

Chapter 5

CLASS 3 – FLAMMABLE LIQUIDS

5.1 PACKING INSTRUCTIONS

Packing Instructions Y340 – Y344

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
<i>Packing instruction</i>	<i>Packing group</i>	<i>Inner packaging (see 6;3.2)</i>	<i>Inner packaging quantity (per receptacle)</i>	<i>Total quantity per package</i>	<i>Total gross mass per package</i>	
Y340	II	Glass	0.5 L	0.5 L	30 kg	No
		Plastics	0.5 L			
		Metal	0.5 L			
Y341	II	Glass	0.5 L	1.0 L		No
		Plastics	0.5 L			
		Metal	0.5 L			
Y342	III	Glass	1.0 L	1.0 L		No
		Plastics	1.0 L			
		Metal	1.0 L			
Y343	III	Glass	1.0 L	2.0 L		No
		Plastics	1.0 L			
		Metal	1.0 L			
Y344	III	Glass	2.5 L	10.0 L		No
		Plastics	5.0 L			
		Metal	5.0 L			

Packing Instructions Y340 – Y344

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes

Aluminium
Fibreboard
Natural wood
Other metal
Plastics
Plywood
Reconstituted wood
Steel

Drums

Aluminium
Fibre
Other metal
Plastics
Plywood
Steel

Jerricans

Aluminium
Plastics
Steel

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 hazard.

2) Closure requirements

- Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing instruction	Packing group	Inner packaging (see 6;3.2)	Inner packaging quantity (per receptacle)	Total quantity per package	
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 350 – 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 hazard.

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)

Drums

Aluminium (1B1, 1B2)
Fibre (1G)
Other metal (1N1, 1N2)
Plastics (1H1, 1H2)
Plywood (1D)
Steel (1A1, 1A2)

Jerricans

Aluminium (3B1, 3B2)
Plastics (3H1, 3H2)
Steel (3A1, 3A2)

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 hazard.

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

Composites

All (see 6;3.1.18)

Cylinders

See 4;2.7

Drums

Aluminium (1B1, 1B2)
Other metal (1N1, 1N2)
Plastics (1H1, 1H2)
Steel (1A1, 1A2)

Jerricans

Aluminium (3B1, 3B2)
Plastics (3H1, 3H2)
Steel (3A1, 3A2)

Packing Instructions 360 – 366

Cargo aircraft 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.
- 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.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing instruction	Packing group	Inner packaging (see 6;3.2)	Inner packaging quantity (per receptacle)	Total quantity per package	
360	I	Glass	1.0 L	2.5 L	2.5 L
		Plastics	Forbidden		
		Metal	2.5 L		
361	I	Glass	1.0 L	30 L	30 L
		Plastics	Forbidden		
		Metal	5.0 L		
362	II	Glass	1.0 L	5 L	5 L
		Plastics	1.0 L		
		Metal	1.0 L		
363	II	Glass	2.5 L	5 L	5 L
		Plastics	2.5 L		
		Metal	5.0 L		
364	II	Glass	2.5 L	60 L	60 L
		Plastics	5.0 L		
		Metal	10.0 L		
365	III	Glass	5.0 L	60 L	60 L
		Plastics	10.0 L		
		Metal	25.0 L		
366	III	Glass	5.0 L	220 L	220 L
		Plastics	10.0 L		
		Metal	25.0 L		

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 hazard.

Packing Instructions 360 – 366

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)

Drums

Aluminium (1B1, 1B2)
Fibre (1G)
Other metal (1N1, 1N2)
Plywood (1D)
Plastics (1H1, 1H2)
Steel (1A1, 1A2)

Jerricans

Aluminium (3B1, 3B2)
Other metal (3N2)
Plastics (3H1, 3H2)
Steel (3A1, 3A2)

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

For UN 1308

For Packing Groups I and II, only combination packagings are permitted. The completed package must not have a gross mass exceeding 75 kg.

