EASA
European Union Aviation Safety Agency

Safe Transport of Dangerous Goods by Air

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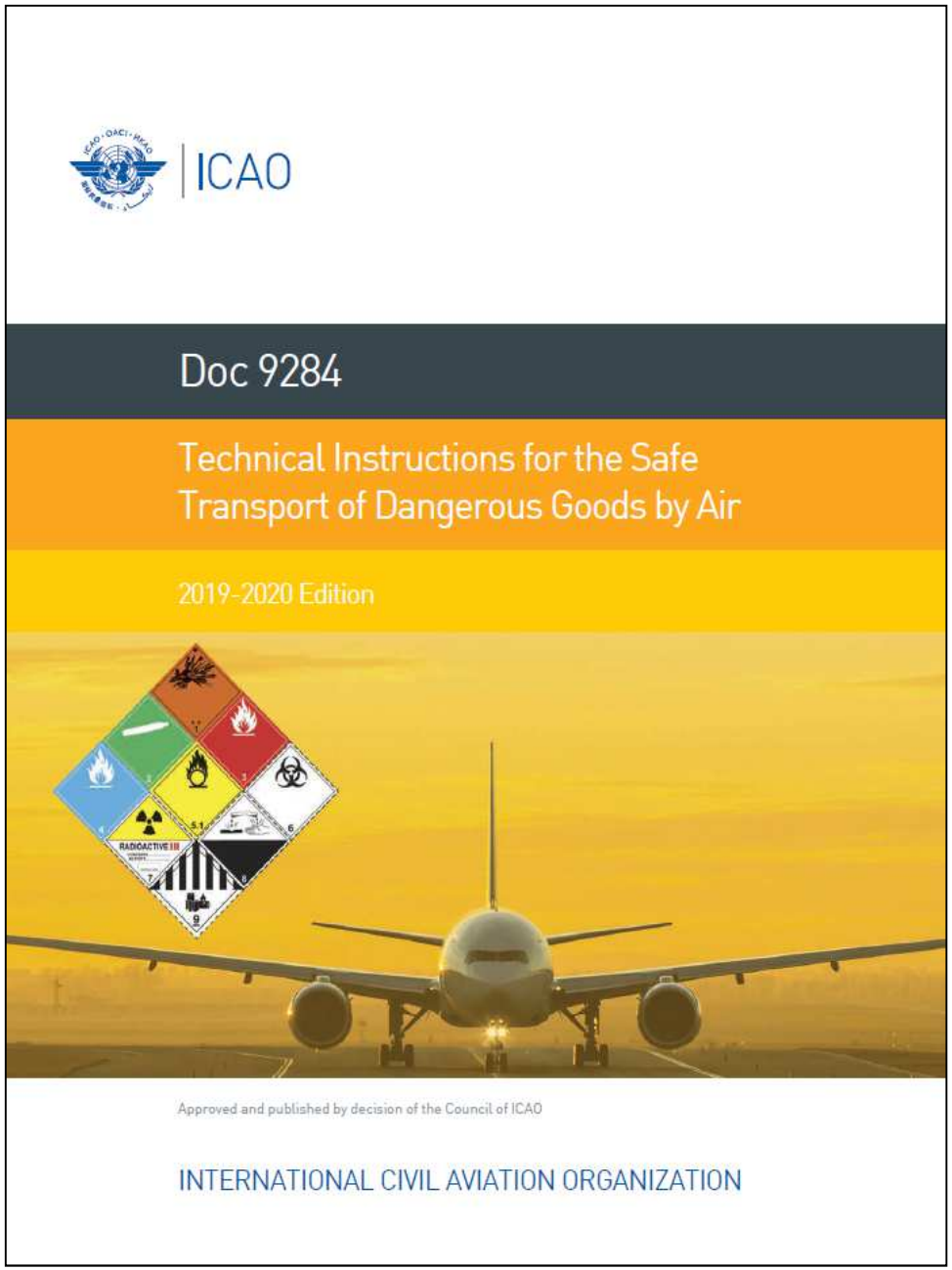
Safe Transport of Dangerous Goods by Air

Packing Instructions

SAFE TRANSPORT OF DANGEROUS GOODS BY AIR



<u>Part 4</u> = Packing instructions

Chapter 1 - General packing requirements

Chapter 2 - General

Chapter 3 - Class 1 - Explosives

Chapter 4 - Class 2 - Gases

Chapter 5 - Class 3 - Flammable Liquids

Chapter 6 - Class 4 - Flammable solids; substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gases

