

Third edition
2020-05

AMENDMENT 1
2023-07

**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



Reference number
ISO 11114-1:2020/Amd.1:2023(E)

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Published in Switzerland

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This document was prepared by Technical Committee ISO/TC 58, *Gas cylinders*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 23, *Transportable gas cylinders*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

Part 1: Metallic materials

AMENDMENT 1

6.3.2, Table 1

Replace the rows corresponding to Gas numbers 5, 6, 49, 58, 59, 61, 62, 63 with the following:

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Table 1 — Gas/material compatibility

No.	Gas number UN number	Name	Formula	Key compatibility characteristics	Material		
					Cylinder	Valve (body and components)	
5	(UN 1741)	BORON TRICHLORIDE	BCl ₃	Hydrolyses 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. Mixtures of dry gas not exceeding 0,1 % of this gas may be filled into AA cylinders.	A	A	N
					NS QTS SS Ni	CS SS Ni ASB	AA AA B
6	(UN 1008)	BORON TRIFLUORIDE	BF ₃	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. Mixtures containing less than 0,1 % BF ₃ may be filled into AA cylinders.	NS QTS SS Ni	CS SS Ni ASB	AA AA B
					QTS NS SS Ni	CS SS Ni ASB	AA AA B ^a
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 refined nickel. Mixtures containing less than 0,1 % of this gas may be filled into AA cylinders.	QTS NS SS Ni	CS SS Ni ASB	AA AA B ^a
					QTS NS SS Ni	CS SS Ni ASB	AA AA B ^a

NOTE Incoloy® and Hastelloy® are examples of suitable products available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of these products.

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

^b For mixtures containing up to 1 000 ppm of dry NO, brass valves can be used.

Table 1 (continued)

No.	Gas number UN number	Name	Formula	Key compatibility characteristics	Material		
					Cylinder	Valve (body and components)	
58	(UN 1048)	HYDROGEN BROMIDE	HBr	<p>This compound is highly hygroscopic and corrosive in wet conditions with most of the materials except some high corrosion resistant nickel alloys (e.g. Hastelloy®). QTS are limited to a maximum ultimate tensile strength of 950 MPa. This limitation also applies to mixtures containing the gas stored at a total pressure at 15 °C greater than half the normal service pressure of the cylinder.</p> <p>However, experience shows that a cylinder can be safely used without any specific strength limitation requirements, providing the maximum working pressure at 15 °C in the cylinder is less than one-fifth of the test pressure (TP/5), in order to maintain a low stress level in the cylinder material.</p> <p>SS shall not be used for valve diaphragms or springs except if the failure of such components does not result in an unsafe situation.</p> <p>Mixtures of dry gas not exceeding 0,1 % of this gas may be filled into A cylinders.</p>	<p>A</p> <p>NS</p> <p>QTS</p> <p>SS</p> <p>Ni</p>	<p>A</p> <p>CS</p> <p>SS</p> <p>Ni</p> <p>ASB</p>	<p>N</p> <p>AA</p> <p>B</p> <p>AA</p>
<p>NOTE Incoloy® and Hastelloy® are examples of suitable products available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of these products.</p> <p>^a Brass is only acceptable as a valve body but not as a general valve component material.</p> <p>^b For mixtures containing up to 1 000 ppm of dry NO, brass valves can be used.</p>							

Table 1 (continued)

No.	Gas number UN number	Name	Formula	Key compatibility characteristics	Material		
					Cylinder	Valve (body and components)	
					A	N	N
59	(UN 1050)	HYDROGEN CHLORIDE	HCl	<p>This compound is highly hygroscopic and corrosive in wet conditions with most of the materials except some high corrosion resistant nickel alloys (e.g. Hastelloy®). QTS are limited to a maximum ultimate tensile strength of 950 MPa. This limitation also applies to mixtures containing this gas and stored at a total pressure at 15 °C greater than half the normal service pressure of the cylinder.</p> <p>However, experience shows that a cylinder can be safely used without any specific strength limitation requirements, providing the maximum working pressure at 15 °C in the cylinder is less than one-fifth of the test pressure (TP/5), in order to maintain a low stress level in the cylinder material.</p> <p>SS shall not be used for valve diaphragm and springs except if the failure of such components does not result in an unsafe situation.</p> <p>Mixtures of dry gas not exceeding 0,1 % of this gas may be filled into AA cylinders.</p>	NS QTS SS Ni	AA	CS SS Ni ASB AA B

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^b For mixtures containing up to 1 000 ppm of dry NO, brass valves can be used.

Table 1 (continued)

No.	Gas number UN number	Name	Formula	Key compatibility characteristics	Material	
					Cylinder	Valve (body and components)
61	(UN 1052)	HYDROGEN FLUORIDE	HF	<p>This compound is highly hygroscopic and corrosive in wet conditions with most of the materials except some high corrosion resistant nickel alloys (e.g. Hastelloy®). QTS are limited to a maximum ultimate tensile strength of 950 MPa. This limitation also applies to mixtures containing the gas stored at a total pressure at 15 °C greater than half the normal service pressure of the cylinder.</p> <p>However, experience shows that a cylinder can be safely used without any specific strength limitation requirements, providing the maximum pressure at 15 °C in the cylinder is less than one-fifth of the test pressure (TP/5), in order to maintain a low stress level in the cylinder material.</p> <p>SS shall not be used for valve diaphragms or springs except if the failure of such components does not result in an unsafe situation.</p> <p>Mixtures of dry gas not exceeding 0,1 % of this gas may be filled into AA cylinders.</p>	A	N
					NS	AA
					QTS	
					SS	
					Ni	CS SS Ni ASB

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