



**NOTA DE ESTUDIO**

**GRUPO DE EXPERTOS SOBRE MERCANCÍAS PELIGROSAS (DGP)**

**VIGESIMOTERCERA REUNIÓN**

**Montreal, 11 - 21 de octubre de 2011**

**Cuestión 3 del orden del día:** **Formulación de recomendaciones sobre las enmiendas del *Suplemento de las Instrucciones Técnicas para el transporte sin riesgos de mercancías peligrosas por vía aérea (Doc 9284SU)* que haya que incorporar en la edición de 2013-2014**

**REVISIÓN DE LA INFORMACIÓN SOBRE MERCANCÍAS PELIGROSAS DE LA CLASE 2**

(Nota presentada por J. McLaughlin)

*Por falta de recursos, sólo se ha traducido el resumen*

**RESUMEN**

En esta nota se propone enmendar el Suplemento de las Instrucciones Técnicas en relación con las mercancías peligrosas de la Clase 2.

**Medidas recomendadas al DGP:** Se invita al DGP a considerar que se establezca un grupo de trabajo que se reúna en la DGP/23. El objetivo del grupo de trabajo sería presentar al DGP, para su adopción, una propuesta final acerca de las mercancías peligrosas de la Clase 2 que figuran en el Suplemento. Las revisiones que se lleven a cabo durante la DGP/23 permitirían incorporar las modificaciones en la próxima edición del Suplemento.

**1. INTRODUCTION**

1.1 The DGP Working Group of the Whole Meeting in Abu Dhabi (DGP-WG/10, 7 to 11 November 2010) began efforts to review and update Class 2 Dangerous Goods in the Supplement to the Technical Instructions during this biennium (DGP/23-WP/2, paragraph 3.3.3 refers). This work involved a systematic review of how similar materials and articles are applied in the Supplement. The time and input of those panel members who participated in the numerous emails and discussions on this issue has been greatly appreciated.

1.2 In order to complete this effort, it is proposed that a working group meeting take place during DGP/23. This working paper offers the following material intended to facilitate discussion:

**Appendix A — Class 2 Dangerous Goods List:** Sorted by division for discussion purposes only, the information within this table has been reviewed for consistency with the UN Model Regulations.

**Appendix B—General Packing Requirements:** Taken from the Technical Instructions, applicable to Class 2 Dangerous Goods

**Appendix C—Summary Sheet:** For Class 2 Dangerous Goods, an outline by divisions of quantities limits assigned. This can assist the working group in discussions and in arriving at final determinations. This information is not proposed for inclusion in the Supplement, however, the DGP may wish to consider information similar to the comprehensive summary offered in DGP/23-WP/73 as a basis for information presented in the guiding principles.

**Appendix D—Packing Instruction 213 (from the Supplement):** Packing Instruction 213 is proposed to be changed to Packing Instruction 210. Currently, Packing Instruction 213 in the Technical Instructions is a different packing instruction than Packing Instruction 213 in the Supplement.

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## APPENDIX A

## CLASS 2 DANGEROUS GOODS LIST

Name	UN No.	Class or division	Sub. risk	P G	Labels	State variations	Special provisions	Excepted Quantity	Passenger Aircraft		Cargo Aircraft	
									Forbidden	P Q	Forbidden	C Q
<b>Aerosols</b>	1950	2.1	6.1									
<b>Aerosols</b>	1950	2.1	8									
<b>Acetylene, dissolved</b>	1001	2.1					A1		F (200)	F (5 KG)	200	15 KG
<b>Butadienes and hydrocarbon mixture, stabilized</b>	1010	2.1					A1				200	150 KG
<b>Butadienes, stabilized</b>	1010	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Butane</b>	1011	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Butylene</b>	1012	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Cyclopropane</b>	1027	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Difluoroethane</b>	1030	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Refrigerant gas R 152a</b>	1030	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Dimethylamine, anhydrous</b>	1032	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Dimethyl ether</b>	1033	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Ethane</b>	1035	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Ethylamine</b>	1036	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Ethyl chloride</b>	1037	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Ethyl chloride</b>	1037	2.1					A1		or1		or	
<b>Ethyl chloride</b>	1037	2.1					A1		or2		214	0.3 KG
<b>Ethylene, refrigerated liquid</b>	1038	2.1										
<b>Ethyl methyl ether</b>	1039	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Ethylene oxide and carbon dioxide mixture</b>	1041	2.1					A1		F (200)	F (5 KG)	200	25 KG
<b>Hydrogen, compressed</b>	1049	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Isobutylene</b>	1055	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Methylacetylene and propadiene mixture, stabilized</b>	1060	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Methylamine, anhydrous</b>	1061	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Methyl chloride</b>	1063	2.1					A1		F (200)	F (5 KG)	200	100 KG





