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**Gas cylinders — Refillable composite gas cylinders and tubes**

Part 3:

**Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450L with non-load-sharing metallic or non-metallic liners**

*Bouteilles à gaz — Bouteilles à gaz rechargeables en matériau composite et tubes*

*Partie 3: Bouteilles à gaz composites entièrement bobinées renforcées par des fibres et tubes d'une contenance allant jusqu'à 450 l avec liners métalliques ou non métalliques ne transmettant pas la charge*





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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 11119-3 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 11119-3:2002), which has been technically revised.

ISO 11119 consists of the following parts, under the general title *Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing*:

- *Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 l*
- *Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners*
- *Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450L with non-load-sharing metallic or non-metallic liners*

The following part is under preparation:

- *Part 4: Fully wrapped fibre reinforced composite gas cylinders with load-sharing welded metal liners*

## Introduction

The purpose of ISO 11119 is to provide a specification for the design, manufacture, inspection and testing of cylinders for world-wide usage. The objective is to balance design and economic efficiency against international acceptance and universal utility.

ISO 11119 aims to eliminate the concern about climate, duplicate inspection and restrictions currently existing because of lack of definitive International Standards and is not to be construed as reflecting on the suitability of the practice of any nation or region.

This part of ISO 11119 addresses the general requirements on design, construction and initial inspection and testing of pressure receptacles of the United Nations *“Recommendations on the Transport of Dangerous Goods Model Regulations.”*



# Gas cylinders — Refillable composite gas cylinders and tubes —

## Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450L with non-load-sharing metallic or non-metallic liners

### 1 Scope

This part of ISO 11119 specifies requirements for composite gas cylinders up to 150 l water capacity and composite tubes above 150 l water capacity and up to 450 l water capacity, for the storage and conveyance of compressed or liquefied gases.

The cylinders and tubes in this part of ISO 11119 are

- a) Type 4 Fully Wrapped Cylinders or Tubes with a non-load sharing liner and composite reinforcement on both the cylindrical portion and the dome ends, and
- b) Type 5 Fully Wrapped Cylinders or Tubes without liners (including cylinders without liners manufactured from two parts joined together) and with a test pressure of less than 60 bar.

The cylinders are constructed:

- 1) in the form of a disposable mandrel overwrapped with carbon fibre or aramid fibre or glass fibre (or a mixture thereof) in a resin matrix to provide longitudinal and circumferential reinforcement;
- 2) in the form of two filament wound shells joined together.

Cylinders and tubes manufactured and tested to this part of ISO 11119 are not intended to contain toxic, oxidizing or corrosive gases.

This part of ISO 11119 is limited to cylinders and tubes with composite reinforcement of carbon fibre or aramid fibre or glass fibre (or a mixture thereof) in a matrix.

Cylinders and tubes manufactured and tested to this part of ISO 11119 have a minimum design life of 15 years.

This part of ISO 11119 does not address the design, fitting and performance of removable protective sleeves.

NOTE 1 References to cylinders in this International Standard include composite tubes if appropriate.

NOTE 2 ISO 11439 applies to cylinders intended for use as fuel containers on natural gas vehicles and ISO 11623 covers periodic inspection and re-testing of composite cylinders.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*

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

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

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

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*

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

ISO 7225, *Gas cylinders — Precautionary labels*

ISO 10618, *Carbon fibre — Determination of tensile properties of resin-impregnated yarn*

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

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

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

ISO 13769, *Gas cylinders — Stamp marking*

ASTM D7269, *Standard Test Methods for Tensile Testing of Aramid Yarns*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE References to cylinders include composite tubes if appropriate.

### 3.1

#### **aramid fibre**

continuous filaments of aramid laid up in tow form

### 3.2

#### **batch**

set of homogeneous items or material

NOTE The number of items in a batch can vary according to the context in which the term is used.

### 3.3

#### **batch of metallic liners**

quantity of liners of the same nominal diameter, length, thickness and design, made successively from the same batch of materials, subjected to the same manufacturing process and heat treated to the same conditions of temperature and time