Chapter 7 - Class 5 - Oxidizing substances; Organic peroxides

Chapter 8 - Class 6 - Toxic and infectious substances

Chapter 9 - Class 7 - Radioactive material

Chapter 10 - Class 8 – Corrosive substances

Chapter 11 - Class 9 - Miscellaneous dangerous goods

PACKING INSTRUCTIONS - INTRODUCTION

- **<u>Reminder</u> : Packing Groups**

- **For packing purposes, dangerous goods, other than those of Classes 1, 2 and 7, Divisions 5.2 and 6.2 and self-reactive substances of Division 4.1, <u>are assigned to three packing groups</u> in accordance with the degree of danger they present**

- **It means that PG I, II or III are assigned to DG classified in Classes 3, 4, 8 and 9, and in Divisions 5.1 and 6.1**
  - → **P.G. I** **Substances presenting a high degree of danger**
  - → **P.G. II** **Substances presenting a medium degree of danger**
  - → **P.G. III** **Substances presenting a low degree of danger**

- **Criteria were given in Part 2 – Classification**

- **According to Part 3 – DG List** (IATA part 4)**, the packing group to which a substance is assigned is listed in Table 3-1** (Table 4.2)**, Column N°8** (E)

PACKING INSTRUCTIONS - INTRODUCTION

➢ **Regarding transportation by air, must be taken in account :**

✓ **Temperature Variations (from – 40°C to + 55°C)**

✓ **Pressure Variations (differential could be from 25 kPa in pressurized cargo compartment, to 75 kPa in non-pressurized ones)**

✓ **Vibrations (from 1 g to 8 g acceleration)**

✓ **Nomenclature (terms and codes used to design packagings)**

✓ **Portable Tanks (see Supplement Part S-4, chapter 12)**

✓ **Carriage of Oxygen compressed (UN1072) or Air compressed (UN1002) with Aquatic Animals (see Supplement Table S-3-1 and SP A302)**

✓ **Packagings for explosives of Class 1, self-reactive substances of Division 4.1 and organic peroxides of Division 5.2 (even if not assigned to packing groups, packagings should comply with the PG II category)**

✓ **Additional requirements for the air mode (≠with other modes)**

✓ **Carriage of flames (e.g. Olympic flame, see SP A324 in the Supplement)**

✓ **Open External Carriage (e.g. suspended from a helicopter or in open external carrying devices, consideration should be given to the packaging used and protection where necessary from effects of airflow and weather)**

PACKING INSTRUCTIONS - INTRODUCTION

- **Packagings ? Which packagings ??? :**

- **Usual wording used for Packing Instructions : (definitions)**

→ **Inner Packaging: Packagings for which an outer packaging is required for transport**

→ **Outer Packaging: The outer protection of a composite or combination packaging together with any absorbent materials, cushioning and any other components necessary to contain and protect inner receptacles or inner packagings**

→ **Intermediate Packaging: Packagings placed between inner packagings or articles, and an outer packaging**

→ **Combination Packaging: A combination of packagings, consisting of one or more inner packagings secured in an outer packaging**

→ **Single Packaging: Packagings which do not require any inner packaging to perform their containment function during transport**

→ **Composite Packaging: Packagings consisting of an outer packaging and an inner receptacle so constructed that they form an integral packaging. Once assembled, it remains thereafter an integrated single unit (= Single Packaging)**

PACKING INSTRUCTIONS - INTRODUCTION

→ **Inner Packaging : Packagings for which an outer packaging is required for transport:**

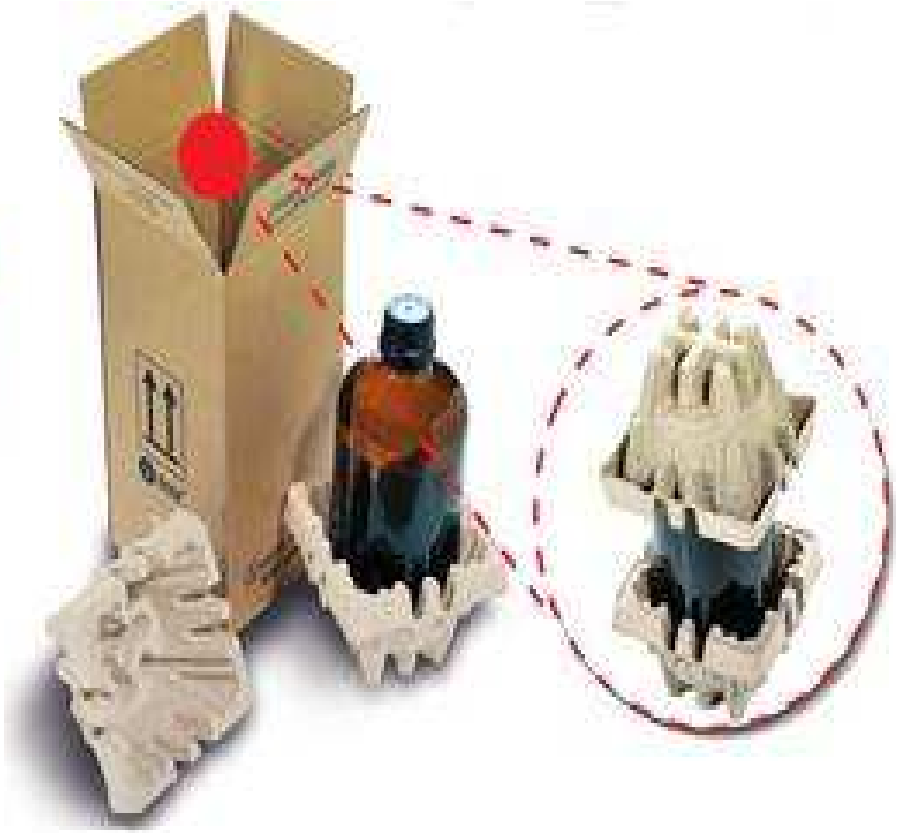
✓ **These receptacles (bottles, ampoules, cans, tins, tubes, bags, boxes, etc ...) can be made of glass, plastic, metal, paper, fibre**