Name	UN No.	Class or division	Sub. risk	P G	Labels	State variations	Special provisions	Excepted Quantity	Passenger Aircraft		Cargo Aircraft	
									Forbidden	P Q	Forbidden	C Q
<b>Insecticide gas, flammable, n.o.s.*</b>	3354	2.1					A1		F (200)	F (5 KG)	200	150 KG
<b>Refrigerating machines</b>	3358	2.1					A103					
<b>Acetylene, solvent free</b>	3374	2.1					A1		F (200)	F (5 KG)	200	15 KG
<b>Hydrogen in a metal hydride storage system contained in equipment</b>	3468	2.1					A1, A143				214	100 KG G
<b>Hydrogen in a metal hydride storage system packed with equipment</b>	3468	2.1					A1, A143				214	100 KG G
<b>Hydrogen in a metal hydride storage system</b>	3468	2.1					A1, A143				214	100 KG G
<b>Air, refrigerated liquid</b>	1003	2.2	5.1				A1		F (202)	F (75 KG)	202	150 KG
<b>Oxygen, compressed</b>	1072	2.2	5.1				A202		200	75 KG	200	150 KG
<b>Oxygen, refrigerated liquid</b>	1073	2.2	5.1				A2		F (202)	F (75 KG)	F (202)	F (150 KG)
<b>Nitrous oxide, refrigerated liquid</b>	2201	2.2	5.1				A2		F (202)	F (75 KG)	F (202)	F (150 KG)
<b>Gas, refrigerated liquid, oxidizing, n.o.s.*</b>	3311	2.2	5.1				A2		F (202)	F (75 KG)	F (202)	F (150 KG)
<b>Aerosols</b>	1950	2.2	6.1									
<b>Aerosols</b>	1950	2.2	6.1				A1, A145, A153		F (212)	F (75 KG)	212	50 KG
<b>Aerosols</b>	1950	2.2	8									
<b>Tire assemblies inflated, unserviceable, damaged or above maximum rated pressure</b>	0	2.2					A59					
<b>Tyre assemblies inflated, unserviceable, damaged or above maximum rated pressure</b>	0	2.2					A59					

Name	UN No.	Class or division	Sub. risk	P G	Labels	State variations	Special provisions	Excepted Quantity	Passenger Aircraft		Cargo Aircraft	
									Forbidden	P Q	Forbidden	C Q
<b>Fertilizer ammoniating solution</b>	1043	2.2					A1		F (200)	F (75 KG)	200	150 KG
<b>Ammonia solution</b>	2073	2.2					A1		F (200)	F (75 KG)	200	150 KG
<b>Carbon monoxide, compressed</b>	1016	2.3	2.1				A2		See 213		See 213	
<b>Coal gas, compressed †</b>	1023	2.3	2.1				A2		See 213		See 213	
<b>Cyanogen</b>	1026	2.3	2.1				A2		See 213		See 213	
<b>Ethylene oxide</b>	1040	2.3	2.1				A2, A131		See 213		See 213	
<b>Ethylene oxide with nitrogen</b>	1040	2.3	2.1				A2					
<b>Hydrogen sulphide</b>	1053	2.3	2.1				A2		See 213		See 213	
<b>Methyl mercaptan</b>	1064	2.3	2.1				A2		See 213		See 213	
<b>Oil gas, compressed</b>	1071	2.3	2.1				A1		See 213		200	25 KG
<b>Trifluorochloroethylene, stabilized</b>	1082	2.3	2.1				A2		See 213		See 213	
<b>Diborane</b>	1911	2.3	2.1				A2		See 213		See 213	
<b>Aerosols</b>	1950	2.3	2.1									
<b>Compressed gas, toxic, flammable, n.o.s.*</b>	1953	2.3	2.1				A2		See 213		See 213	
<b>Gas cartridges</b>	2037	2.3	2.1				A2		See 213		See 213	
<b>Receptacles, small, containing gas</b>	2037	2.3	2.1				A2		See 213		See 213	
<b>Arsine</b>	2188	2.3	2.1				A2		See 213		See 213	
<b>Germane</b>	2192	2.3	2.1				A2		See 213		See 213	
<b>Phosphine</b>	2199	2.3	2.1				A2		See 213		See 213	
<b>Hydrogen selenide, anhydrous</b>	2202	2.3	2.1				A2		See 213		See 213	
<b>Carbonyl sulphide</b>	2204	2.3	2.1				A2		See 213		See 213	
<b>Stibine</b>	2676	2.3	2.1				A2		See 213		See 213	
<b>Liquefied gas, toxic, flammable, n.o.s.*</b>	3160	2.3	2.1				A2		See 213		See 213	
<b>Gas sample, non-pressurized, toxic, flammable, n.o.s.</b>	3168	2.3	2.1				A1		F (206)	F (1 L)	206	1 L

