Chapter 7

CLASS 5 – OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

7.1 GENERAL REQUIREMENTS FOR ORGANIC PEROXIDES

7.1.1 Packagings for organic peroxides must conform to the requirements of 6;1, 6;2, 6;3 and 6;4 and must meet the test requirements of 6;4 for Packing Group II.

7.1.2 Venting of packages is not permitted for air transport.

7.1.3 The packaging of organic peroxides presenting an explosive subsidiary hazard must comply with the provisions of 4;3.2.2 and 4;3.2.3.

7.2 PACKING INSTRUCTIONS

Packing Instructions Y540 – Y541

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*	
Y540	II	Glass	0.1 L	0.5 L	30 kg	No
		Plastics	0.1 L			
		Metal	0.1 L			
Y541	III	Glass	0.5 L	1.0 L		No
		Plastics	0.5 L			
		Metal	0.5 L			

Packing Instructions Y540 – Y541

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 Y543 – Y546

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; and
— a 24-hour stacking test.

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*	
Y543	II	Glass	0.5 kg	1.0 kg	30 kg	No
		Plastics	0.5 kg			
		Metal	0.5 kg			
		Paper bag	0.5 kg			
		Plastic bag	0.5 kg			
		Fibre	0.5 kg			
Y544	II	Glass	0.5 kg	2.5 kg	30 kg	No
		Plastics	0.5 kg			
		Metal	0.5 kg			
		Paper bag	0.5 kg			
		Plastic bag	0.5 kg			
		Fibre	0.5 kg			

Y545	III	Glass	1.0 kg	5 kg	30 kg	No
		Plastics	1.0 kg			
		Metal	1.0 kg			
		Paper bag	1.0 kg			
		Plastic bag	1.0 kg			
		Fibre	1.0 kg			
Y546	III	Glass	1.0 kg	10 kg	30 kg	No
		Plastics	1.0 kg			
		Metal	1.0 kg			
		Paper bag	1.0 kg			
		Plastic bag	1.0 kg			
		Fibre	1.0 kg			

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 Instructions 550 – 551

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*	
–	I	Forbidden			
550	II	Glass	1.0 L	1 L	No
		Plastics	1.0 L		
		Metal	1.0 L		
551	III	Glass	2.5 L	2.5 L	No
		Plastics	2.5 L		
		Metal	2.5 L		

Packing Instructions 550 – 551

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group III

— Packagings must meet the Packing Group II performance requirements.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

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

Packing Instructions 553 – 555

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*	
553	I	Glass	1.0 L	2.5 L	No
		Plastics	1.0 L		
		Metal	1.0 L		
554	II	Glass	2.5 L	5 L	No
		Plastics	2.5 L		
		Metal	2.5 L		
555	III	Glass	5.0 L	30 L	30 L
		Plastics	5.0 L		
		Metal	5.0 L		

Packing Instructions 553 – 555

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

— UN 1873, parts of packagings which are in direct contact with perchloric acid must be constructed of glass or plastics.
— 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.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

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

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

— Packagings must meet the Packing Group II performance requirements.

SINGLE PACKAGINGS FOR PACKING GROUP III (PI 555)

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

Packing Instructions 557 – 559

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.

Packing Instructions 557 – 559

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing instruction	*Packing group*	*Inner packaging (see 6;3.2)*	*Inner packaging quantity (per receptacle)*	*Total quantity per package*	
557	I	Glass	1.0 kg	1 kg	No
		Plastics	1.0 kg		
		Metal	1.0 kg		
558	II	Glass	1.0 kg	5 kg	No
		Plastics	1.0 kg		
		Metal	1.0 kg		
		Paper bag	1.0 kg		
		Plastic bag	1.0 kg		
		Fibre	1.0 kg		
559	III	Glass	2.5 kg	25 kg	No
		Plastics	2.5 kg		
		Metal	2.5 kg		
		Paper bag	2.5 kg		
		Plastic bag	2.5 kg		
		Fibre	2.5 kg		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Groups I and II

— For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

Packing Group III

— Packagings must meet the Packing Group II performance requirements.
— For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS FOR PACKING GROUP I

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)

OUTER PACKAGINGS OF COMBINATION PACKAGINGS FOR PACKING GROUPS II AND III

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)

Packing Instructions 561 – 563

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*	
561	I	Glass	1.0 kg	15 kg	15 kg
		Plastics	1.0 kg		
		Metal	1.0 kg		
562	II	Glass	2.5 kg	25 kg	25 kg
		Plastics	2.5 kg		
		Metal	5.0 kg		
		Paper bag	2.5 kg		
		Plastic bag	2.5 kg		
		Fibre	2.5 kg		
563	III	Glass	5.0 kg	100 kg	100 kg
		Plastics	5.0 kg		
		Metal	5.0 kg		
		Paper bag	5.0 kg		
		Plastic bag	5.0 kg		
		Fibre	5.0 kg		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Groups I and II

— For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

Packing Group III

— Packagings must meet the Packing Group II performance requirements.
— For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

Packing Instructions 561 – 563

OUTER PACKAGINGS OF COMBINATION PACKAGINGS FOR PACKING GROUP I

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

OUTER PACKAGINGS OF COMBINATION PACKAGINGS FOR PACKING GROUPS II AND III ONLY

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

Fibre, fibreboard, wood and plywood single packagings must be fitted with a suitable liner.

