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Test methods for natural fibre-reinforced plastic composite (NFC) deck boards

Méthodes d'essai pour les planches en composite bois-plastique (WPC)

Reference number
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Contents

Page

Foreword ..... **v**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **2**
4 Test specimens **2**
5 Conditioning **2**
6 Test method **2**
6.1 Density 2
6.1.1 Test method 2
6.1.2 Test specimens 2
6.1.3 Immersion liquid 2
6.1.4 Procedure 2
6.2 Maximum bending load 3
6.2.1 Test specimens 3
6.2.2 Test method 3
6.3 Bending creep strain 4
6.3.1 Test specimens 4
6.3.2 Test method 4
6.4 Impact resistance 4
6.4.1 Test specimens 4
6.4.2 Test method 4
6.5 Impact strength 5
6.5.1 Test specimens 5
6.5.2 Test method 5
6.6 Distortion 6
6.6.1 Test specimens 6
6.6.2 Test method 6
6.7 Screw holding strength 6
6.7.1 Test specimens 6
6.7.2 Test method 7
6.8 Skid resistance 7
6.8.1 Test specimens 7
6.8.2 Test method 7
6.9 Water absorption 9
6.9.1 Test specimens 9
6.9.2 Test method 9
6.10 Freeze and thaw test 11
6.10.1 Test specimens 11
6.10.2 Test method 12
6.11 Lengthwise linear thermal expansion coefficient 12
6.12 Weatherproofing 12
6.12.1 Test specimens 12
6.12.2 Test method 12
6.13 Harmful substance test 13
6.14 Formaldehyde emission 13
6.14.1 Test specimens 13
6.14.2 Test method 13
6.15 Burning behaviour 13
6.16 Resistance against discolouration caused by microorganisms 13
6.16.1 Resistance against discolouring micro-fungi 13
6.16.2 Resistance against discolouring algae 13

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7 Test reports **14**
Bibliography **15**

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

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Introduction

Natural fibre-reinforced composite (NFC) or wood-plastics composite (WPC) is made from one or more natural fibres or flours and a polymer or mixture of polymers. Natural fibres and flours come from different vegetable sources. Any kinds of polymers, virgin or recycled, can be used but currently the most common ones are poly(vinyl chloride), polypropylene, and polyethylene. For editorial reasons, in this International Standard, the term and abbreviation "natural fibre-reinforced composite" (NFC) is used instead of "wood-plastics composite" (WPC).

NFC materials can be considered neither as filled plastics nor as a special kind of wood material. They are to be considered as different materials having their own characteristics.

At present, the main application of NFC products is deck boards. NFC deck boards can be processed by different techniques, as extruding for profiles and pipes, compression moulding or injection moulding.

Recently, industrial interests have focused on NFC as a composite material partially derived from biomass.

However, as NFC's main constituents are hydrophilic natural fibres and hydrophobic polymer(s), problems such as cracking, bending, and strength reduction may occur in case of long-term use due to their different characteristics in the use environment related to e.g. moisture, UV resistance and thermal changes. However, due to the lack of standardized testing methods to evaluate the performance and durability of NFC, it is difficult to give the orientation for the product development and to protect the consumers' interest. Consequently International Standards are being established in order to encourage technology development in the NFC production field and to protect consumers from NFC products of low quality.

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Test methods for natural fibre-reinforced plastic composite (NFC) deck boards

1 Scope

This International Standard provides test methods of natural fibre-reinforced composite (NFC) deck boards used in exterior applications. This International Standard will cover the preparation of specimen, test equipments, procedures of measurements and evaluation methods.

2 Normative references

The following referenced 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 178, *Plastics — Determination of flexural properties*

ISO 179-1, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test*

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

ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness)*

ISO 899-2, *Plastics — Determination of creep behaviour — Part 2: Flexural creep by three-point loading*

ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pyknometer method and titration method*

ISO 1478, *Tapping screws thread*

ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 8124-3, *Safety of toys — Part 3: Migration of certain elements*

ISO 9239-1, *Reaction to fire tests for floorings — Part 1: Determination of the burning behaviour using a radiant heat source*

ISO 11359-2, *Plastics — Thermomechanical analysis (TMA) — Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature*

ISO 11664-1, *Colorimetry — Part 1: CIE standard colorimetric observers*

ISO 11664-2, *Colorimetry — Part 2: CIE standard illuminants*

ISO 11664-4, *Colorimetry — Part 4: CIE 1976 L*a*b* Colour space*

ISO 12460-4, *Wood-based panels-Determination of formaldehyde release*

ISO 18314-1, *Analytical colorimetry — Part 1: Practical colour measurement (in preparation)*

EN 15534-1, *Composites made from cellulose-based materials and thermoplastics (usually called wood polymer composites (WPC) or natural fibre composites (NFC)) — Part 1: Test methods for characterization of compounds and products*

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3 Terms and definitions

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

3.1
natural fibre composite
NFC
product made thereof being the result of the combination of one or several cellulosic materials with one or several thermoplastics

3.2
solid type board
board that have a totally filled cross section

Note 1 to entry: It can be fixed to the supports by using anchoring clips or screws.

3.3
structured type board
board that have hollow parts in the cross section

Note 1 to entry: It can be fixed to the supports by using anchoring clips or screws.

Note 2 to entry: It is available e.g. in hollow, honeycomb, and arch types.

4 Test specimens

Unless otherwise specified, test specimens having the actual thickness and width of the product shall be used for testing. Sampling may be agreed between the supplier and the applicant.

5 Conditioning

Unless otherwise specified in the relevant test method, the test specimens shall be conditioned during at least 72 h in the standard atmosphere 23/50 according to ISO 291 [(23 ± 2) °C, (50 ± 10) % RH].

6 Test method

6.1 Density

6.1.1 Test method

The density of NFC materials shall be determined according to ISO 1183-1 Method A (immersion method).

6.1.2 Test specimens

The density of NFC materials shall be measured using test specimens which the mass is at least 1,0 g.

6.1.3 Immersion liquid

Use freshly distilled or deionised water containing not more than 0,1 % of a wetting agent to help removing air bubbles. The liquid with which the test specimens come into contact during the measurement shall have no effect on the test specimens.

6.1.4 Procedure

Weigh the test specimen, to the nearest 0,1 mg, in air while suspended with a wire of maximum diameter 0,5 mm. Record the mass of the test specimen.

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