



**ISO 9809-4**

**Gas cylinders — Design,  
construction and testing of  
refillable seamless steel gas  
cylinders and tubes —**

Part 4:  
**Stainless steel cylinders with an  $R_m$   
value of less than 1 100 MPa**

*Bouteilles à gaz — Conception, construction et essais des  
bouteilles à gaz et des tubes rechargeables en acier sans  
soudure —*

*Partie 4: Bouteilles en acier inoxydable ayant une valeur de  $R_m$   
inférieure à 1 100 MPa*

**Third edition  
2026-02**



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2026

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

<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Symbols</b> .....	<b>3</b>
<b>5 Inspection and testing</b> .....	<b>4</b>
<b>6 Materials</b> .....	<b>4</b>
6.1 General requirements.....	4
6.2 Controls on chemical composition.....	5
6.3 Heat treatment.....	5
6.4 Cold working or cryoforming.....	5
6.5 Failure to meet test requirements.....	6
<b>7 Design</b> .....	<b>6</b>
7.1 General requirements.....	6
7.2 Design of cylindrical shell thickness.....	6
7.3 Design of convex ends (heads and bases).....	7
7.4 Design of the concave base ends.....	9
7.5 Neck design.....	10
7.6 Foot rings.....	10
7.7 Neck rings.....	10
7.8 Design drawing.....	11
<b>8 Construction and workmanship</b> .....	<b>11</b>
8.1 General.....	11
8.2 Wall thickness.....	11
8.3 Surface imperfections.....	11
8.4 Ultrasonic examination.....	11
8.5 Out-of-roundness.....	12
8.6 Mean diameter.....	12
8.7 Straightness.....	12
8.8 Verticality and stability.....	12
8.9 Neck threads.....	13
<b>9 Type approval procedure</b> .....	<b>13</b>
9.1 General requirements.....	13
9.2 Prototype test.....	14
9.2.1 General requirements.....	14
9.2.2 Pressure cycling test.....	14
9.2.3 Base check.....	15
9.2.4 Bend test and flattening test.....	15
9.2.5 Torque test for taper thread only.....	16
9.2.6 Shear stress calculation for parallel threads.....	17
9.3 Type approval certificate.....	17
9.4 Specific type approval/production tests for cylinders ordered in quantities below 200.....	17
<b>10 Batch tests</b> .....	<b>18</b>
10.1 General requirements.....	18
10.2 Tensile test.....	19
10.3 Impact test.....	20
10.4 Hydraulic burst test.....	22
10.4.1 Test installation.....	22
10.4.2 Test conditions.....	23
10.4.3 Interpretation of test results.....	24

This is a preview of ISO 9809-4:2026. [Click here to purchase the full version from the ANSI store.](#)

<b>11</b>	<b>Tests/examinations on every cylinder</b> .....	<b>25</b>
11.1	General.....	25
11.2	Hydraulic test.....	26
11.2.1	Proof pressure test.....	26
11.2.2	Volumetric expansion test.....	26
11.3	Hardness test.....	26
11.4	Leak test.....	26
11.5	Water -capacity check.....	27
<b>12</b>	<b>Certification</b> .....	<b>27</b>
<b>13</b>	<b>Marking</b> .....	<b>27</b>
<b>Annex A</b>	<b>(normative) Description and evaluation of manufacturing imperfections and conditions for rejection of seamless steel gas cylinders at the time of final inspection by the manufacturer</b> .....	<b>28</b>
<b>Annex B</b>	<b>(normative) Ultrasonic examination</b> .....	<b>42</b>
<b>Annex C</b>	<b>(informative) Example of type approval certificate</b> .....	<b>48</b>
<b>Annex D</b>	<b>(informative) Example of acceptance certificate</b> .....	<b>49</b>
<b>Annex E</b>	<b>(informative) Example of shear strength calculation for parallel threads</b> .....	<b>51</b>
<b>Bibliography</b>	.....	<b>53</b>

This is a preview of ISO 9809-4:2026. [Click here to purchase the full version from the ANSI store.](#)

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*, Subcommittee SC 3, *Cylinder design*, 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).

This third edition cancels and replaces the second edition (ISO 9809-4:2021), which has been technically revised.

The main changes are as follows:

- modification of definition in [3.8](#);
- modification of [Formula 1](#) in [7.2](#);
- bend test and flattening test moved under [Clause 9](#) (prototype tests);
- clarification of shear stress calculation for parallel threads;
- clarification of [9.4](#);
- update of Bibliography.

A list of all parts in the ISO 9809 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).

This is a preview of ISO 9809-4:2026. [Click here to purchase the full version from the ANSI store.](#)

This document provides a specification for the design, construction, inspection and testing of a seamless stainless steel cylinder. The objective is to balance the design and economic efficiency against international acceptance and universal utility.

ISO 9809 (all parts) aims to eliminate the concern about climate, duplicate inspections and restrictions because of the lack of definitive International Standards.

This document has been written so that it is suitable to be referenced in the UN Model Regulations<sup>[1]</sup>.