

Transportable gas cylinders - Fully wrapped composite cylinders

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NATIONAL FOREWORD

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ICS 23.020.35

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EUROPEAN STANDARD

EN 12245

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2022

ICS 23.020.35

Supersedes EN 12245:2009+A1:2011

English Version

Transportable gas cylinders - Fully wrapped composite cylinders

Bouteilles à gaz transportables - Bouteilles
entièrement bobinées en matériaux composites

Ortsbewegliche Gasflaschen - Vollumwickelte Flaschen
aus Verbundwerkstoffen

This European Standard was approved by CEN on 17 January 2022.

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COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Page

European foreword	5
Introduction	6
1 Scope.....	7
2 Normative references.....	7
3 Terms, definitions and symbols	9
3.1 Terms and definitions.....	9
3.2 Symbols	11
4 Design and manufacture	12
4.1 General.....	12
4.2 Liner.....	12
4.2.1 Metallic liners.....	12
4.2.2 Non-metallic liners.....	12
4.2.3 Design drawing.....	13
4.2.4 Design of ends	14
4.2.5 Neck ring	14
4.3 Composite overwrap.....	14
4.3.1 Materials	14
4.3.2 Winding	14
4.4 Finished cylinder	15
4.4.1 Design drawings.....	15
4.4.2 Cylinders without liner.....	15
4.4.3 Autofrettage.....	15
4.4.4 Manufacturing requirements for the finished cylinder	16
5 Cylinder and material tests	16
5.1 General.....	16
5.2 Requirements and test methods	16
5.2.1 Test 1 - Composite material tests, including adhesives (where applicable)	16
5.2.2 Test 2 - Liner material tests.....	17
5.2.3 Test 3 - Liner test (for metallic liners only).....	18
5.2.4 Test 4 - Pressure test of finished cylinders at ambient temperature.....	20
5.2.5 Test 5 - Cylinder burst test.....	20
5.2.6 Test 6 - Resistance to pressure cycles at test pressure (p_h) and ambient temperature	21
5.2.7 Test 7 - Immersion in salt water.....	23
5.2.8 Test 8 - Exposure to elevated temperature at test pressure.....	24
5.2.9 Test 9 - Drop/Impact test.....	24
5.2.10 Test 10 - Flawed cylinder test.....	27
5.2.11 Test 11 - Extreme temperature cycle test	29
5.2.12 Test 12 - Fire resistance test.....	30
5.2.13 Test 13 - Permeability test of cylinders with non-metallic or without liners.....	32
5.2.14 Test 14 - Liner collapse and blistering test (only for cylinders with non-metallic liners for compressed gases)	33
5.2.15 Test 15 - Test of compatibility of thermoplastic liners and matrix for type 5 cylinders with air or oxidising gases.....	33
5.2.16 Test 16 - Torque test (for taper threads only)	34
5.2.17 Test 17 - Neck strength	34
5.2.18 Test 18 - Cylinder stability.....	35
5.2.19 Test 19 - Neck ring.....	35

5.2.20 Test 20 – Shear stress calculation for parallel threads for steel liners and steel bosses	35
5.3 Failure to meet test requirements	35
5.3.1 Metallic liners	35
5.3.2 Finished cylinder	35
6 Conformity evaluation	36
7 Marking	36
8 Operating instructions for cylinders with non-metallic liners	37
Annex A (normative) Prototype, design variant and production testing	38
A.1 General	38
A.2 Prototype testing	38
A.2.1 General	38
A.2.2 Definition of new design	38
A.2.3 Prototype testing requirements	39
A.2.4 Prototype testing certificate	39
A.3 Design variant testing	43
A.3.1 General	43
A.3.2 Definition of a design variant	43
A.3.2.1 Conditions to be satisfied	43
A.3.2.2 Equivalent fibre	44
A.3.2.3 Equivalent matrix	44
A.3.2.4 Equivalent liner	44
A.3.2.5 Cylinder variant	45
A.3.3 Design variant test requirements	46
A.3.4 Design variant testing certificate	46
A.4 Production testing	49
A.4.1 General	49
A.4.2 Production test requirements	49
A.4.3 Liner batch tests and inspections	49
A.4.3.1 Metallic liner	49
A.4.3.2 Non-metallic liner	50
A.4.4 Composite materials batch tests and inspections	50
A.4.5 Tests and inspections of the finished cylinder	50
A.4.5.1 Tests	50
A.4.5.2 Inspections	51
A.4.6 Batch acceptance certificate	51
Annex B (informative) Examples of prototype approval and production testing certificates	52
B.1 Type approval certificate – composite cylinders with metallic liners	52
B.2 Type approval certificate – composite cylinders with non-metallic liners	53

