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AMENDMENT 1
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**Gas cylinders — Compatibility of
cylinder and valve materials with gas
contents —**

Part 1:
Metallic materials

AMENDMENT 1

*Bouteilles à gaz — Compatibilité des matériaux des bouteilles et des
robinets avec les contenus gazeux —*

Partie 1: Matériaux métalliques

AMENDEMENT 1



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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Amendment 1 to ISO 11114-1:2012 was prepared by Technical Committee ISO/TC 58, *Gas cylinders*.

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Gas cylinders — Compatibility of cylinder and valve materials with gas contents —

Part 1: Metallic materials

AMENDMENT 1

Page 3, 4.3.2 Particular considerations

Replace the note with the following:

NOTE Reference is made in this document to stainless steels by their commonly used AISI identification numbers, i.e. 304. For example, the equivalent grades according to EN 10088-1 are as follows:

304	1.4301
304L	1.4306 and 1.4307
316	1.4401
316L	1.4404
316Ti	1.4571
321	1.4541
904L	1.4539

Page 5, 6.2 Compatibility for gas mixtures

Replace the NOTE with the following:

NOTE In a gas mixture, the partial pressure for hydrogen sulphide and methyl mercaptan is reduced to 0,25 MPa (2,5 bar) at a maximum UTS of 950 MPa.

For the halogenated gases non compatible with aluminium alloys cylinder, the maximum acceptable concentration in a gas mixtures shall be limited to 0,1 % as indicated in Table 1 unless higher concentrations have been validated after conducting specific tests (example of such tests are given in EIGA document 161/16 Gas compatibility with Aluminium alloy cylinder). The moisture content in these mixtures shall be limited to a maximum of 10 ppmV.

Page 6, 6.3.2 Abbreviations of materials

Replace the whole lines corresponding to gases number 7, 8, 9, 13, 18, 20, 22, 46, 49, 60, 63, 69, 74, 83, 90, 91, 96, 100, 101, 102, 103 with the following:

No.	Gas number UN number	Name	Formula	Key compatibility characteristics	Material					
					Cylinder			Valve (body and components)		
					A	N	A	N	A	N
7	(UN 1974)	BROMOCHLORODIFLUORO-METHANE	CBrClF ₂ (R12B1)	No reaction with any common materials when dry but in the presence of water, corrosion can occur.	NS			B		
8	(UN 1009)	BROMOTRIFLUOROMETHANE	CBrF ₃ (R13B1)	No reaction with any common materials when dry but in the presence of water, corrosion can occur.	NS			B		
9	(UN 2419)	BROMOTRIFLUOROETHYLENE	C ₂ BrF ₃	No reaction with any common materials when dry but in the presence of water, corrosion can occur.	NS			B		
13	(UN 1012)	BUTENE-1	CH ₃ CH ₂ CH:CH ₂	No reaction with any common materials. See 5.2.3 for the effect of impurities in wet conditions.	NS			B		
18	(UN 1982)	TETRAFLUOROMETHANE (CARBON TETRAFLUORIDE)	CF ₄ (R14)	No reaction with any common materials when dry but in the presence of water, corrosion may occur.	NS			B		
20	(UN 1017)	CHLORINE	Cl ₂	Hydrolyses to hypochlorous acid and to hydrogen chloride in contact with moisture. In wet conditions, see specific risk of hydrogen chloride compatibility, i.e. severe corrosion of most of the materials and risk of hydrogen embrittlement. The service life of brass valves strongly depends on the operating service conditions. Mixtures containing less than 0,1 % of this gas may be filled into AA cylinders.	NS	AA		B	AA	AA

^a Brass is only acceptable as valve body but not as general valve component material.