PACKING INSTRUCTIONS - INTRODUCTION

→ **Outer Packaging : The outer protection of a composite or combination packaging together with any absorbent materials, cushioning and any other components necessary to contain and protect inner receptacles or inner packagings**

PACKING INSTRUCTIONS - INTRODUCTION

→ **Combination Packaging: A combination of packagings, consisting of one or more inner packagings secured in an outer packaging**



PACKING INSTRUCTIONS - INTRODUCTION

→ **Single Packaging**: **Packagings which do not require any inner packaging to perform their containment function during transport**

PACKING INSTRUCTIONS - INTRODUCTION

→ **Composite Packaging: an outer packaging and an inner receptacle forming an integral packaging (= Single Packaging)**

→ **Despite wording used in the Packing Instructions, Part 4 also includes :**

✓ **Reused, Reconditioned or Remanufactured Packaging**

✓ **Salvage Packaging** *(see Part 4, chapter 1.4 for special provisions, e.g. appropriate measures are taken to prevent excessive movement of the damaged or leaking packages, when the salvage packaging contains liquids, sufficient absorbent material is added, Prior approval from the appropriate national authority must be obtained, …)*

→**All packaging listed previously may also be transported Overpacked**

PACKING INSTRUCTIONS – GENERAL PACKING REQUIREMENTS

(Applicable to all Classes, except Class 7)

- **Dangerous goods must be packed in good quality packagings, which must be strong enough to withstand the shocks and loadings normally encountered during transport, including removal from a pallet, unit load device or overpack for subsequent manual or mechanical handling**

- **Packagings must be constructed and closed so as to prevent any loss of contents when prepared for transport, which may be caused under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure (resulting from altitude, for example)**

- **Packagings (including inner packagings and receptacles) must be closed in accordance with the information provided by the manufacturer**

- **No dangerous residue must adhere to the outside of packages during transport. These provisions apply, as appropriate, to new, reused, reconditioned or re-manufactured packagings**

PACKING INSTRUCTIONS – GENERAL PACKING REQUIREMENTS

→ **Compatibility Requirements :**

➢ **Parts of packagings which are in direct contact with dangerous goods:**

✓ **must not be affected or significantly weakened by those DG**

✓ **must not cause a dangerous effect, e.g. catalyzing a reaction or reacting with the DG**

✓ **must not allow permeation of the DG that could constitute a danger under normal conditions of transport**

➢ **Where necessary, packagings must be provided with a suitable inner coating or treatment**

➢ **Shippers must also ensure that any absorbent materials and the materials of intermediate packagings for liquids do not react dangerously with the liquid**

PACKING INSTRUCTIONS – GENERAL PACKING REQUIREMENTS

→ **That's why Shippers must ensure that all appropriate measures have been taken to ensure that the packagings used are compatible with the dangerous goods to be transported: (e.g., non-exhaustive list)**

- **absorbent materials and the materials of intermediate packagings for liquids must not react dangerously with the liquid**
- **materials, such as some plastics, which can be significantly softened or rendered brittle or permeable, must not be affected by the possible temperatures during transport or by of the chemical action of the contents or by the use of a refrigerant**
- **corrosivity, permeability, softening, premature aging, embrittlement**
- **effect of fluorine on glass**
- **effects of corrosion on metals such as steel and aluminium**
- **consideration of the interaction (such as swelling, permeation, chemical degradation and environmental stress cracking) of substances with polymer materials such as polyethylene and polypropylene**