B.3	Type approval certificate – composite cylinders without liners	54
B.4	Design variant approval certificate – composite cylinders with metallic liners	55
B.5	Production test certificate	56
Annex C (informative) Example of high velocity impact (bullet) test		58
C.1	Procedure	58
C.2	Criteria	58
C.3	Parameters to monitor and record	58
Annex D (informative) Standardized test requirements for thermally activated pressure relief devices		59
D.1	General	59
D.2	Cylinder test	59
D.2.1	Cylinder set up	59
D.2.2	Fire source	59
D.2.3	Temperature and pressure measurements	59
D.2.4	General test requirements	60
D.2.5	Tests options	60
D.2.5.1	Option A – Controlled release of pressure	60
D.2.5.2	Option B – Fire until rupture	60
D.3	PRD test	60
D.4	Vent test	60
D.5	System assessment	61
D.5.1	Qualification limit envelope	61
D.5.2	Service limit envelope	61
D.5.3	Acceptable results	61
Bibliography		64

European foreword

This document (EN 12245:2022) has been prepared 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 November 2022, and conflicting national standards shall be withdrawn at the latest by November 2022.

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 supersedes EN 12245:2009+A1:2011.

This document has been submitted for reference in:

- the RID; and
- the technical annexes of the ADR.

NOTE These regulations take precedence over any clause of this standard. It is emphasized that RID/ADR are being revised regularly at intervals of two years which may lead to temporary non-compliances with the clauses of this standard.

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 organisations 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, Turkey and the United Kingdom.

Introduction

The purpose of this document is to provide a specification for the design, manufacture, inspection and testing of refillable, transportable fully wrapped composite cylinders and tubes.

The specifications given are based on knowledge of, and experience with, materials, design requirements, manufacturing processes and control during manufacture of cylinders and tubes in common use in the countries of the CEN members.

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1 Scope

This document specifies minimum requirements for the materials, design, construction, prototype testing and routine manufacturing inspections of fully wrapped composite gas cylinders for compressed, liquefied and dissolved gases.

NOTE 1 For the purposes of this document, the word “cylinder” includes tubes (seamless transportable pressure receptacles of a water capacity exceeding 150 l and of not more than 3 000 l).

This document is applicable to cylinders that comprise a liner of metallic material (welded or seamless) or non-metallic material (or a mixture thereof), reinforced by a wound composite consisting of fibres of glass, carbon or aramid (or a mixture thereof) embedded in a matrix.

This document is also applicable to composite cylinders without liners.

This document is not applicable to gas cylinders which are partially covered with fibres and commonly called “hoop wrapped” cylinders. For hoop wrapped composite cylinders, see EN 12257.

NOTE 2 This document does not address the design, fitting and performance of removable protective sleeves. Where these are fitted, they are considered separately.

This document is primarily for compressed, liquefied and dissolved gases other than LPG.

NOTE 3 For dedicated LPG cylinders, see EN 14427.

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.

EN 12862, *Transportable gas cylinders - Specification for the design and construction of refillable transportable welded aluminium alloy gas cylinders*

EN 13322-1, *Transportable gas cylinders - Refillable welded steel gas cylinders - Design and construction - Part 1: Carbon steel*

EN 13322-2, *Transportable gas cylinders - Refillable welded steel gas cylinders - Design and construction - Part 2: Stainless steel*

EN 14638-1, *Transportable gas cylinders - Refillable welded receptacles of a capacity not exceeding 150 litres - Part 1: Welded austenitic stainless steel cylinders made to a design justified by experimental methods*

EN 14638-3, *Transportable gas cylinders - Refillable welded receptacles of a capacity not exceeding 150 litres - Part 3: Welded carbon steel cylinders made to a design justified by experimental methods*

EN ISO 75-1, *Plastics - Determination of temperature of deflection under load - Part 1: General test method (ISO 75-1)*

EN ISO 75-3, *Plastics - Determination of temperature of deflection under load - Part 3: High-strength thermosetting laminates (ISO 75-3)*

EN ISO 527-1, *Plastics - Determination of tensile properties - Part 1: General principles (ISO 527-1)*

