

---

---

**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*

<https://standards.iteh.ai/c/AMENDEMENT 1/sist/e13c4775-6d00-4214-9c61-3afd9215a916/iso-11114-1-2020-amd-1-2023>



iTeh STANDARD PREVIEW  
(standards.iteh.ai)

[ISO 11114-1:2020/Amd 1:2023](https://standards.iteh.ai/catalog/standards/sist/e13c4775-6d00-4214-9c61-3afd9215a916/iso-11114-1-2020-amd-1-2023)

<https://standards.iteh.ai/catalog/standards/sist/e13c4775-6d00-4214-9c61-3afd9215a916/iso-11114-1-2020-amd-1-2023>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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).

A list of all parts in the ISO 11114 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).



# 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:

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

<https://standards.iteh.ai/catalog/standards/sist/e13c4775-6d00-4214-9c61-3afd9215a916/iso-11114-1-2020-amd-1-2023>

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 <sub>3</sub>	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 <sub>3</sub>	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 <sub>3</sub> 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 <sup>a</sup>
49	(UN 1045)	FLUORINE	F <sub>2</sub>	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 <sup>a</sup>

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.

<sup>a</sup> Brass is only acceptable as a valve body but not as a general valve component material.

<sup>b</sup> 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)		
				A	N	A	N	
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 AA cylinders.</p>	NS QTS SS Ni	AA	CS SS Ni ASB	B AA
<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><sup>a</sup> Brass is only acceptable as a valve body but not as a general valve component material.</p> <p><sup>b</sup> 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

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.

<sup>a</sup> Brass is only acceptable as a valve body but not as a general valve component material.

<sup>b</sup> 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)		
					A	N	N	
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>	NS QTS SS Ni	AA	CS SS Ni ASB	AA
<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><sup>a</sup> Brass is only acceptable as a valve body but not as a general valve component material.</p> <p><sup>b</sup> 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	
62	(UN 2197)	HYDROGEN IODIDE	HI	<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 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

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.

<sup>a</sup> Brass is only acceptable as a valve body but not as a general valve component material.

<sup>b</sup> For mixtures containing up to 1 000 ppm of dry NO, brass valves can be used.