; and~~

~~8) the valves must be protected by a cap or other suitable means during transport.~~

~~i) For aerosols containing a biological or medical preparation which will be deteriorated by a heat test and which are non-toxic and non-flammable, packed in inner non-refillable receptacles not exceeding 575 mL capacity each, the following provisions are applicable:~~

~~1) the pressure in the aerosol must not exceed 970 kPa at 55°C;~~

~~2) the liquid contents must not completely fill the closed receptacle at 55°C;~~

~~3) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect; and~~

~~4) the valves must be protected by a cap or other suitable means during transport.~~

j) Except for aerosols, inner packagings must not exceed:

1) 500 mL for liquids; and

2) 500 g for solids.

k) Consumer commodities shipped according to these provisions may be shipped in a unit load device prepared by a single shipper provided they contain no other dangerous goods other than UN 1845 — **Carbon dioxide, solid** (dry ice) used as a refrigerant. When the unit load device contains dry ice, the provisions of these Instructions applicable to dry ice must be met in addition to the provisions set out in this packing instruction. The shipper must provide the operator with written documentation stating the number of packages of consumer commodities contained in each unit load device.

l) The gross mass on the dangerous goods transport document must be shown as:

1) for one package, the actual gross mass of the package;

2) for more than one package, either the actual gross mass of each package or as the average mass of the packages. (For example, if there are 10 packages and the total gross mass of them is 100 kg, the dangerous goods transport document may show this as “average gross mass per package 10 kg”.)

m) Packages prepared in accordance with these provisions must be durably and legibly marked with the mark shown in Figure 3-1.

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Part 6

PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

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Table 6-3. Index of inner packagings

Code	*Kind*	*Paragraph*
	Glass	3.2.1
	Plastic	3.2.2
	Metal cans, tins or tubes	3.2.3
	Paper bags	3.2.4
	Plastic bags	3.2.5
	Fibre cans or boxes	3.2.6
~~IP.7~~	~~Metal receptacles (aerosols), non-refillable~~	~~3.2.7.1~~
~~IP.7A~~	~~Metal receptacles (aerosols), non-refillable~~	~~3.2.7.1~~
~~IP.7B~~	~~Metal receptacles (aerosols), non-refillable~~	~~3.2.7.2~~
~~IP.7C~~	~~Plastic receptacle (aerosols), non-refillable~~	~~3.2.8~~
	Metal or plastic flexible tubes	~~3.2.9~~3.2.7

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APPENDIX C

PROPOSED AMENDMENT TO PART S-4 OF THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS

Part S-4

PACKING INSTRUCTIONS

. . .

Packing Instruction 203

Passenger and cargo aircraft for UN 1950 and 2037 only

The general packing requirements of 4;1 must be met.

For the purposes of this packing instruction, a receptacle is considered to be an inner packaging.

Note.— "Receptacle" has the same meaning as set out in 1;3. Any reference in this packing instruction to receptacle will include "aerosols" of UN 1950 and "receptacles, small, containing gas" and "gas cartridges" of UN 2037.

~~***Metal aerosols (IP.7, IP.7A, IP.7B) and non-refillable receptacles containing gas (gas cartridges)***~~Aerosols and receptacles, small containing gas (gas cartridges) must meet the requirements of Part 6;5.4 of the Technical Instructions.

The capacity of metal receptacles must not exceed 1 000 mL; plastics receptacles must not exceed 500 mL.

~~Non-refillable metal aerosols and non-refillable receptacles containing gas (gas cartridges) must not exceed 1 000 mL capacity.~~

~~The following conditions must be met:~~

~~a) the pressure in the receptacle must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;~~

~~b) if the pressure in the receptacle exceeds 970 kPa at 55°C but does not exceed 1 105 kPa at 55°C, an IP.7, IP.7A or IP.7B metal receptacle must be used;~~

~~c) if the pressure in the receptacle exceeds 1 105 kPa at 55°C but does not exceed 1 245 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;~~

~~d) if the pressure in the receptacle exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;~~

~~e) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in a), b), c) or d) do not apply to the pressure within the capsule for an aerosol. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into the outer metal receptacle;~~

~~f) the liquid content must not completely fill the closed receptacle at 55°C;~~

~~g) each receptacle exceeding 120 mL capacity must have been heated until the pressure in the receptacle is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect.~~

~~***Plastic aerosols (IP.7C)***~~

~~Non-refillable plastic aerosols must not exceed 120 mL capacity, except when the propellant is a non-flammable, non-toxic gas and the contents are not dangerous goods in accordance with the provisions of the Technical Instructions, in which case the quantity must not exceed 500 mL.~~

~~The following conditions must be met:~~

~~a) the contents must not completely fill the closed receptacle at 55°C;~~

~~b) the pressure in the receptacle may not exceed 970 kPa at 55°C; and~~

~~c) each receptacle must be leak tested in accordance with the provisions of 6;3.2.8.1.6 of the Technical Instructions.~~

~~Non-flammable aerosols containing medical preparations or biological products~~

~~Aerosols, non-flammable, containing only a non-toxic substance or substances and biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non-refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:~~

~~a) the pressure in the aerosol must not exceed 970 kPa at 55°C;~~

~~b) the liquid contents must not completely fill the closed receptacle at 55°C;~~

~~c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;~~

~~d) the valves must be protected by a cap or other suitable means during transport.~~

UN number and name	*Net quantity per package*	
	Passenger	*Cargo*
UN 1950 **Aerosols**, flammable	75 kg	150 kg
UN 1950 **Aerosols**, flammable (engine starting fluid)	(75 kg)	150 kg
UN 1950 **Aerosols**, non-flammable	75 kg	150 kg
UN 1950 **Aerosols**, non-flammable (tear gas devices)	(25 kg)	50 kg
UN 2037 **Gas cartridges**	1 kg	15 kg
UN 2037 **Receptacles, small, containing gas**	1 kg	15 kg

ADDITIONAL PACKING REQUIREMENTS

— Packagings must meet Packing Group II performance requirements.
— Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of the contents during normal conditions of air transport.
— Receptacles must be tightly packed, so as to prevent movement.

~~UN 1950 Aerosols, non-flammable (tear gas devices) — Cargo Aircraft Only~~

~~— Only metal receptacles, IP.7, IP.7A, IP.7B are permitted. The aerosols must be individually placed into spiral wound tubes fitted with metal ends or a double-faced fibreboard box with suitable padding before being packed into the outer packaging.~~

OUTER PACKAGINGS (see 6;3.1)

Boxes	*Drums*
Aluminium (4B)	Aluminium (1B2)
Fibreboard (4G)	Fibre (1G)
Natural wood (4C1, 4C2)	Other metal (1N2)
Other metal (4N)	Plastics (1H2)
Plastics (4H1, 4H2)	Plywood (1D)
Plywood (4D)	Steel (1A2)
Reconstituted wood (4F)	
Steel (4A)	

— END —