No.	Gas number UN number	Name	Formula	Key compatibility characteristics	Material			
					Cylinder		Valve (body and components)	
					A	N	A	N
22	(UN 1063)	METHYL CHLORIDE	CH ₃ Cl (R40)	In the presence of water, corrosion can occur. Mixtures of dry gas containing not more than 0,1 % of this gas may be filled into AA cylinders. ^a	NS QTS SS Ni	AA	B CS SS Ni	AA
46	(UN 1037)	ETHYL CHLORIDE	C ₂ H ₅ Cl (R160)	No reaction with any common materials when dry but in the presence of water, corrosion can occur. Mixtures of dry gas not exceeding 0,1 % of this gas may be filled into AA cylinders.	QTS NS SS Ni	AA	B SS CS Ni	AA
49	(UN 1045)	FLUORINE	F ₂	Hydrolyses to hydrogen fluoride in contact with moisture. In wet conditions, see specific risk of hydrogen fluoride compatibility, i.e. severe corrosion of most of the materials and risk of hydrogen embrittlement. Risk of violent reaction with AA. Recommended materials are also Ni alloy and nickel. Mixtures containing less than 0,1 % of this gas may be filled into AA cylinders.	QTS NS SS Ni	AA	CS SS Ni	AA B
60	(UN 1051)	HYDROGEN CYANIDE	HCN	This compound is highly hydroscopic. Risk of corrosion in wet conditions, depending on type of alloy.	NS QTS AA SS		B CS SS AA	

^a Brass is only acceptable as valve body but not as general valve component material.

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No.	Gas number UN number	Name	Formula	Key compatibility characteristics	Material		
					Cylinder		Valve (body and components)
					A	N	A
63	(UN 1053)	HYDROGEN SULPHIDE	H ₂ S	<ul style="list-style-type: none"> — In the presence of water, pitting corrosion can occur. Pitting corrosion can be minimized by using SS alloys such as 316. — In wet conditions, risk of stress corrosion cracking for QTS. Risk of hydrogen embrittlement with NS, QTS. — SS shall not be used for springs or diaphragms except if the failure of such components does not result in an unsafe situation because of possibility of hydrogen embrittlement. — For mixtures with higher partial pressure than the one defined in 6.2 and stored at a total pressure greater than 50 % of the normal service pressure of the cylinder, NS, and QTS at a limited strength shall be used (see 6.2). — Nickel is not acceptable for bursting disks and components. 	NS QTS AA SS	CS SS AA	B
69	(UN 1062)	METHYL BROMIDE	CH ₃ Br (R40B1)	<ul style="list-style-type: none"> In the presence of water, pitting corrosion can occur. Pitting corrosion can be minimized by using SS alloys such as 316. Mixtures of dry gas not exceeding 0,1 % of this gas may be filled into AA cylinders. 	NS QTS SS Ni	B CS SS Ni	AA AA
74	(UN 1660)	NITRIC OXIDE	NO	<ul style="list-style-type: none"> In the presence of water, pitting corrosion can occur. Pitting corrosion can be minimized by using SS alloys such as 316. Risk of stress corrosion cracking with brass (and other copper alloys) valves due to atmospheric moisture. This applies to all mixtures containing even traces of NO. 	NS QTS SS AA	CS SS	B AA

^a Brass is only acceptable as valve body but not as general valve component material.

No.	Gas number UN number	Name	Formula	Key compatibility characteristics	Material					
					Cylinder			Valve (body and components)		
					A	N	A	A	N	N
83	(UN 1076)	PHOSGENE	COCl ₂	In wet conditions, phosgene is corrosive with most materials, particularly aluminium alloys (hydrolyses to HCl). Mixtures of dry gas containing not more than 0,1 % of this gas may be filled into AA cylinders.	NS QTS SS Ni	AA	B CS SS Ni	AA	AA	AA
90	(UN 1818)	SILICON TETRACHLORIDE	SiCl ₄	Hydrolyses to hydrogen chloride in contact with moisture. In wet conditions, see specific risk of hydrogen chloride compatibility, i.e. severe corrosion of most materials. Mixtures of dry gas not exceeding 0,1 % of this gas may be filled into AA cylinders.	NS QTS SS Ni	AA	B SS Ni	CS	AA	AA
91	(UN 1859)	SILICON TETRAFLUORIDE	SiF ₄	Hydrolyses to hydrogen fluoride in contact with moisture. In wet conditions, see specific risk of hydrogen fluoride compatibility, i.e. severe corrosion of most materials. Mixtures of dry gas not exceeding 0,1 % of this gas may be filled into AA cylinders.	NS QTS SS Ni	AA	B SS Ni	CS	AA	AA

^a Brass is only acceptable as valve body but not as general valve component material.

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