→ **Evidence of such measures or assessments must be made available to the competent authority upon request.**

PACKING INSTRUCTIONS – GENERAL PACKING REQUIREMENTS

→ **Compatibility Requirements : (continuous)**

➢ **Dangerous goods must not be packed together in the same outer packaging with dangerous or other goods if they react dangerously with each other and cause :**

- ✓ **combustion and/or evolution of considerable heat**
- ✓ **evolution of flammable, toxic or asphyxiant gases**
- ✓ **the formation of corrosive substances**
- ✓ **the formation of unstable substances**

➢ **In addition, if an outer packaging contain more than one item of DG, Shippers must ensure that :**

- ✓ **the DG do not require segregation according to Table 7-1**
- ✓ **The ‘’Q’’ quantity of DG packed doesn’t exceed the value of ‘’1’’**

PACKING INSTRUCTIONS – GENERAL PACKING REQUIREMENTS

→ **Compatibility Requirements : (continuous)**

➢ **Segregation (DG which might react dangerously one with another must not be packed together) → Table 7-1 : (to be fully explain in Part 7)**

Table 7-1. Segregation between packages

	Class or division										
Hazard label	*1*	*2.1*	*2.2, 2.3*	*3*	*4.1*	*4.2*	*4.3*	*5.1*	*5.2*	*8*	*9 see 2.2.1.2*
1	Note 1	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2
2.1	Note 2	—	—	—	—	—	—	—	—	—	x
2.2, 2.3	Note 2	—	—	—	—	—	—	—	—	—	—
3	Note 2	—	—	—	—	—	—	x	—	—	x
4.1	Note 2	—	—	—	—	—	—	—	—	—	x
4.2	Note 2	—	—	—	—	—	—	x	—	—	—
4.3	Note 2	—	—	—	—	—	—	—	—	x	—
5.1	Note 2	—	—	x	—	x	—	—	—	—	x
5.2	Note 2	—	—	—	—	—	—	—	—	—	—
8	Note 2	—	—	—	—	—	x	—	—	—	—
9 see 2.2.1.2	Note 2	x	—	x	x	—	—	x	—	—	—

→ **''X'' = Incompatible**

PACKING INSTRUCTIONS – GENERAL PACKING REQUIREMENTS

→ **Compatibility Requirements : (continuous)**

➢ **Q value :**

➢ **When different DG are contained together in one outer packaging, the quantities of such dangerous goods must not exceed the value of 1, where Q is calculated using the formula:**

$$Q = n1/M1 + n2/M2 + n3/M3 + \ldots \qquad (\rightarrow Q < 1)$$

– where n1, n2, n3, etc…, are the net quantities of the different dangerous goods

– and M1, M2, M3, etc…, are the maximum net quantities for these different dangerous goods according to Table 3-1 for passenger or cargo aircraft (Column 11 and 13)

PACKING INSTRUCTIONS – GENERAL PACKING REQUIREMENTS

→ **Compatibility Requirements : (continuous)**

➢ **Q value : (particular cases)**

➢ **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**

PACKING INSTRUCTIONS – GENERAL

- **Each Chapters of Part 4** (IATA Part 5) **is devoted to the specific packing instructions applicable to an individual class of dangerous goods (including in some cases general requirements)**

Chapter 3 = Class 1, Chapter 4 = Class 2, … , Chapter 11 = Class 9

- **Packing Instructions are indicated in the DG list (Table 3-1, columns 10 and 12)**(Table 4;2, columns G, I & K)

- **Each Class refers to one series**

Class 1 = P.I. 1xx, Class 2 = P.I. 2xx, …, …, Class 9 = P.I. 9xx

Limited quantities = Y1xx, Y2xx, …, …, Y9xx

- **Each Packing Instruction details the acceptable single and combination packagings**
- **For combination packagings, tables show the acceptable outer packagings and associated inner packagings with the maximum net quantity permitted in each inner packaging**

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 131

Packing Instruction 131

Inner packagings

Bags
- paper
- plastics

Receptacles
- fibreboard
- metal
- plastics
- wood

Reels

Intermediate packagings

Not necessary

Outer packagings

Boxes
- aluminium (4B)
- fibreboard (4G)
- natural wood, ordinary (4C1)
- natural wood, with siftproof walls (4C2)
- \+ other metal (4N)
- plywood (4D)
- reconstituted wood (4F)
- steel (4A)

Drums
- ≠ aluminium (1B1, 1B2)
- fibre (1G)
- ≠ plastics (1H1, 1H2)
- \+ other metal (1N1, 1N2)
- plywood (1D)
- ≠ steel (1A1, 1A2)

PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:

— For UN 0029, 0267 and 0455, bags and reels must not be used as inner packagings.

