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

**Part 17:
Determination of ultimate stress in
compression parallel to grain**

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

*Partie 17: Détermination de la contrainte maximale en compression
longitudinale*



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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).

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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 13061-17 cancels and replaces ISO 3787:1976, 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 17:

Determination of ultimate stress in compression parallel to grain

1 Scope

This document specifies a method for determining the ultimate stress in compression parallel to grain 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 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 ultimate stress in compression parallel to grain is determined by application of a gradually increasing load in direction parallel to grain of a test piece until failure.

5 Apparatus

5.1 Testing machine capable of ensuring constant rate of loading or of movement of the loading head in accordance with 7.2 and allowing measurement of the load to a precision of 1 %.

5.2 Uniform-loading device consisting of at least one of self-aligning plates of hardened steel, whose spherical surfaces are in contact to provide uniform distribution of load over the ends of the test piece.

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

5.4 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 prepared in the form of rectangular prisms having a square cross-section of side of at least 20 mm and length along the grain 1,5 to 4 times the side. When testing wood with growth rings more than 4 mm wide, the cross-sectional dimensions shall be increased so that the test piece contains not less than five growth rings.

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

7.2 Load the test piece using the uniform-loading device (5.2). The speed of testing (at a constant rate of loading or constant rate of movement of the loading head of the machine) shall be such that the ultimate load is reached in not less than 1,0 min and not more than 5 min after the start of loading. Continue the test until the test piece is broken. Determine the maximum load (F_{max}), to a precision in accordance with that specified in 5.1.

7.3 As soon as the test has been completed, determine the moisture content of the test piece in accordance with ISO 13061-1.

7.4 Determine the density of the test piece in accordance with ISO 13061-2 using dimensions measured prior to the loading (7.1) as the volume of the test piece changes after the test.

8 Calculation and expression of results

8.1 The ultimate stress in compression parallel to the grain, $\sigma_{c,0,W}$, of each test piece at a moisture content, W , at the time of test, shall be calculated, in N/mm² (MPa), using the [Formula \(1\)](#):

$$\sigma_{c,0,W} = \frac{F_{\max}}{a \times b} \quad (1)$$

where

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

a and b are the cross-sectional dimensions of the test piece, in mm.

The results shall be expressed to a precision of 0,1 N/mm² (MPa).

8.2 When required, the ultimate stress, $\sigma_{c,0,W}$, shall be adjusted to 12 % moisture content using nationally or internationally recognized method.

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

$$\sigma_{12} = \sigma_W [1 + \alpha(W - 12)]$$

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 N/mm² (MPa).

9 Test report

The test report shall include the following particulars:

- a reference to this document, i.e. ISO 13061-17;
- sampling details in accordance with ISO 3129;
- details concerning the sizes of the test pieces.
- time to failure;
- test results and their statistical values calculated as specified in [Clause 8](#);
- moisture content and density of each test piece measured in accordance with ISO 13061-1 and ISO 13061-2, respectively;
- method used for the adjustment of the test results to a 12 % moisture content, if applicable;
- mode of failure;
- speed of testing;