SLOVENSKI STANDARD
SIST EN ISO 9809-4:2023

01-april-2023

Plinske jeklenke - Konstruiranje, izdelava in preskušanje ponovno polnljivih plinskih jeklenk in velikih jeklenk iz celega iz jekla - 4. del: Nerjavne jeklenke iz jekla z vrednostjo Rm, manjšo od 1100 MPa (ISO 9809-4:2021)

Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes - Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa (ISO 9809-4:2021)

Gasflaschen - Auslegung, Herstellung und Prüfung von wiederbefüllbaren nahtlosen Gasflaschen aus Stahl - Teil 4: Flaschen aus Edelstahl mit einem Rm-Wert von weniger als 1 100 MPa (ISO 9809-4:2021)

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 avec une valeur Rm inférieure à 1 100 MPa (ISO 9809-4:2021)

Ta slovenski standard je istoveten z: **EN ISO 9809-4:2022**

ICS:

23.020.35	Plinske jeklenke	Gas cylinders

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 9809-4

December 2022

ICS 23.020.35

English Version

Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes - Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa (ISO 9809-4:2021)

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 Rm inférieure à 1 100 MPa (ISO 9809-4:2021)

Gasflaschen - Auslegung, Herstellung und Prüfung von wiederbefüllbaren nahtlosen Gasflaschen aus Stahl - Teil 4: Flaschen aus Edelstahl mit einem Rm-Wert von weniger als 1 100 MPa (ISO 9809-4:2021)

This European Standard was approved by CEN on 11 December 2022.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

The text of ISO 9809-4:2021 has been prepared by Technical Committee ISO/TC 58 "Gas cylinders" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 9809-4:2022 by Technical Committee CEN/TC 23 "Transportable gas cylinders" the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO 9809-4:2021 has been approved by CEN as EN ISO 9809-4:2022 without any modification.

INTERNATIONAL STANDARD

ISO 9809-4

Second edition
2021-11

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 avec une valeur R_m inférieure à 1 100 MPa

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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 documents 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).

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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.

This document was prepared by Technical Committee ISO/TC 58, *Gas cylinders*, Subcommittee SC 3, *Cylinder design*.

This second edition cancels and replaces the first edition (ISO 9809-4:2014), which has been technically revised. The main changes compared with the previous edition are as follows:

— update of Clause 5;

— clarification of Figure 3;

— clarification of 8.9;

— modification of 9.1, 9.2, 9.2.4 and Annex A;

— new subclause 9.2.5 for parallel threads;

— new subclause 9.4 for cylinders ordered in small quantities.

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.

Introduction

This document provides a specification for the design, manufacture, 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[1].

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

1 Scope

This document specifies the minimum requirements for the materials, design, construction and workmanship, manufacturing processes, examinations and testing at time of manufacture for refillable, seamless, stainless steel gas cylinders with water capacities up to and including 150 l.

It is applicable to cylinders for compressed, liquefied and dissolved gases with a maximum actual tensile strength, R_{ma}, of less than 1 100 MPa.

NOTE If so desired, cylinders of water capacity between 150 l and 450 l can be manufactured to be in full conformance to this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

ISO 3651-2, *Determination of resistance to intergranular corrosion of stainless steels — Part 2: Ferritic,austenitic and ferritic-austenitic (duplex) stainless steels — Corrosion test in media containing sulfuric acid*

ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 9328-1, *Steel flat products for pressure purposes — Technical delivery conditions — Part 1: General requirements*

ISO 9329-4, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 4: Austenitic stainless steels*

ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel*

ISO 10286, *Gas cylinders — Vocabulary*

ISO 13341, *Gas cylinders — Fitting of valves to gas cylinders*

ISO 13769, *Gas cylinders — Stamp marking*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10286 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
batch
quantity of up to 200 cylinders, plus cylinders for destructive testing of the same nominal diameter, thickness, length and design made successively on the same equipment, from the same cast of steel, and subjected to the same heat treatment for the same duration of time

3.2
burst pressure
p_b
highest pressure reached in a cylinder during a burst test

3.3
cold working
process in which a cylinder is subjected to a pressure higher than the cylinder *test pressure* (3.11) to increase the *yield strength* (3.12) of the steel

3.4
cryoforming
process where the cylinder is subjected to a controlled low-temperature deformation treatment that results in a permanent increase in strength

3.5
design stress factor
F
ratio of the equivalent wall stress at *test pressure*, p_h, (3.11) to guaranteed minimum yield strength, R_{eg}

3.6
quenching
hardening heat treatment in which a cylinder, which has been heated to a uniform temperature above the upper critical point, Ac_3, of the steel, is cooled rapidly on a suitable medium

3.7
reject
action to set aside a cylinder (Level 2 or Level 3) that is not allowed to go into service

3.8
rendered unserviceable
cylinder that has been treated in such a way as to render it impossible for use

Note 1 to entry: Examples for acceptable methods to render cylinders unserviceable can be found in ISO 18119. Any actions on cylinders rendered unserviceable are outside the scope of this document.

3.9
repair
action to return a rejected cylinder to a Level 1 condition

3.10
tempering
toughening heat treatment which follows *quenching* (3.6), in which the cylinder is heated to a uniform temperature below the critical point, Ac_1, of the steel

3.11
test pressure
p_h
required pressure applied during a pressure test

Note 1 to entry: Test pressure is used for the cylinder wall thickness calculation.

3.12
yield strength
stress value corresponding to the 0,2 % proof stress or for austenitic steels in the solution-annealed condition, 1 % proof stress

3.13
working pressure
settled pressure of a compressed gas at a uniform reference temperature of 15 °C in a full gas cylinder

4 Symbols

A percentage elongation after fracture

a calculated minimum thickness, in millimetres, of the cylindrical shell

a' guaranteed minimum thickness, in millimetres, of the cylindrical shell

a_1 guaranteed minimum thickness, in millimetres, of a concave base at the knuckle (see Figure 2)

a_2 guaranteed minimum thickness, in millimetres, at the centre of a concave base (see Figure 2)

b guaranteed minimum thickness, in millimetres, at the centre of a convex base (see Figure 1)

c_1 maximum permissible deviation, in millimetres, of burst profile for quenched and tempered cylinders (see Figure 11)

c_2 maximum permissible deviation, in millimetres, of the burst profile for cryoformed or solution-annealed cylinders with less than 7,5 mm wall thickness (see Figure 12)

D nominal outside diameter of the cylinder, in millimetres (see Figure 1)

D_f diameter, in millimetres, of former (see Figure 6)

F design stress factor (variable)

H outside height, in millimetres, of the domed part (convex head or base end) (see Figure 1)

h outside depth (concave base end), in millimetres (see Figure 2)

L_o original gauge length, in millimetres, as defined in ISO 6892-1 (see Figure 5)

l overall length of the cylinder, in millimetres (see Figure 3)

n ratio of the diameter of the bend test former to the actual thickness of test piece, t

p_b measured burst pressure, in bar, above atmospheric pressure

NOTE 1 bar = 10^5 Pa = 0,1 MPa.

p_h hydraulic test pressure, in bar, above atmospheric pressure

p_y observed pressure when the cylinder starts yielding during the hydraulic burst test, in bar, above atmospheric pressure