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 211

Packing Instruction 211

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

Refrigerating machines or components containing non-toxic liquefied gases or Ammonia solutions (UN 2672) must meet the following requirements:

a) each cylinder must not contain more than 450 kg of a Division 2.2 gas without subsidiary hazard or 25 kg of Ammonia solutions (UN 2672);

b) machines or components having two or more charged cylinders may not contain an aggregate of more than 910 kg of a Division 2.2 gas without subsidiary hazard or more than 45 kg of Ammonia solutions (UN 2672);

c) each cylinder must be equipped with a safety device meeting the requirements of a recognized national standard;

d) each cylinder must be equipped with a shut-off valve at each opening except openings used for safety devices and with no other connection. These valves must be closed prior to and during transport;

e) cylinders must be manufactured, inspected and tested in accordance with a recognized UN or national standard;

f) all parts subject to refrigerant pressure during shipment must be tested in accordance with a recognized UN or national standard;

g) the liquid portion of the refrigerant, if any, must not completely fill any pressure vessel at 55°C;

h) the amount of refrigerant, if liquefied, must not exceed the filling density prescribed by applicable State regulations.

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 216

Packing Instruction 216

Passenger and cargo aircraft for UN 3478 and 3479 (contained in equipment) only

General requirements

Part 4;1.1.1 and 1.1.8 requirements must be met, including:

1) **Compatibility requirements**

— Substances must be compatible with their packagings as required by 4;1.1.3.

UN number and name	*Quantity — passenger*	*Quantity — cargo*
UN 3478 **Fuel cell cartridges contained in equipment,** containing liquefied flammable gas UN 3479 **Fuel cell cartridges contained in equipment,** containing hydrogen in metal hydride	1 kg of fuel cell cartridges	15 kg of fuel cell cartridges

ADDITIONAL PACKING REQUIREMENTS

— Fuel cell cartridges that are contained in equipment must be protected against short circuit and the equipment must be protected against inadvertent operation.
— Equipment must be securely cushioned in the outer packagings.
— Fuel cell systems must not charge batteries during transport.
— On passenger aircraft, each fuel cell system and each fuel cell cartridge must conform to IEC 62282-6-100 Ed. 1, including Amendment 1, or a standard approved by the appropriate authority of the State of Origin.

OUTER PACKAGINGS

Boxes *Drums* *Jerricans*

Strong outer packagings

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. from 350 to 355

Packing Instructions 350 – 355

Passenger aircraft

General requirements

Part 4, Chapter 1 requirements must be met, including:

1) **Compatibility requirements**

— Substances must be compatible with their packagings as required by 4;1.1.3.
— Metal packagings must be corrosion resistant or be protected against corrosion for substances with a Class 8 subsidiary risk.

2) **Closure requirements**

— Closures must meet the requirements of 4;1.1.4.

	COMBINATION PACKAGINGS				
Packing instruction	*Packing group*	*Inner packaging (see 6;3.2)*	*Inner packaging quantity (per receptacle)*	*Total quantity per package*	**SINGLE PACKAGINGS**
350	I	Glass	0.5 L	0.5 L	No
		Plastics	Forbidden		
		Metal	0.5 L		
351	I	Glass	0.5 L	1 L	No
		Plastics	Forbidden		
		Metal	1.0 L		
352	II	Glass	1.0 L	1 L	No
		Plastics	1.0 L		
		Metal	1.0 L		
353	II	Glass	1.0 L	5 L	No
		Plastics	5.0 L		
		Metal	5.0 L		
354	III	Glass	2.5 L	5 L	5 L
		Plastics	5.0 L		
		Metal	5.0 L		
355	III	Glass	2.5 L	60 L	60 L
		Plastics	10.0 L		
		Metal	10.0 L		

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. from 350 to 355

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

— Inner packagings must be packed with sufficient absorbent material to absorb the entire contents of the inner packagings and placed in a rigid leakproof receptacle before packing in outer packagings.

Packing Group III

— Packagings must meet the Packing Group II performance requirements if the substance has a Class 8 subsidiary risk.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes		*Drums*		*Jerricans*
Aluminium (4B)	≠	Aluminium (1B1, 1B2)	≠	Aluminium (3B1, 3B2)
Fibreboard (4G)		Fibre (1G)	≠	Plastics (3H1, 3H2)
Natural wood (4C1, 4C2)	≠	Other metal (1N1, 1N2)	≠	Steel (3A1, 3A2)
• Other metal (4N)	≠	Plastics (1H1, 1H2)		
Plastics (4H1, 4H2)		Plywood (1D)		
Plywood (4D		Steel (1A1, 1A2)		
Reconstituted wood (4F)				
Steel (4A)				

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

— Packagings must meet the Packing Group II performance requirements if the substance has a Class 8 subsidiary risk.

