

**Gas cylinders - High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles<sup>2</sup>**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 11439:2001 sisaldab Euroopa standardi EN ISO 11439:2000 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 16.02.2001 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 11439:2001 consists of the English text of the European standard EN ISO 11439:2000.</p> <p>This document is endorsed on 16.02.2001 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b></p> <p>This standard sets out minimum requirements for serially produced light-weight refillable gas cylinders intended only for the on-board storage of high pressure compressed natural gas as a fuel for automotive vehicles to which the cylinders are to be fixed. The service conditions do not cover external loadings which may arise from vehicle collisions, etc.</p>	<p><b>Scope:</b></p> <p>This standard sets out minimum requirements for serially produced light-weight refillable gas cylinders intended only for the on-board storage of high pressure compressed natural gas as a fuel for automotive vehicles to which the cylinders are to be fixed. The service conditions do not cover external loadings which may arise from vehicle collisions, etc.</p>
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ICS 43.060.40

Võtmesõnad:

**English version**

Gas cylinders

**High pressure cylinders for the on-board storage  
of natural gas as a fuel for automotive vehicles  
(ISO 11439 : 2000)**

Bouteilles à gaz – Bouteilles haute  
pression pour le stockage de gaz  
naturel utilisé comme carburant à  
bord des véhicules automobiles  
(ISO 11439 : 2000)

Gasflaschen – Gasflaschen zur  
Mitführung von verdichtetem Erdgas  
als Treibstoff für Kraftfahrzeuge  
(ISO 11439 : 2000)

This European Standard was approved by CEN on 2000-09-15.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

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## Foreword

International Standard

ISO 11439 : 2000 Gas cylinders – High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles,

which was prepared by ISO/TC 58 ‘Gas cylinders’ of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 23 ‘Transportable gas cylinders’, the Secretariat of which is held by BSI, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by March 2001 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

## Endorsement notice

The text of the International Standard ISO 11439 : 2000 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative).

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## Introduction

Cylinders for the on-board storage of fuel for natural gas vehicle service are required to be light-weight, at the same time maintaining or improving on the level of safety currently existing for other pressure vessels. These requirements are achieved by:

- a) specifying service conditions precisely and comprehensively as a firm basis for both cylinder design and use;
- b) using an appropriate method to assess cyclic pressure fatigue life and to establish allowable defect sizes in metal cylinders or liners;
- c) requiring design qualification tests;
- d) requiring non-destructive testing and inspection of all production cylinders;
- e) requiring destructive tests on cylinders and cylinder material taken from each batch of cylinders produced;
- f) requiring manufacturers to have a comprehensive quality system documented and implemented;
- g) requiring periodic re-inspection and, if necessary, retesting in accordance with the manufacturer's instructions;
- h) requiring manufacturers to specify as part of their design, the safe service life of their cylinders.

Cylinder designs that meet the requirements of this International Standard:

- a) will have a fatigue life which exceeds the specified service life;
- b) when pressure cycled to failure, will leak but not rupture;
- c) when subject to hydrostatic burst tests, will have factors of "stress at burst pressure" over "stress at working pressure" that exceed the values specified for the type of design and the materials used.

Owners or users of cylinders designed to this International Standard should note that the cylinders are designed to operate safely if used in accordance with specified service conditions for a specified finite service life only. The expiry date is marked on each cylinder and it is the responsibility of owners and users to ensure that cylinders are not used after that date, and that they are inspected in accordance with the manufacturer's instructions.

## 1 Scope

This International Standard specifies minimum requirements for serially produced light-weight refillable gas cylinders intended only for the on-board storage of high pressure compressed natural gas as a fuel for automotive vehicles to which the cylinders are to be fixed. The service conditions do not cover external loadings which may arise from vehicle collisions, etc.

This International Standard covers cylinders of any steel, aluminium or non-metallic material construction, using any design or method of manufacture suitable for the specified service conditions. This International Standard does not cover cylinders of stainless steel or of welded construction.

Cylinders covered by this International Standard are designated as follows:

CNG-1	Metal
CNG-2	Metal liner reinforced with resin impregnated continuous filament (hoop wrapped)
CNG-3	Metal liner reinforced with resin impregnated continuous filament (fully wrapped)
CNG-4	Resin impregnated continuous filament with a non-metallic liner (all composite)

NOTE Cylinders designed in accordance with ISO 9809-1, ISO 9809-2, ISO 9809-3 and ISO 7866 can be used for this service provided these designs meet additional requirements as specified in this International Standard.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 148:1983, *Steel — Charpy impact test (V-notch)*.

ISO 306:1994, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST)*.

ISO 527-2:1993, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (incorporating Technical Corrigendum 1:1994)*.

ISO 2808:1997, *Paints and varnishes — Determination of film thickness*.



ISO 6506-1:1999, *Metallic materials — Brinell hardness test — Part 1: Test method.*

ISO 6892:1998, *Metallic materials — Tensile testing at ambient temperature.*

ISO 7225, *Gas cylinders — Precautionary labels.*

ISO 7866:1999, *Gas cylinders — Refillable seamless aluminium alloy gas cylinders — Design, construction and testing.*

ISO 9227:1990, *Corrosion tests in artificial atmospheres — Salt spray tests.*

ISO 9712:1999, *Non-destructive testing — Qualification and certification of personnel.*

ISO 9809-1:1999, *Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa.*

ISO 9809-2:2000, *Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa.*

ISO 14130:1997, *Fibre-reinforced plastic composites — Determination of apparent interlaminar shear strength by short-beam method.*

ASTM D522-93a, *Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.*

ASTM D1308-87(1998), *Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.*

ASTM D2794-93(1999)e1, *Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).*

ASTM D3170-87(1996)e1, *Standard Test Method for Chipping Resistance of Coatings.*

ASTM D3418-99, *Standard Test Method for Transition Temperatures of Polymers by Differential Scanning Calorimetry.*

ASTM G53-93<sup>3)</sup>, *Standard Practice for Operating Light and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials.*

NACE TM0177-96<sup>4)</sup>, *Laboratory Testing of Metals for Resistance to Sulfide Stress Cracking and Stress Corrosion Cracking in H<sub>2</sub>S Environments.*

### 3 Terms and definitions

For the purposes of this International Standard the following terms and definitions shall apply:

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1) To be published. (Revision of ISO 4624:1978)

2) To be published

3) To be discontinued in 2000 and replaced by G154.

4) NACE standards are available from NACE International, PO Box 218340, Houston, Texas 77218-8340, U.S.A.