INTERNATIONAL STANDARD

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

Part 8: Determination of ultimate strength in shearing parallel to grain

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

Partie 8: Détermination de la contrainte de rupture en cisaillement parallèle aux fibres

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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 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 218, *Timber*.

This first edition of ISO 13061-8 cancels and replaces ISO 3347:1976, which has been technically revised.

The main changes are as follows:

— sizes, moisture content of test pieces;

— adjustment for moisture content;

— reformulation of sentences for clarity;

— minor editorial changes have been made to align with ISO/IEC Directives Part 2:2021.

A list of all parts in the ISO 13061 series can be found on the ISO website, under the general title *Physical and mechanical properties of wood — Test methods for small clear wood specimens*.

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.

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 8: Determination of ultimate strength in shearing parallel to grain

1 Scope

This document specifies a method for determining the ultimate strength in shearing parallel to grain of small clear wood specimens by measuring the breaking load applied statically along the radial or the tangential plane of a test piece.

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 specimens*

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 given in ISO 24294 and the following apply.

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

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

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

4 Principle

The ultimate strength in shearing parallel to grain is determined by the application of a gradually increasing shearing load along the grain of a test piece until failure.

5 Apparatus

5.1 Testing machine, capable of ensuring a constant rate of loading of the test piece or of movement of the loading head and allowing the measurement of the load to a precision of 1 %.

5.2 Device, ensuring the maximum shearing stresses in the shearing plane of the test piece.

5.3 Measuring instrument, capable of measuring the dimensions of the test piece to the nearest 0,1 mm.

5.4 Equipment for the determination of moisture content and density, which shall be 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 shape of the test piece shall be such as to minimize the stress normal to the shearing surface. The width of the test piece shall be 20 mm to 50 mm and the length of the shearing surface shall be 20 mm to 50 mm. The shearing surface shall be made in a radial or tangential plane.

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 to or exceed the 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 width of the test piece and the length of the expected shearing surface in the plane of expected shear to the nearest 0,1 mm.

7.2 Ensure that bearing surfaces of the test piece are in contact with the appropriate surfaces of the device (5.2).

7.3 Load the test piece using the testing machine (5.1).

7.4 The load shall be applied continuously at a constant rate of loading or a constant rate of movement of the loading head such that the test piece is broken in not less than 1 min and not more than 5 min after start of loading. Read the maximum load to the accuracy specified in 5.1.

NOTE Mechanical properties of wood depend on the speed of testing. Therefore, it is important to select the speed of testing appropriate for the purpose of the test program and include it in the report.

7.5 As soon as the test has been completed, take the larger remaining portion of the test piece for the determination of the moisture content and density according to ISO 13061-1 and ISO 13061-2, respectively.

8 Calculation and expression of results

8.1 The ultimate strength in shearing parallel to grain in the radial or tangential direction, τ_W, for each test piece at a moisture content W at the time of test, shall be calculated, in N/mm^2 (MPa), using Formula (1):

$$\tau_W = \frac{P_{\max}}{bl} \tag{1}$$

where

$P_{\max}$ is the maximum load, in N;

b is the width of the test piece, in mm;

l is the length of the shearing surface, in mm.

The results shall be expressed to the nearest 0,1 N/mm^2 (MPa).

8.2 When required, the ultimate strength, τ_W, shall be adjusted to a 12 % moisture content to the nearest 0,1 N/mm^2 (MPa) using nationally or internationally recognized method.

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

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

where

α is the correction factor for the moisture content which shall be obtained from either national standards or an internationally recognized method;

W is the moisture content of the test piece, 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 0,1 N/mm^2 (MPa).

9 Test report

The test report shall include the following information:

a) a reference to this document, i.e. ISO 13061-8:2022;

b) sampling details in accordance with ISO 3129;

c) details concerning the test pieces;

d) time to failure;

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

f) moisture content and density of wood 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) speed of testing;

i) direction, radial or tangential, of the loading;