Packing Group III

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

SINGLE PACKAGINGS FOR PACKING GROUP I

Composites

All (see 6;3.1.18)

Cylinders

See 4;2.7

Drums

Aluminium (1B1)
Other metal (1N1)
Steel (1A1)

Jerricans

Aluminium (3B1)
Steel (3A1)

SINGLE PACKAGINGS FOR PACKING GROUP II

Composites

All (see 6;3.1.18)

Cylinders

See 4;2.7

Drums

Aluminium (1B1)
Other metal (1N1)
Plastics (1H1)
Steel (1A1)

Jerricans

Aluminium (3B1)
Plastics (3H1)
Steel (3A1)

SINGLE PACKAGINGS FOR PACKING GROUP III ONLY

Composites

All (see 6;3.1.18)

Cylinders

See 4;2.7

Drums

Aluminium (1B1, 1B2)
Other metal (1N1, 1N2)
Plastics (1H1, 1H2)
Steel (1A1, 1A2)

Jerricans

Aluminium (3B1, 3B2)
Plastics (3H1, 3H2)
Steel (3A1, 3A2)

Packing Instruction 370

Passenger and cargo aircraft for UN 3269 (Packing Group II or III) 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.
- 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.

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
Packing conditions	Inner packaging (see 6;3.2)	Inner packaging quantity (per receptacle) – for liquid base material	Inner packaging quantity (per receptacle) – for liquid activator	Inner packaging quantity (per receptacle) – for solid activator	Total quantity per package	
Activator (Organic peroxide)	Plastics*	n/a	125 mL	500 g	5 kg	No
	Metal*	n/a	125 mL	500 g		
Base material Class 3 Packing Group II	Glass	1.0 L	n/a	n/a		
	Plastics	5.0 L	n/a	n/a		
	Metal	5.0 L	n/a	n/a		
Activator (Organic peroxide)	Plastics*	n/a	125 mL	500 g	10 kg	No
	Metal*	n/a	125 mL	500 g		
Base material Class 3 Packing Group III	Glass	2.5 L	n/a	n/a		
	Plastics	10.0 L	n/a	n/a		
	Metal	10.0 L	n/a	n/a		

*Including tubes.

The total quantity of kits per package is to be calculated on a one-to-one basis of their volume, that is, 1 L equal to 1 kg.

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

The components may be placed in the same outer packaging provided that they will not interact dangerously in the event of leakage (see 4;1.1.7).

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)

Drums

Aluminium (1B1, 1B2)
Fibre (1G)
Other metal (1N1, 1N2)
Plastics (1H1, 1H2)
Steel (1A1, 1A2)

Jerricans

Aluminium (3B1, 3B2)
Plastics (3H1, 3H2)
Steel (3A1, 3A2)

Packing Instruction Y370

Limited quantities
Passenger and cargo aircraft for UN 3269 (Packing Group II or III) only

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 conditions	Inner packaging (see 6;3.2)	Inner packaging quantity (per receptacle) – for liquid base material	Inner packaging quantity (per receptacle) – for liquid activator	Inner packaging quantity (per receptacle) – for solid activator	Total quantity per package	Total gross mass per package	
Activator (Organic peroxide)	Plastics*	n/a	30 mL	100 g	1 kg	30 kg	No
	Metal*	n/a	30 mL	100 g			
Base material Class 3 Packing Group II	Glass	1.0 L	n/a	n/a			
	Plastics	1.0 L	n/a	n/a			
	Metal	1.0 L	n/a	n/a			
Activator (Organic peroxide)	Plastics*	n/a	30 mL	100 g	5 kg		
	Metal*	n/a	30 mL	100 g			
Base material Class 3 Packing Group III	Glass	2.5 L	n/a	n/a			
	Plastics	5.0 L	n/a	n/a			
	Metal	5.0 L	n/a	n/a			

*Including tubes.

The total quantity of kits per package is to be calculated on a one-to-one basis of their volume, that is, 1 L equal to 1 kg.

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

The components may be placed in the same outer packaging provided that they will not interact dangerously in the event of leakage (see 4;1.1.7).