Name	UN No.	Class or division	Sub. risk	P G	Labels	State variations	Special provisions	Excepted Quantity	Passenger Aircraft		Cargo Aircraft	
									Forbidden	P Q	Forbidden	C Q
Ethylene oxide and carbon dioxide mixture	3300	2.3	2.1				A2		See 213		See 213	
Insecticide gas, toxic, flammable, n.o.s.*	3355	2.3	2.1				A2		See 213		See 213	
Gas cartridges	2037	2.3	5.1				A2		See 213		See 213	
Receptacles, small, containing gas	2037	2.3	5.1				A2		See 213		See 213	
Perchloryl fluoride	3083	2.3	5.1				A2		See 213		See 213	
Compressed gas, toxic, oxidizing, n.o.s.*	3303	2.3	5.1				A2		See 213		See 213	
Liquefied gas, toxic, oxidizing, n.o.s.*	3307	2.3	5.1				A2		See 213		See 213	
Ammonia, anhydrous	1005	2.3	8				A2		See 213		See 213	
Boron trifluoride	1008	2.3	8				A2		See 213		See 213	
Hydrogen bromide, anhydrous	1048	2.3	8				A2		See 213		See 213	
Hydrogen chloride, anhydrous	1050	2.3	8				A2		See 213		See 213	
Nitrosyl chloride	1069	2.3	8				A2		See 213		See 213	
Phosgene	1076	2.3	8				A2		See 213		See 213	
Sulphur dioxide	1079	2.3	8				A2		See 213		See 213	
Cyanogen chloride, stabilized	1589	2.3	8				A2		See 213		See 213	
Boron trichloride	1741	2.3	8				A2		See 213		See 213	
Silicon tetrafluoride	1859	2.3	8				A2		See 213		See 213	
Gas cartridges	2037	2.3	8				A2		See 213		See 213	
Receptacles, small, containing gas	2037	2.3	8				A2		See 213		See 213	
Hydrogen chloride, refrigerated liquid	2186	2.3	8									
Selenium hexafluoride	2194	2.3	8				A2		See 213		See 213	
Tellurium hexafluoride	2195	2.3	8				A2		See 213		See 213	



Name	UN No.	Class or division	Sub. risk	P G	Labels	State variations	Special provisions	Excepted Quantity	Passenger Aircraft		Cargo Aircraft	
									Forbidden	P Q	Forbidden	C Q
<b>Tungsten hexafluoride</b>	2196	2.3	8				A2		See 213		See 213	
<b>Hydrogen iodide, anhydrous</b>	2197	2.3	8				A2		See 213		See 213	
<b>Phosphorus pentafluoride</b>	2198	2.3	8				A2		See 213		See 213	
<b>Carbonyl fluoride</b>	2417	2.3	8				A2		See 213		See 213	
<b>Sulphur tetrafluoride</b>	2418	2.3	8				A2					
<b>Hexafluoroacetone</b>	2420	2.3	8				A2		See 213		See 213	
<b>Trifluoroacetyl chloride</b>	3057	2.3	8				A2		See 213		See 213	
<b>Compressed gas, toxic, corrosive, n.o.s.*</b>	3304	2.3	8				A2		See 213		See 213	
<b>Liquefied gas, toxic, corrosive, n.o.s.*</b>	3308	2.3	8				A2		See 213		See 213	
<b>Ammonia solution</b>	3318	2.3	8				A2		See 213		See 213	
<b>Gas cartridges</b>	2037	2.3	2.1, 8				A2		See 213		See 213	
<b>Receptacles, small, containing gas</b>	2037	2.3	2.1, 8				A2		See 213		See 213	
<b>Dichlorosilane</b>	2189	2.3	2.1, 8				A2		See 213		See 213	
<b>Methylchlorosilane</b>	2534	2.3	2.1, 8				A2		See 213		See 213	
<b>Compressed gas, toxic, flammable, corrosive, n.o.s.*</b>	3305	2.3	2.1, 8				A2		See 213		See 213	
<b>Liquefied gas, toxic, flammable, corrosive, n.o.s.*</b>	3309	2.3	2.1, 8				A2		See 213		See 213	
<b>Chlorine</b>	1017	2.3	5.1, 8				A2		See 213		See 213	
<b>Fluorine, compressed</b>	1045	2.3	5.1, 8				A2		See 213		See 213	
<b>Dinitrogen tetroxide</b>	1067	2.3	5.1, 8				A2		See 213		See 213	
<b>Nitrogen dioxide</b>	1067	2.3	5.1, 8				A2		See 213		See 213	
<b>Nitric oxide, compressed</b>	1660	2.3	5.1, 8				A2		See 213		See 213	
<b>Chlorine trifluoride</b>	1749	2.3	5.1, 8				A2		See 213		See 213	
<b>Nitric oxide and dinitrogen tetroxide mixture</b>	1975	2.3	5.1, 8				A2		See 213		See 213	