SINGLE PACKAGINGS FOR PACKING GROUP III (PI 354 OR PI 355)

Composites	*Cylinders*	*Drums*	*Jerricans*
All (see 6;3.1.18)	See 4;2.7	Aluminium (1B1, 1B2) Other metal (1N1, 1N2) Plastics (1H1, 1H2) Steel (1A1, 1A2)	Aluminium (3B1, 3B2) Plastics (3H1, 3H2) Steel (3A1, 3A2)

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 452

Packing Instruction 452

Passenger aircraft for UN 2555, 2556 and 2557 only

General requirements

Part 4, Chapter 1 requirements must be met, including:

1) **Compatibility requirements**

— Substances must be compatible with their packagings as required by 4;1.1.3.

2) **Closure requirements**

— Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS				SINGLE PACKAGINGS
UN number and proper shipping name	*Inner packaging (see 6;3.2)*	*Inner packaging quantity (per receptacle)*	*Total quantity per package*	
UN 2555 **Nitrocellulose with water**	Glass	1.0 kg	15 kg	No
	Plastics	1.0 kg		
	Metal	1.0 kg		
	Plastic bag	1.0 kg		
UN 2556 **Nitrocellulose with alcohol**	Glass	1.0 kg	1 kg	No
	Plastics	1.0 kg		
	Metal	1.0 kg		
	Plastic bag	1.0 kg		
UN 2557 **Nitrocellulose, mixture without plasticizer, without pigment** or **Nitrocellulose, mixture without plasticizer, with pigment** or **Nitrocellulose, mixture with plasticizer, without pigment** or **Nitrocellulose, mixture with plasticizer, with pigment**	Glass	1.0 kg	1 kg	No
	Plastics	1.0 kg		
	Metal	1.0 kg		
	Plastic bag	1.0 kg		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

— Packagings must be designed and constructed to prevent the loss of water or alcohol content or the content of the phlegmatizer.
— Packagings must be so constructed and closed so as to avoid an explosive over pressure or pressure build-up of more than 300 kPa (3 bar).

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	*Drums*	*Jerricans*
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Other metal (3N2)
Natural wood (4C1, 4C2)	Other metal (1N2)	Plastics (3H1, 3H2)
Other metal (4N)	Plastics (1H1, 1H2)	Steel (3A2)
Plastics (4H1, 4H2)	Plywood (1D)	
Plywood (4D)		
Reconstituted wood (4F)		
Steel (4A)		

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. From Y640 to Y642

Packing Instructions Y640 – Y642

Limited quantities
Passenger and cargo aircraft

General requirements

Part 4, Chapter 1 requirements must be met (except that 4;1.1.2, 1.1.9 c), 1.1.9 e), 1.1.16, 1.1.18 and 1.1.20 do not apply), including:

1) **Compatibility requirements**

— Substances must be compatible with their packagings as required by 4;1.1.3.
— Metal packagings must be corrosion resistant or be protected against corrosion for substances with a Class 8 subsidiary hazard.

2) **Closure requirements**

— Closures must meet the requirements of 4;1.1.4.

3) **Limited quantity requirements**

— Part 3, Chapter 4 requirements must be met including:

— the capability of the package to pass a 1.2 m drop test;
— a 24-hour stacking test; and
— inner packagings for liquids must be capable of passing a pressure differential test (4;1.1.6).

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
Packing instruction	*Packing group*	*Inner packaging (see 6;3.2)*	*Inner packaging quantity (per receptacle)*	*Total quantity per package*	*Total gross mass per package*	
Y640	II	Glass	0.1 L	0.5 L	30 kg	No
		Plastics	0.1 L			
		Metal	0.1 L			
Y641	II	Glass	0.1 L	1.0 L		No
		Plastics	0.1 L			
		Metal	0.1 L			
Y642	III	Glass	0.5 L	2.0 L		No
		Plastics	0.5 L			
		Metal	0.5 L			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

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

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 876

Packing Instruction 876

Cargo aircraft only for Chlorosilanes

General requirements

Part 4, Chapter 1 requirements must be met, including:

1) **Compatibility requirements**

— Substances must be compatible with their packagings as required by 4;1.1.3.
— Metal packagings must be corrosion resistant or be protected against corrosion.