Packing Instruction Y370		
OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)		
<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Steel	
Plywood		
Reconstituted wood		
Steel		

Packing Instruction 371					
Passenger and cargo aircraft for UN 1204 and UN 3064 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 – passenger	Total quantity per package – cargo	
UN 1204 Nitroglycerin solution in alcohol with not more than 1% nitroglycerin (Packing Group II)	Glass	1.0 L	5 L	60 L	No
	Plastics	1.0 L			
	Metal	1.0 L			
UN 3064 Nitroglycerin solution in alcohol with more than 1% but not more than 5% nitroglycerin (Packing Group II)	Metal	1.0 L	Forbidden	5 L	No
ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS					
<i>For UN 1204 and UN 3064</i>					
Inner packagings must be completely surrounded with absorbent cushioning material of sufficient quantity to absorb the entire liquid content.					
<i>For UN 3064</i>					
Wooden boxes (4C1, 4C2, 4D or 4F) must be used as the outer packaging and must be completely lined with a suitable material impervious to water, alcohol and nitroglycerin.					

Packing Instruction 371		
OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)		
<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
Aluminium (4B) Fibreboard (4G) Natural wood (4C1, 4C2) Other metal (4N) Plastics (4H1, 4H2) Plywood (4D) Reconstituted wood (4F) Steel (4A)	Aluminium (1B1, 1B2) Fibre (1G) Other metal (1N1, 1N2) Plastics (1H1, 1H2) Steel (1A1, 1A2)	Aluminium (3B1, 3B2) Plastics (3H1, 3H2) Steel (3A1, 3A2)

Packing Instruction 372	
Cargo aircraft only for UN 3165 only	
≠ >	General requirements The requirements of Part 4;1.1.1, 4;1.1.5; 4;1.1.8 and 4;1.1.10 must be met. 1) Compatibility requirements — Substances must be compatible with their packagings as required by 4;1.1.3.
	ADDITIONAL PACKING REQUIREMENTS UN 3165 Aircraft hydraulic power unit fuel tank (containing a mixture of anhydrous hydrazine and methyl hydrazine) (M86 fuel) and designed for installation as complete units in aircraft are acceptable, subject to either of the following conditions: a) the unit must consist of an aluminium pressure receptacle made from tubing and having welded heads. Primary containment of the fuel within this receptacle must consist of a welded aluminium bladder having a maximum internal volume of 46 L. The outer receptacle must have a minimum design gauge pressure of 1 275 kPa and a minimum burst gauge pressure of 2 755 kPa. Each receptacle must be leak-checked during manufacture and before shipment and must be found leakproof. The complete inner unit must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings. Maximum quantity of fuel per primary containment and package is 42 L; or b) the unit must consist of an aluminium pressure receptacle. Primary containment of the fuel within this receptacle must consist of a welded hermetically sealed fuel compartment with an elastomeric bladder having a maximum internal volume of 46 L. The pressure receptacle must have a minimum design gauge pressure of 2 860 kPa and a minimum burst gauge pressure of 5 170 kPa. Each receptacle must be leak-checked during manufacture and before shipment and must be found leakproof. The complete inner unit must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings. Maximum quantity of fuel per primary containment and package is 42 L. <i>Note.— This packing instruction is the same as UN packing instruction P301.</i>

Packing Instruction 373

Passenger and cargo aircraft for UN 1228 (Packing Group II or III) 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	Packing group	Inner packaging (see 6;3.2)	Inner packaging quantity (per receptacle) – passenger	Inner packaging quantity (per receptacle) – cargo	Total quantity per package – passenger	Total quantity per package – cargo	Passenger	Cargo
UN 1228 Mercaptans, liquid, flammable, toxic, n.o.s.*	II	Glass	Forbidden	5.0 L	Forbidden	60 L	No	60 L
		Plastics		5.0 L				
		Metal		5.0 L				
	III	Glass	1.0 L	5.0 L	5 L	220 L	No	220 L
		Plastics	1.0 L	5.0 L				
		Metal	1.0 L	5.0 L				

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Glass 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.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes

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

Drums

Aluminium (1B1, 1B2)
Fibre (1G)
Other metal (1N1, 1N2)
Plastics (1H1, 1H2)
Steel (1A1, 1A2)

Jerricans

Aluminium (3B1, 3B2)
Plastics (3H1, 3H2)
Steel (3A1, 3A2)