Name	UN No.	Class or division	Sub. risk	P G	Labels	State variations	Special provisions	Excepted Quantity	Passenger Aircraft		Cargo Aircraft	
									Forbidden	P Q	Forbidden	C Q
Nitric oxide and nitrogen dioxide mixture	1975	2.3	5.1, 8				A2		See 213		See 213	
Gas cartridges	2037	2.3	5.1, 8				A2		See 213		See 213	
Receptacles, small, containing gas	2037	2.3	5.1, 8				A2		See 213		See 213	
Oxygen difluoride, compressed	2190	2.3	5.1, 8				A2		See 213		See 213	
Nitrogen trioxide	2421	2.3	5.1, 8				A2		See 213		See 213	
Chlorine pentafluoride	2548	2.3	5.1, 8				A2		See 213		See 213	
Bromine chloride	2901	2.3	5.1, 8				A2		See 213		See 213	
Compressed gas, toxic, oxidizing, corrosive, n.o.s.*	3306	2.3	5.1, 8				A2		See 213		See 213	
Liquefied gas, toxic, oxidizing, corrosive, n.o.s.*	3310	2.3	5.1, 8				A2		See 213		See 213	
Methyl bromide	1062	2.3					A2		See 213		F (207)	F (25 KG)
Chloropicrin and methyl bromide mixture	1581	2.3					A2		See 213		See 213	
Chloropicrin and methyl chloride mixture	1582	2.3					A2		See 213		See 213	
Hexaethyl tetraphosphate and compressed gas mixture	1612	2.3					A2		See 213		See 213	
Aerosols	1950	2.3										
Compressed gas, toxic, n.o.s.*	1955	2.3					A2		See 213		See 213	
Insecticide gas, toxic, n.o.s.*	1967	2.3					A2		See 213		See 213	
Gas cartridges	2037	2.3					A2		See 213		See 213	
Receptacles, small, containing gas	2037	2.3					A2		See 213		See 213	
Sulphuryl fluoride	2191	2.3					A2		See 213		See 213	
Sulphuryl fluoride	2191	2.3					A2		See 213		See 213	
Liquefied gas, toxic, n.o.s.*	3162	2.3					A2		See 213		See 213	

Name	UN No.	Class or division	Sub. risk	P G	Labels	State variations	Special provisions	Excepted Quantity	Passenger Aircraft		Cargo Aircraft	
									Forbidden	P Q	Forbidden	C Q
<b>Gas sample, non-pressurized, toxic, n.o.s.</b>	3169	2.3					A1		F (206)	F (1 L)	206	1 L

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**APPENDIX B**  
**GENERAL PACKING REQUIREMENTS**

**Chapter 4**

**CLASS 2 — GASES**

**4.1 SPECIAL PACKING PROVISIONS  
FOR DANGEROUS GOODS OF CLASS 2**

**4.1.1 General requirements**

4.1.1.1 This section provides general requirements applicable to the use of cylinders and closed cryogenic receptacles for the transport of Class 2 gases (e.g. UN 1072 **Oxygen, compressed**). Cylinders and closed cryogenic receptacles must be constructed and closed so as to prevent any loss of contents which might be caused under normal conditions of transport, including by vibration, or by changes in temperature, humidity or pressure (resulting from change in altitude, for example).

