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

**Part 12:
Determination of static hardness**

iTeh STANDARD PREVIEW
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*Propriétés physiques et mécaniques du bois — Méthodes d'essais sur
petites éprouvettes de bois sans défauts —
Partie 12: Détermination de la dureté statique*

ISO 13061-12:2017

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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. (standards.iteh.ai)

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

This first edition of ISO 13061-12 cancels and replaces ISO 3350:1975, 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.

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

Part 12: Determination of static hardness

1 Scope

This document specifies a method for determining of the static hardness of wood by measuring resistance of a test piece to the penetration of a plunger under gradually increasing load.

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 tests*

ISO 13061-1, *Physical and mechanical properties of wood — Test methods for small clear 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 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 given 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 static hardness of wood is determined by measuring the resistance of a test piece to the penetration of a plunger to a specified depth under gradually increasing load.

5 Apparatus

5.1 Testing machine, ensuring the rate of movement of the loading head according to 7.1 and allowing measurement of the load to a precision of 1 %.

5.2 Device consisting of a body, a plunger with a hemispherical tip of radius 5,64 mm ± 0,01 mm, and an instrument for measuring linear movements to a precision of 0,01 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 The test pieces shall be prepared in the form of right prisms having a square cross-section of 50 mm × 50 mm and the length along the grain not less than 50 mm.

If the static hardness is measured in all three directions, the length along the grain shall be at least 50 mm. If only one side is tested, then the height of the test piece in the direction of loading may be reduced as long as splitting does not occur and the test face shall be 50 mm × 50 mm.

6.3 Moisture content of test pieces

6.3.1 Test pieces can be tested in green or in 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 $(65 \pm 5) \%$ and a temperature of $(20 \pm 2) ^\circ\text{C}$.

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 Apply the load to the plunger on the centre line of the radial, tangential or end surface of the test piece at a constant speed of 3 mm/min to 6 mm/min. When the depth of indentation equal to the radius of the hemispherical tip of the plunger (5,64 mm) or, if splitting of the test piece occurs, to a depth of 2,82 mm, is reached, read the load to the accuracy specified in 5.1.

NOTE Starting point of the indentation is determined when the plunger physically contacts the test piece and the load increases, or is about to continuously increase.

7.2 As soon as the test has been completed, cut a portion of the test piece having indentation marks as the test piece for the determination of moisture content in accordance with ISO 13061-1. Density shall be determined using the undamaged portion of the test piece in accordance with ISO 13061-2.

8 Calculation and expression of results

8.1 The static hardness, H_W , of each test piece at a moisture content, W , at the time of test, shall be calculated as the load, in Newtons, necessary to obtain an indentation whose area of projection is equal to 1 cm², using [Formula \(1\)](#):

$$H_W = K \times F \quad (1)$$

where

- F is the maximum load during the penetration of the plunger into the test piece to the specified depth, in newtons;
- K is the coefficient equal to 1 and 4/3 in the case of penetration of the plunger to a depth of 5,6 4mm and 2,82 mm, respectively.

The results shall be expressed to a precision of 1 N. The depth of penetration of the plunger shall be reported.

8.2 When required, the static hardness of the test piece H_W shall be adjusted to 12 % moisture content using a nationally or an internationally recognized method.

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

$$H_{12} = H_W [1 + \alpha (W - 12)]$$

where

- α is the correction factor for 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 N.

9 Test report

ISO 13061-12:2017

The test report shall include the following particulars:

- a) a reference to this document, i.e. ISO 13061-12;
- b) sampling details in accordance with ISO 3129;
- c) details concerning the sizes of the test pieces;
- d) depth of penetration of the the plunger;
- e) test results and their statistical values calculated as specified in [Clause 8](#);
- f) moisture content and density of each test piece measured in accordance with ISO 13061-1 and ISO 13061-2, respectively;
- g) method used for the adjustment of the test results to a 12 % moisture content, if applicable;
- h) direction of loading and depth of penetration of the plunger;
- i) speed of testing;
- j) date when the test was carried out;
- k) name of the organization which carried out the test.