Packing Group III

— Packagings must meet the Packing Group II performance requirements.

SINGLE PACKAGINGS FOR PACKING GROUP I

Drums

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

SINGLE PACKAGINGS FOR PACKING GROUPS II AND III

Boxes	*Composites*	*Cylinders*	*Drums*	*Jerricans*
Aluminium (4B)	All (see 6;3.1.18)	See 4;2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Fibreboard (4G)			Fibre (1G)	Plastics (3H1, 3H2)
Natural wood (4C2)			Other metal (1N1, 1N2)	Steel (3A1, 3A2)
Other metal (4N)			Plastics (1H1, 1H2)	
Plastics (4H2)			Plywood (1D)	
Plywood (4D)			Steel (1A1, 1A2)	
Reconstituted wood (4F)				
Steel (4A)				

Packing Instruction 565

Cargo aircraft for UN 3356 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.

2) **Closure requirements**

— Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS				SINGLE PACKAGINGS
UN number and proper shipping name	*Packing conditions*	*Total quantity per package – passenger*	*Total quantity per package – cargo*	
UN 3356 **Oxygen generator, chemical**	The generators must be tightly packed in the outer packagings listed below.	Forbidden	25 kg	Unpackaged No

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

a) The generator, without its packaging, must be capable of withstanding a 1.8 m drop test onto a rigid, non-resilient, flat and horizontal surface, in the position most likely to cause actuation, without loss of its contents and without actuation. For portable breathing equipment (PBE), which are in a vacuum-sealed bag as part of their containment system, this test may be conducted on the PBE in the vacuum-sealed bag.

b) When a generator is equipped with an actuating device, it must have at least two positive means of preventing unintentional actuation as follows:

1) mechanically actuated devices:

i) two pins, installed so that each is independently capable of preventing the actuator from striking the primer;
ii) one pin and one retaining ring, each installed so that each is independently capable of preventing the actuator from striking the primer; or
iii) a cover securely installed over the primer and a pin installed so as to prevent the actuator from striking the primer and cover.

2) electrically actuated devices: The electrical leads must be mechanically shorted and the mechanical short must be shielded in metal foil;

3) for PBE:

i) a pin so as to prevent the actuator from striking the primer; and
ii) placed in protective packaging such as a vacuum-sealed bag;

c) The generator(s) must be transported in a package which will meet the following requirements when one generator in the package is actuated:

1) other generators in the package will not be actuated;

2) packaging material will not ignite; and

3) the outside surface temperature of the completed package will not exceed 100°C.

Note.— To enable tests 1), 2) and 3) to be conducted on PBE, it is acceptable to break the vacuum-sealed bag to actuate the generator before placing it in the package.

d) Packagings must meet the Packing Group II performance requirements.

Packing Instruction 565

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

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

Packing Instruction 570

Passenger and cargo 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.

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) – passenger*	*Total quantity per package – passenger*	*Inner packaging quantity (per receptacle) – cargo*	*Total quantity per package – cargo*	
Liquids							
UN 3103	**Organic peroxide type C, liquid**	Plastics	0.5 L	5 L	1.0 L	10 L	No
UN 3105	**Organic peroxide type D, liquid**	Plastics	0.5 L	5 L	1.0 L	10 L	
UN 3107	**Organic peroxide type E, liquid**	Plastics	1.0 L	10 L	2.5 L	25 L	
UN 3109	**Organic peroxide type F, liquid**	Plastics	1.0 L	10 L	2.5 L	25 L	
Solids							
UN 3104	**Organic peroxide type C, solid**	Plastics and plastic bag	0.5 kg	5 kg	1.0 kg	10 kg	No
UN 3106	**Organic peroxide type D, solid**	Plastics and plastic bag	0.5 kg	5 kg	1.0 kg	10 kg	
UN 3108	**Organic peroxide type E, solid**	Plastics and plastic bag	1.0 kg	10 kg	2.5 kg	25 kg	
UN 3110	**Organic peroxide type F, solid**	Plastics and plastic bag	1.0 kg	10 kg	2.5 kg	25 kg	

Packing Instruction 570

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

— Packagings must meet the Packing Group II performance requirements.

Cargo aircraft only

Inner packagings of peroxyacetic acid, stabilized (classified as UN 3107 **Organic peroxide type E, liquid** or UN 3109 **Organic peroxide type F, liquid)** may be fitted with a vent consisting of hydrophobic membrane when the substance is used for purposes such as sterilization, provided:

a) each inner packaging contains not more than 70 mL;

b) the inner packaging is designed so that the vent is not immersed in liquid in any orientation;

c) each inner packaging is enclosed in an intermediate rigid plastic packaging with a small opening to permit release of gas and contains a buffer that neutralizes the contents of the inner packaging in the event of leakage;

d) intermediate packagings are packed in a fibreboard box (4G) outer packaging;

e) each outer packaging contains not more than 1.4 L of liquid; and

f) the rate of oxygen release from the outer packaging does not exceed 15 mL per hour.

Such packages must be transported on cargo aircraft only. The requirements of 4;1.1.6, 4;1.1.12 and 4;7.1.2 do not apply.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	*Drums*	*Jerricans*
Fibreboard (4G) Natural wood (4C1, 4C2) Plastics (4H1, 4H2) Plywood (4D) Reconstituted wood (4F)	Fibre (1G) Plastics (1H1, 1H2) Plywood (1D)	Plastics (3H1, 3H2)