SINGLE PACKAGINGS FOR CARGO AIRCRAFT ONLY

Composites

All (see 6;3.1.18)

Cylinders

See 4;2.7

Drums

Aluminium (1B1, 1B2)
Other metal (1N1, 1N2)
Plastics (1H1, 1H2)
Steel (1A1, 1A2)

Jerricans

Aluminium (3B1, 3B2)
Plastics (3H1, 3H2)
Steel (3A1, 3A2)

Packing Instruction Y373

Limited quantities
Passenger and cargo aircraft for UN 1228 (Packing Group III) only

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.

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
UN number and proper shipping name	Packing group	Inner packaging (see 6;3.2)	Inner packaging quantity (per receptacle)	Total quantity per package	Total gross mass per package	
UN 1228 Mercaptans, liquid, flammable, toxic, n.o.s.*	III	Glass	0.5 L	1 L	30 kg	No
		Plastics	0.5 L			
		Metal	0.5 L			

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Glass 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.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes

Aluminium
Fibreboard
Natural wood
Other metal
Plastics
Plywood
Reconstituted wood
Steel

Drums

Aluminium
Fibre
Other metal
Plastics
Steel

Jerricans

Aluminium
Plastics
Steel

Packing Instruction 374

Passenger and cargo aircraft for UN 3473 only

General requirements

Part 4;1.1.1, 1.1.2 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.

<i>UN number and proper shipping name</i>	<i>Quantity – passenger</i>	<i>Quantity – cargo</i>
UN 3473 Fuel cell cartridges	5 kg of fuel cell cartridges	50 kg of fuel cell cartridges

ADDITIONAL PACKING REQUIREMENTS

- Fuel cell cartridges must be securely cushioned in the outer packagings.
- Packagings must meet the Packing Group II performance requirements.

OUTER PACKAGINGS

Boxes

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

Drums

Aluminium (1B2)
Fibre (1G)
Other metal (1N2)
Plastics (1H2)
Plywood (1D)
Steel (1A2)

Jerricans

Steel (3A2)
Plastics (3H2)
Aluminium (3B2)

Packing Instruction Y374

Limited quantities for UN 3473 only

General requirements

Part 3;4 requirements must be met.

Single packagings are not permitted for limited quantities.

For the purpose of this packing instruction, a fuel cell cartridge is considered an inner packaging.

1) Compatibility requirements

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

<i>UN number and name</i>	<i>Maximum quantity per package</i>
UN 3473 Fuel cell cartridges , containing flammable liquids	2.5 kg of fuel cell cartridges

ADDITIONAL PACKING REQUIREMENTS

- Fuel cell cartridges must be securely cushioned in the outer packagings.
- Fuel cell cartridges must not exceed 0.5 L of flammable liquid fuel per cartridge.

Packing Instruction Y374		
OUTER PACKAGINGS		
<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
Aluminium Fibreboard Natural wood Other metal Plastics Plywood Reconstituted wood Steel	Aluminium Fibre Other metal Plastics Plywood Steel	Aluminium Plastics Steel

Packing Instruction 375		
Passenger and cargo aircraft for UN 3473 (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.		
<i>UN number and proper shipping name</i>	<i>Quantity – passenger</i>	<i>Quantity – cargo</i>
UN 3473 Fuel cell cartridges contained in equipment	5 kg of fuel cell cartridges	50 kg of fuel cell cartridges
ADDITIONAL PACKING REQUIREMENTS		
<ul style="list-style-type: none"> — 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		
<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
	Strong outer packagings	

Packing Instruction 376

Passenger and cargo aircraft for UN 3473 (packed with 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.

<i>UN number and proper shipping name</i>	<i>Quantity — passenger</i>	<i>Quantity — cargo</i>
UN 3473 Fuel cell cartridges packed with equipment	5 kg of fuel cell cartridges	50 kg of fuel cell cartridges

ADDITIONAL PACKING REQUIREMENTS

- When fuel cell cartridges are packed with equipment, they must be packed in intermediate packagings together with the equipment they are capable of powering.
- The maximum number of fuel cell cartridges in the intermediate packaging must be the minimum number required to power the equipment, plus 2 spares.
- The fuel cell cartridges and the equipment must be packed with cushioning material or divider(s) or inner packaging so that the fuel cell cartridges are protected against damage that may be caused by the movement or placement of the equipment and the cartridges within the packaging.