2) **Closure requirements**

— Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS				SINGLE PACKAGINGS	
UN number	*Inner packaging (see 6;3.2)*	*Net quantity per inner packaging — cargo*	*Total quantity per package — cargo*	*Passenger*	*Cargo*
UN 1724, UN 1728, UN 1747, UN 1753, UN 1762, UN 1763, UN 1766, UN 1767, UN 1769, UN 1771, UN 1781, UN 1784, UN 1799, UN 1800, UN 1801, UN 1804, UN 1816, UN 1818, UN 2434, UN 2435, UN 2437, UN 2986, UN 2987	Glass	1.0 L	30.0 L	No	30.0 L
	Plastics	Forbidden			
	Steel	5.0 L			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	*Drums*
Fibreboard (4G) Natural wood (4C1, 4C2) Plastics (4H1, 4H2) Plywood (4D) Reconstituted wood (4F) Steel (4A)	Fibre (1G) Plastics (1H1, 1H2) Plywood (1D) Steel (1A1, 1A2)

SINGLE PACKAGINGS FOR CARGO AIRCRAFT ONLY

Composites	*Cylinders*	*Drums*	*Jerricans*
Plastic receptacle in steel drum (6HA1)	Steel (as permitted by 4;2.7)	Steel (1A1)	Steel (3A1)

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 960

Packing Instruction 960

Passenger and cargo aircraft for UN 3316 only

General requirements

Part 4, Chapter 1 requirements must be met, including:

1) **Compatibility requirements**

— Substances must be compatible with their packagings as required by 4;1.1.3.

2) **Closure requirements**

— Closures must meet the requirements of 4;1.1.4.

UN number and proper shipping name	*State*	*Inner packaging* (see 6;3.2)*	*Maximum quantity of dangerous goods per kit***	*Package quantity — passenger*	*Package quantity — cargo*	**SINGLE PACKAGINGS**
UN 3316 Chemical kit or First aid kit	Liquid	250 mL	1 L	10 kg	10 kg	No
	Solid	250 g	1 kg			

* Containing dangerous goods.
** The total quantity of dangerous goods in any one kit must not exceed 1 L or 1 kg.

ADDITIONAL PACKING REQUIREMENTS

— Kits may contain dangerous goods which require segregation according to Table 7-1.
— Packagings must meet the performance standards of the most stringent packing group assigned to any individual substance contained in the kit. Where the kit contains only dangerous goods to which no packing group is assigned, packagings must meet Packing Group II performance standards.
— Kits must not be packed with other dangerous goods in the same outer packaging, with the exception of dry ice. If dry ice is used, the requirements in Packing Instruction 954 must be met.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes

Aluminium (4B)
Fibreboard (4G)
Natural wood (4C1, 4C2)
Other metal (4N)
Plastics (4H1, 4H2)
Plywood (4D)
Reconstituted wood (4F)
Steel (4A)

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 968

→ **New application since 1st of January 2015: Packing Instruction 968 regarding Lithium Metal or Lithium alloy Batteries (UN3090)**

Packing Instruction 968

Cargo aircraft only for UN 3090

1. **Introduction**

This entry applies to lithium metal or lithium alloy batteries. This packing instruction is structured as follows:

- Section IA applies to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;
- Section IB applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II; and
- Section II applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities not exceeding the allowance permitted in Section II, Table 968-II.

2. **Lithium batteries forbidden from transport**

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 968

→ **New application since 1st of January 2015: Packing Instruction 968 regarding Lithium Metal or Lithium alloy Batteries (UN3090)**

→ **Section IA**

Table 968-IA

UN number and proper shipping name		*Net quantity per package*	
		Passenger	*Cargo*
UN 3090	**Lithium metal batteries**	Forbidden	35 kg

→ **Section IB**

Table 968-IB

Contents	*Net quantity per package*	
	Passenger	*Cargo*
Lithium metal cells and batteries	Forbidden	2.5 kg

→ **Section II**

Table 968-II

Contents	*Lithium metal cells and/or batteries with a lithium content not more than 0.3 g*	*Lithium metal cells with a lithium content more than 0.3 g but not more than 1 g*	*Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g*
1	*2*	*3*	*4*
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 968

→ **New application since 1st of January 2015: Packing Instruction 968 regarding Lithium Metal or Lithium alloy Batteries (UN3090)**

→ **In addition, since last Addendum N°3 dated 15th January 2016 concerning Section II**

- **Shippers are not permitted to offer for transport more than one Lithium Metal Section II package in any single consignment**
- **Packages/overpacks of Section II lithium metal batteries must be offered to the operator separately from cargo which is not subject to these Instructions (general cargo) and must not be loaded into a unit load device (ULD = Pallet, container, …) before being offered to the operator**
- **Not more than one package of Section II Lithium Metal may be placed into an overpack**
- **Even if a shipment is prepared in accordance with Section IA and/or Section IB, the limit of one package of Section II batteries per overpack still applies for a single shipper**