4.1.1.2 Parts of cylinders and closed cryogenic receptacles that are in direct contact with dangerous goods must not be affected or weakened by those dangerous goods and must not cause a dangerous effect (e.g. catalysing a reaction or reacting with the dangerous goods). In addition to the requirements specified in the relevant packing instruction, which take precedence, the applicable provisions of ISO 11114-1:1997 and ISO 11114-2:2000 must be met.

4.1.1.3 Cylinders and closed cryogenic receptacles, including their closures, must be selected that are able to contain a gas or a mixture of gases according to the requirements of 6.5.1.2 and the requirements of the specific packing instructions of this Part.

4.1.1.4 Refillable cylinders must not be filled with a gas or gas mixture different from that previously contained unless the necessary operations for change of gas service have been performed. The change of service for compressed and liquefied gases must be in accordance with ISO 11621:1997, as applicable. In addition, a cylinder that previously contained a Class 8 corrosive substance or a substance of another class with a corrosive subsidiary risk must not be authorized for the transport of a Class 2 substance unless the necessary inspection and testing as specified in 6.5.1.6 have been performed.

4.1.1.5 Prior to filling, the filler must perform an inspection of the cylinder or closed cryogenic receptacle and ensure that the cylinder or closed cryogenic receptacle is authorized for the gas to be transported and that the provisions of these Instructions have been met. Shut-off valves must be closed after filling and remain closed during transport. The shipper must verify that the closures and equipment are not leaking.

4.1.1.6 Cylinders and closed cryogenic receptacles must be filled according to the working pressures, filling ratios and provisions specified in the appropriate packing instruction for the specific substance. Reactive gases and gas mixtures must be filled to a pressure such that if complete decomposition of the gas occurs, the working pressure of the cylinder must not be exceeded.

4.1.1.7 Cylinders and closed cryogenic receptacles, including their closures, must conform to the design, construction, inspection and testing requirements detailed in 6.5. When outer packagings are prescribed, the cylinders must be firmly secured therein. Unless otherwise specified in the detailed packing instructions, one or more inner packagings may be enclosed in an outer packaging.

4.1.1.8 Valves must be designed and constructed in such a way that they are inherently able to withstand damage without release of the contents or must be protected from damage, which could cause inadvertent release of the contents of the cylinder and closed cryogenic receptacle, by one of the following methods:

- a) Valves are placed inside the neck of the cylinder and closed cryogenic receptacle and protected by a threaded plug or cap;
- b) Valves are protected by caps. Caps must possess vent holes of a sufficient cross-sectional area to evacuate the gas if leakage occurs at the valves;
- c) Valves are protected by shrouds or guards;
- d) Not used; or

- e) Cylinders and closed cryogenic receptacles are transported in an outer packaging. The packaging as prepared for transport must be capable of meeting the drop test specified in 6;4.3 at the Packing Group I performance level.

For cylinders and closed cryogenic receptacles with valves as described in b) and c), the requirements of ISO 11117:1998 must be met; for valves with inherent protection, the requirements of Annex A of ISO 10297:2006 must be met. For metal hydride storage systems, the valve protection requirements specified in ISO 16111:2008 must be met.

4.1.1.9 Non-refillable cylinders and closed cryogenic receptacles must:

- a) be transported in an outer packaging, such as a box, or crate, or in shrink-wrapped trays or stretch-wrapped trays;
- b) not used;
- c) not be repaired after being put into service.

4.1.1.10 Refillable cylinders, other than closed cryogenic receptacles, must be periodically inspected according to the provisions of 6;5.1.6 and Packing Instruction 200 or 214. Cylinders and closed cryogenic receptacles must not be filled after they become due for periodic inspection but may be transported after the expiry of the time limit.

4.1.1.11 Repairs must be consistent with the fabrication and testing requirements of the applicable design and construction standards and are only permitted as indicated in the relevant periodic inspection standards specified in 6;5.2.4. Cylinders, other than the jacket of closed cryogenic receptacles, must not be subjected to repairs of any of the following:

- a) weld cracks or other weld defects;
- b) cracks in walls;
- c) leaks or defects in the material of the wall, head or bottom.

4.1.1.12 Cylinders and closed cryogenic receptacles must not be offered for filling:

- a) when damaged to such an extent that the integrity of the cylinder and closed cryogenic receptacle or its service equipment may be affected;
- b) unless the cylinder and closed cryogenic receptacle and its service equipment have been examined and found to be in good working order; or
- c) unless the required certification, retest, and filling markings are legible.