OUTER PACKAGINGS

Boxes

Drums

Jerricans

Strong outer packagings

Packing Instruction 377

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	Total quantity per package	
UN 1162, UN 1196, UN 1250, UN 1298, UN 1305, UN 2985	Glass	1.0 L	5.0 L	5.0 L
	Plastics	Forbidden		
	Steel	5.0 L		

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes

Fibreboard (4G)
Natural wood (4C1, 4C2)
Plastics (4H1, 4H2)
Plywood (4D)
Reconstituted wood (4F)
Steel (4A)

Drums

Fibre (1G)
Plastics (1H1, 1H2)
Plywood (1D)
Steel (1A1, 1A2)

SINGLE PACKAGINGS

Composites

Plastic receptacle in steel drum (6HA1)

Cylinders

Steel (as
permitted by 4;2.7)

Drums

Steel (1A1)

Jerricans

Steel (3A1)

Packing Instruction 378

Passenger and cargo aircraft for UN 3528 only
(See Packing Instruction 220 for flammable gas-powered engines or machinery, Packing Instruction 950 for flammable liquid-powered vehicles, Packing Instruction 951 for flammable gas-powered vehicles, Packing Instruction 952 for battery-powered equipment and vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels)

General requirements

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

Compatibility requirements

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

UN number and proper shipping name		Quantity – passenger	Quantity – cargo
UN 3528	Engine, internal combustion, flammable liquid powered or Machinery, internal combustion, flammable liquid powered or Engine, fuel cell, flammable liquid powered or Machinery, fuel cell, flammable liquid powered	No limit	No limit

General

- 1) The engine or machinery, including the means of containment containing dangerous goods, must be in compliance with the construction requirements specified by the appropriate national authority;
- 2) Any valves or openings (such as venting devices) must be closed during transport;
- 3) The engines or machinery must be oriented to prevent inadvertent leakage of dangerous goods and secured by means capable of restraining the engines or machinery to prevent any movement during transport which would change the orientation or cause them to be damaged.

ADDITIONAL PACKING REQUIREMENTS

If the engine or machinery is constructed and designed so that the means of containment containing the dangerous goods affords adequate protection, an outer packaging is not required. Dangerous goods in engines or machinery must otherwise be packed in outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, and meeting the applicable requirements of 4;1.1.1, or they must be fixed in such a way that they will not become loose during normal conditions of transport, such as in cradles or crates or other handling devices.

Flammable liquid fuel tanks

Except as otherwise provided for in this packing instruction, fuel tanks must be drained of fuel and tank caps fitted securely. Special precautions are necessary to ensure complete drainage of the fuel system of machines or equipment incorporating internal combustion engines, such as lawn mowers and outboard motors, where such machines or equipment could possibly be handled in other than an upright position. When it is not possible to handle in other than an upright position, machinery must be drained of fuel as far as practicable, and if any fuel remains, it must not exceed one-quarter of the tank capacity.

Batteries

All batteries must be installed and securely fastened in the battery holder of the 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 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 870.
- 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, 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.
- 3) If metallic sodium or sodium alloy batteries are installed, they must conform to the requirements of Special Provision A94.

Packing Instruction 378**Other operational equipment**

Dangerous goods required for the operation or safety of the machine or equipment, such as fire extinguishers, tire inflation canisters or safety devices, must be securely mounted in the machine or equipment.

Internal combustion or fuel cell engine shipped separately (not installed)

- 1) When internal combustion engines or fuel cell engines are being shipped separately, all fuel, coolant or hydraulic systems remaining in or on the engine must be drained as far as practicable and all disconnected fluid pipes must be sealed with leakproof caps, which are positively retained.
- 2) This requirement also applies to vehicles containing internal combustion engines or fuel cell engines which are being shipped in a dismantled state such that fuel lines have been disconnected.