EN ISO 527-2, *Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2)*

EN ISO 1183 (all parts), *Plastics — Methods of determining the density and relative density of non-cellular plastics (ISO 1183)*

EN ISO 1628-3, *Plastics - Determination of the viscosity of polymers in dilute solution using capillary viscometers - Part 3: Polyethylenes and polypropylenes (ISO 1628-3)*

EN ISO 2884-1, *Paints and varnishes - Determination of viscosity using rotary viscometers - Part 1: Cone-and-plate viscometer operated at a high rate of shear (ISO 2884-1)*

EN ISO 3146, *Plastics - Determination of melting behaviour (melting temperature or melting range) of semi-crystalline polymers by capillary tube and polarizing-microscope methods (ISO 3146)*

EN ISO 7866, *Gas cylinders - Refillable seamless aluminium alloy gas cylinders - Design, construction and testing (ISO 7866)*

EN ISO 9809-1, *Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes - Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa (ISO 9809-1)*

EN ISO 9809-2, *Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes - Part 2: Quenched and tempered steel cylinders and tubes with tensile strength greater than or equal to 1 100 MPa (ISO 9809-2)*

EN ISO 10156, *Gas cylinders - Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets (ISO 10156)*

EN ISO 10618, *Carbon fibre - Determination of tensile properties of resin-impregnated yarn (ISO 10618)*

EN ISO 11114-1, *Gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 1: Metallic materials (ISO 11114-1)*

EN ISO 11114-2, *Gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 2: Non-metallic materials (ISO 11114-2)*

EN ISO 11114-3, *Gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 3: Autogenous ignition test for non-metallic materials in oxygen atmosphere (ISO 11114-3)*

EN ISO 11114-4, *Transportable gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 4: Test methods for selecting steels resistant to hydrogen embrittlement (ISO 11114-4)*

EN ISO 11114-5:2022, *Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 5: Test methods for evaluating plastic liners (ISO 11114-5:2022)*

EN ISO 11120, *Gas cylinders - Refillable seamless steel tubes of water capacity between 150 l and 3000 l - Design, construction and testing (ISO 11120)*

EN ISO 11357-2, *Plastics - Differential scanning calorimetry (DSC) - Part 2: Determination of glass transition temperature and step height (ISO 11357-2)*

EN ISO 13341, *Gas cylinders - Fitting of valves to gas cylinders (ISO 13341)*

EN ISO 14130, *Fibre-reinforced plastic composites - Determination of apparent interlaminar shear strength by short-beam method (ISO 14130)*

ISO 3341, *Textile glass — Yarns — Determination of breaking force and breaking elongation*

ISO 6721-11, *Plastics — Determination of dynamic mechanical properties — Part 11: Glass transition temperature*

ISO 9809-4, *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*

ASTM D 2196-18e1, *Standard test method for rheological properties of non-Newtonian materials by rotational (Brookfield) viscosimeter*

ASTM D 2290-19a, *Standard test method for apparent hoop tensile strength of plastic or reinforced plastic pipe*

ASTM D 2291/D 2291M-16, *Standard practice for fabrication of ring test specimens for glass-resin composites*

ASTM D 2344/D 2344M-16, *Standard test method for short-beam strength of polymer matrix composite materials and their laminates*

ASTM D 4018-17, *Standard test methods for properties of continuous filament carbon and graphite fiber tows*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the following terms, definitions and symbols 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 <https://www.electropedia.org/>

3.1.1

ambient temperature

temperature of surroundings varying between 10 °C and 35 °C (for test purposes only)

3.1.2

autofrettage

pressure application procedure which strains the metal liner past its yield point sufficiently to cause permanent plastic deformation, and results in the liner having compressive stresses and the fibres having tensile stresses when at zero internal gauge pressure

[SOURCE: EN ISO 10286:2021, 3.3.4 – “yield strength” has been replaced with “yield point”]

3.1.3

batch

<fibres, pre-impregnated fibres or components of the matrix system> homogeneous quantity of material, identified and certified as such by the supplier

3.1.4

batch

<metallic liners> quantity of liners of the same nominal diameter, thickness, length and design, made successively from the same material cast and subjected to the same heat treatment for the same length of time

3.1.5

batch

<non-metallic liners> quantity of liners of the same nominal diameter, thickness, length and design, made successively from the same batch of materials and subjected to the same manufacturing process