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Carbon fibre — Determination of density

Fibre de carbone — Détermination de la masse volumique

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Foreword

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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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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 61, *Plastics*, Subcommittee SC 13, *Composites and reinforcement fibres*.

This third edition cancels and replaces the second edition (ISO 10119:2002), which has been technically revised.

The main changes compared to the previous edition are as follows:

— gas pycnometer method (method D) has been added;

— the calibration of the measurement cell and expansion cell have been added.

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.

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Introduction

Density is a parameter that characterizes the basic physical properties of carbon fibre, and is also an important parameter for calculating the tensile strength and tensile modulus of carbon fibre.

ISO 10119:2002 describes three methods (A, B and C) of using liquid to determine the density of carbon fibre. In this edition, the gas pycnometer method is added as method D.

Gas pycnometer method uses inert gas instead of liquids to measure the volume of fibres, powders and cellular materials so as to obtain the density. The method give a much higher resolution (i.e. a factor of 100 times better).

With the development of electronic technology, fully automatic instruments are commercially available, which allow faster throughput testing which are suitable for large scale testing. In addition, there is no environmental pollution because no organic solvent is used.

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Carbon fibre — Determination of density

1 Scope

This document specifies four methods for the determination of the density of carbon fibre tested as a yarn:

— method A: liquid-displacement method;

— method B: sink/float method;

— method C: density-gradient column method;

— method D: gas pycnometer method.

Method C is the reference method in cases of dispute, etc.

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 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 1675, *Plastics — Liquid resins — Determination of density by the pyknometer method*

ISO 10548, *Carbon fibre — Determination of size content*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
density
mass per unit volume of a substance at a specified temperature

Note 1 to entry: This property is expressed in grams per cubic centimetre or in kilograms per cubic metre at the specified temperature. The recommended temperature is 23 °C.

4 Test specimens — General requirements

Test specimens shall be taken from desized samples unless otherwise agreed between the supplier and the customer. To remove the size, use the solvent extraction, chemical digestion or pyrolysis method specified in ISO 10548. The determination of the density may also be carried out on sized fibre by agreement between customer and supplier. The density of sized fibre may be taken to be identical to that of unsized fibre when the size content is low.

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