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**Fibre-reinforced composites —  
Method for accelerated moisture  
absorption and supersaturated  
conditioning by moisture using sealed  
pressure vessel**

*Composites renforcés de fibres — Méthode pour l'absorption  
accélérée de l'humidité et le conditionnement sursaturé en humidité à  
l'aide d'un récipient sous pression scellé*

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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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 13, *Composites and reinforcement fibres*.

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](http://www.iso.org/members.html).

## Introduction

Mechanical properties of fibre reinforced thermoset or thermoplastics with saturated moisture content under used conditions need to be determined for the specification of these materials. However, the moisture content of the fibre reinforced thermoset or thermoplastic materials immediately after production are usually lower than that during use, because the production process is under a higher temperature and uses dried ingredients for optimum quality control. The fibre reinforced materials absorb moisture under the used conditions and reach a saturated moisture content after a long period, for example after 6 months. Accordingly, the accelerated moisture absorption method (70 °C, 75 % RH) is specified in ASTM D5229/D5229M for determining the properties at saturation. However, the absorption time is still long (over three months) using this method.

This document specifies a method for obtaining practical saturated moisture absorption for effective and shorter research and development process of thermoset and thermoplastic materials. The method uses a sealed pressure vessel at a higher temperature with saturated water vapour condition (120 °C, 0,2 MPa of water vapour pressure).



# Fibre-reinforced composites — Method for accelerated moisture absorption and supersaturated conditioning by moisture using sealed pressure vessel

## 1 Scope

This document specifies accelerated moisture absorption properties and supersaturated conditioning by moisture for fibre-reinforced plastics) using sealed pressure vessel at higher temperature than 100 °C with saturated water vapour at used heating temperature.

The purpose of this moisture absorbing procedure is to screen test specimens with moisture by mechanical or thermal properties.

This document applies to carbon-fibre materials and their products with either thermoset or thermoplastic matrices, with a  $T_g$  greater than 150 °C. This document can also apply to materials reinforced with other fibres (e.g. glass-fibres) with a  $T_g$  greater than 150 °C.

## 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 472, *Plastics — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472 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

#### **additional moisture content**

mass percentage of additionally absorbing moisture in the test material to total mass of the material and moisture already existing in this material

Note 1 to entry: See [Formula \(1\)](#).

### 3.2

#### **initial moisture content**

mass percentage of absorbed moisture in the test material at the initial time

Note 1 to entry: See [Formula \(3\)](#).

### 3.3

#### **supersaturated conditioning by moisture**

moisture absorbing conditions in the test material at room temperature cooled from the saturated moisture absorbing condition at higher temperature and higher humidity, such as saturated water vapour pressure at used higher temperature