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Physical and mechanical properties of wood — Test methods for small clear wood specimens —

Part 10: Determination of impact bending strength

Propriétés physiques et mécaniques du bois — Méthodes d'essais sur petites éprouvettes de bois sans défauts —

Partie 10: Détermination de la résilience en flexion dynamique

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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).

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 218, *Timber.*

This first edition of ISO 13061-10 cancels and replaces ISO 3348:1975, which has been technically revised with regards to the sizes, moisture content of test pieces, and adjustment for moisture content.

A list of all parts in the ISO 13061 series can be found on the ISO website.

Introduction

The main purpose of this document is to establish the common international point of member countries of the International Organization for Standardization (ISO), concerning testing methods for small clear wood specimens and general requirements for determining physical and mechanical properties of wood.

Physical and mechanical properties of wood — Test methods for small clear wood specimens —

Part 10:
Determination of impact bending strength

1 Scope

This document specifies a method for determining the impact bending strength of wood.

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 3129, *Wood — Sampling methods and general requirements for physical and mechanical testing of small clear wood*

ISO 13061-1, *Physical and mechanical properties of wood — Test methods for small clear wood specimens — Part 1: Determination of moisture content for physical and mechanical tests*

ISO 13061-2, *Physical and mechanical properties of wood — Test methods for small clear wood specimens — Part 2: Determination of density for physical and mechanical tests*

ISO 24294, *Timber — Round and sawn timber — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 24294 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 Principle

The impact bending strength is determined by testing a piece for cross-sectional bending under dynamic load application.

5 Apparatus

5.1 Pendulum impact machine with a range of energy three to five times more than the work used for the impact break of a test piece which allows for the measurement of the energy to a precision of 1 J. The pendulum tup and test piece supports shall have a radius of curvature of 15 mm. The height of the supports shall be greater than 20 mm. The distance between the centers of the supports shall be (240 ± 1) mm.

5.2 Measuring instrument capable of determining the cross-sectional dimensions of the test piece to a precision of 0,1 mm.

5.3 Equipment for the determination of moisture content and density in accordance with ISO 13061-1 and ISO 13061-2, respectively.

6 Preparation of test pieces

6.1 The sampling and preparation of test pieces shall be in accordance with ISO 3129.

6.2 Test pieces shall be made in the form of right prisms having a square cross-section 20 mm × 20 mm and length along the grain 300 mm. One face of the test piece shall be in a radial plane and the other in a tangential plane.

6.3 Moisture content of test pieces

6.3.1 Test pieces can be tested in green or air-dry condition.

6.3.2 The moisture content of test pieces tested in green condition shall be equal or exceed fibre saturation point (FSP).

6.3.3 Test pieces tested in air-dry condition shall be conditioned to a constant mass in an atmosphere with a relative humidity of (65 ± 5) % and a temperature of (20 ± 2) °C.

NOTE Constant mass is considered to be reached when the results of two successive weighing operations, carried out at an interval of 8 h, do not differ by more than 0,2 % of the mass of the test piece.

6.3.4 After preparation, the test pieces shall be stored under conditions, which ensure that their moisture content remains unchanged before testing.

7 Procedure

7.1 Measure the cross-sectional dimensions at the midpoint of the long axis of the test piece, to a precision of 0,1 mm.

7.2 Place the test piece symmetrically on the supports and carry out the test by an impact, usually, on a radial surface (a tangential bending). It shall be permitted to carry out the test by an impact on a tangential surface (a radial bending).

7.3 The test piece shall be broken by one impact. Measure the work absorbed by the test piece to a precision specified in 5.2. The form of any fracture (e.g. conchoidal or chipped) shall be recorded in the test report. A conchoidal fracture shall be considered as one with projecting fibers of not more than 3 mm long.

7.4 As soon as the test has been completed, cut a portion 20 mm to 30 mm long from near the fracture zone of the tested piece for the determination of moisture content and density in accordance with ISO 13061-1 and ISO 13061-2, respectively.

8 Calculation and expression of results

8.1 The impact bending strength, A_W, of each test piece at a moisture content, W, at the time of test, shall be calculated, in kJ/m^2, using Formula (1):

$$A_W = \frac{1\,000 \times Q}{b \times h} \tag{1}$$

where

Q is the energy required for fracture of the test piece, in J;

b and h are the dimensions of the test piece in the radial and tangential directions, in mm.

The results shall be expressed to a precision of 1 kJ/m^2.

8.2 When required, the impact bending strength, A_W, shall be adjusted to a 12 % moisture content to an accuracy of 1 kJ/m^2 using nationally or internationally recognized method.

NOTE An approximate adjustment of the impact bending strength to 12 % moisture content can be done using the following formula, which is valid for moisture contents of (12 ± 5) %:

$$A_{12} = A_W \left[1 + \alpha (W - 12)\right]$$

where

α is the correction factor for the moisture content, whose value shall be obtained from a national standard or an internationally recognized method;

W is the moisture content of the wood, determined according to ISO 13061-1.

8.3 The mean and the standard deviation of the results obtained for the individual test pieces in a sample shall be calculated to a precision of 1 kJ/m^2.

9 Test report

The test report shall include the following particulars:

a) a reference to this document, i.e. ISO 13061-10;

b) sampling details in accordance with ISO 3129;

c) details concerning the sizes of the test pieces;

d) test results and their statistical values calculated as specified in Clause 8;

e) moisture content and density of each test piece measured in accordance with ISO 13061-1 and ISO 13061-2, respectively;

f) method used for the adjustment of the test results to a 12 % moisture content, if applicable;

g) direction of bending;

h) form of fracture;

i) date when the test was carried out;

j) name of the organization which carried out the test.