4.1.1.13 Filled cylinders and closed cryogenic receptacles must not be offered for transport:

- a) when leaking;
- b) when damaged to such an extent that the integrity of the cylinder and closed cryogenic receptacle or its service equipment may be affected;
- c) unless the cylinder and closed cryogenic receptacle and its service equipment have been examined and found to be in good working order; or
- d) unless the required certification, retest, and filling markings are legible.

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**APPENDIX C**  
**SUMMARY SHEET**

<b>Gases Class 2</b>			
2.1	6.1		forbidden UN1950 Aerosol
	8		forbidden UN1950 Aerosol
	none		PAX (5 KG) CAO 150 KG except Ethyl Chloride
	none		UN1063 Methyl Chloride (5 KG) PAX CAO 100KG
	none		UN1950 Aerosols (75 KG) PAX CAO 150 KG
	none		UN2203 Silane (5 KG) PAX CAO (150 KG)
	none		UN3312, UN3138, UN1038, 3312 Gas refrigerated and 3358 Refrigerating machines
	none		UN3468 Hydrogen in metal hydride Forbidden PAX CAO 100 KG G
2.2	5.1		UN1003 Air, refrigerated (75 KG) PAX CAO (150) KG
	5.1		Oxygen UN1072 75 KG PAX CAO 150 KG
	5.1		UN1073 Oxygen refrigerated liquid (75 KG) PAX CAO (150 KG) and UN3311 gas refrigerated oxidizing
	6.1		UN1950 Aerosols Forbidden
	8		UN1950 Aerosol forbidden
	none		(75 KG) PAX 150KG CAO
2.3	2.1		see 213 to be 210
	2.1		UN1071 Oil gas compressed PAX see 213 CAO 25 KG
	5.1		see 213 to be 210
	5.1 and 8		see 213 to be 210
	2.1 and 8		see 213 to be 210
	8		see 213 to be 210
	none		see 213 to be 210
	none		UN3169 Gas sample, nonpressurized and toxic (1 L) PAX 1 L CAO

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APPENDIX D

PROPOSED AMENDMENT TO THE SUPPLEMENT  
TO THE TECHNICAL INSTRUCTIONS

Chapter 4

CLASS 2 — GASES

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<u>240213</u>	PACKING INSTRUCTION <u>240213</u>	<u>240213</u>
<p>The general packing requirements of Part 4, Chapter 1 of the Technical Instructions must be met.</p> <p>Small quantities of gases in Division 2.3, including mixtures of gases, may be carried in an aircraft under the following conditions:</p> <ol style="list-style-type: none"> <li>The maximum quantity of gas permitted per package must be determined using the following formula:           <math display="block">\text{Permitted mass} \leq 10^{-3} (\text{RMM}) (\text{LC}_{50})</math> <p>where:</p> <p>RMM = relative molecular mass  <math>\text{LC}_{50}</math> expressed in mL/m<sup>3</sup> as defined in Part 2, Chapter 6 of the Technical Instructions            Permitted mass expressed in grams.</p> <p>For mixtures of toxic gases, where the <math>\text{LC}_{50}</math> of the mixture or its mass per unit volume at NTP are unknown, the following formula shall be used to determine the permitted mass of the mixture:</p> <math display="block">\frac{\text{mass of component 1}}{10^{-3} (\text{RMM})_1 (\text{LC}_{50})_1} + \frac{\text{mass of component 2}}{10^{-3} (\text{RMM})_2 (\text{LC}_{50})_2} + \frac{\text{mass of component } n}{10^{-3} (\text{RMM})_n (\text{LC}_{50})_n} \leq 1</math> <p>where:</p> <p>NTP is normal temperature and pressure            (RMM) = relative molecular mass of component 1 ... n</p> <p>This latter formula makes no allowance for any synergistic effect of the mixture and it should not be used where the toxic effects are other than additive.</p> </li> <li>The gas must be contained in a gas cylinder which meets the requirements of Packing Instruction 200 or an IP.8 glass ampoule, provided it is compatible with the gas.           <p>The maximum quantity of gas permitted in a glass ampoule is determined by the above formula but is further limited to not more than 100 g.</p> </li> <li>The glass ampoule or gas cylinder must be tightly packed as to prevent movement in an outer metal pressure vessel containing inert absorbent and cushioning material. The outer metal pressure vessels must be designed to contain the total quantity of gas in case of leakage of the ampoule or cylinder. The outer metal pressure vessel must meet the requirements of Packing Instruction 200. Special care must be taken to prevent corrosion of the inner wall of the outer metal pressure vessels.</li> <li>The outer metal pressure vessel must be tightly packed, so as to prevent movement, in a strong outside packaging.</li> </ol>		