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 968

→ **New application since 1st of January 2019: Packing Instruction 968 regarding Lithium Metal or Lithium alloy Batteries (UN3090) (new segregation requirements)**

→ **Additional requirements concerning Sections IA et IB**

➢ **They must not be packed in the same outer packaging with explosives substances and articles of Class 1 (others than 1.4S), flammable gases of Division 2.1, flammable liquids of Class 3, flammable solids of Division 4.1 or oxidizers of Division 5.1**

→ **Overpacks requirements concerning Sections II**

➢ **Packages must not be placed in an overpack with explosives substances and articles of Class 1 (others than 1.4S), flammable gases of Division 2.1, flammable liquids of Class 3, flammable solids of Division 4.1 or oxidizers of Division 5.1**

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 965

→ New since January 2016 and April 2016: Packing Instruction 965 regarding Lithium Ion or Lithium polymer Batteries (UN3480)

Packing Instruction 965

Cargo aircraft only for UN 3480

1. **Introduction**

This entry applies to lithium ion or lithium polymer batteries. This packing instruction is structured as follows:

- Section IA applies to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;
- Section IB applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II; and
- Section II applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities not exceeding the allowance permitted in Section II, Table 965-II.

A single cell battery as defined in Part III, sub-section 38.3.2.3 of the UN *Manual of Tests and Criteria* is considered a "cell" and must be transported according to the requirements for "cells" for the purpose of this packing instruction.

2. **Lithium batteries forbidden from transport**

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 965

→ **New since January 2016 and April 2016: Packing Instruction 965 regarding Lithium Ion or Lithium polymer Batteries (UN3480)**

→ **Section IA**

Table 965-IA

UN number and proper shipping name		*Net quantity per package*	
		Passenger	*Cargo*
UN 3480	**Lithium ion batteries**	Forbidden	35 kg

→ **Section IB**

Table 965-IB

Contents	*Net quantity per package*	
	Passenger	*Cargo*
Lithium ion cells and batteries	Forbidden	10 kg

→ **Section II**

Table 965-II

Contents	*Lithium ion cells and/or batteries with a Watt-hour rating not more than 2.7 Wh*	*Lithium ion cells with a Watt-hour rating more than 2.7 Wh, but not more than 20 Wh*	*Lithium ion batteries with a Watt-hour rating more than 2.7 Wh, but not more than 100 Wh*
1	*2*	*3*	*4*
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 965

→ **New since January 2016 and April 2016: Packing Instruction 965 regarding Lithium Ion or Lithium polymer Batteries (UN3480)**

→ **As for the P.I. 965, concerning Section II Lithium Ion**

- **Shippers are not permitted to offer for transport more than one Lithium Metal Section II package in any single consignment**
- **Packages/overpacks of Section II lithium metal batteries must be offered to the operator separately from cargo which is not subject to these Instructions (general cargo) and must not be loaded into a unit load device (ULD = Pallet, container, …) before being offered to the operator**
- **Not more than one package of Section II Lithium Metal may be placed into an overpack**
- **Even if a shipment is prepared in accordance with Section IA and/or Section IB, the limit of one package of Section II batteries per overpack still applies for a single shipper**

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 965

→ **New since January 2016 and April 2016: Packing Instruction 965 regarding Lithium Ion or Lithium polymer Batteries (UN3480)**

→ **Supplementary provision for all Lithium Ion batteries**

➢ **As well for Section IA, Section IB and Section II :**

→ **Lithium ion cells and batteries must not be offered for transport at a state of charge (SOC) exceeding 30 per cent of their rated capacity**

→ **Those with a state of charge greater than 30 per cent of their rated capacity may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities**

→ **An Addendum to the Supplement provides guides to the States to deliver Approval, and describes criteria to evaluate mitigate risks in accordance with Special Provision A331**

PACKING INSTRUCTIONS – BY NUMBER – e.g. P.I. 965

→ **New since January 2016 and April 2016: Packing Instruction 965 regarding Lithium Ion or Lithium polymer Batteries (UN3480)**

→ **Additional requirements concerning Sections IA et IB**

➢ **They must not be packed in the same outer packaging with explosives substances and articles of Class 1 (others than 1.4S), flammable gases of Division 2.1, flammable liquids of Class 3, flammable solids of Division 4.1 or oxidizers of Division 5.1**

→ **Overpacks requirements concerning Sections II**

➢ **Packages must not be placed in an overpack with explosives substances and articles of Class 1 (others than 1.4S), flammable gases of Division 2.1, flammable liquids of Class 3, flammable solids of Division 4.1 or oxidizers of Division 5.1**

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