INTERNATIONAL STANDARD 3132

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Wood — Testing in compression perpendicular to grain

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3132 was drawn up by Technical Committee ISO/TC 55, *Sawn timber and sawlogs*, and circulated to the Member Bodies in June 1973.

It has been approved by the Member Bodies of the following countries :

Australia	France	Poland
Austria	Hungary	Romania
Belgium	India	South Africa, Rep. of
Bulgaria	Ireland	Sweden
Canada	Italy	Thailand
Chile	Mexico	Turkey
Czechoslovakia	Netherlands	U.S.S.R.
Egypt, Arab Rep. of	Norway	Yugoslavia

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Germany
Japan
United Kingdom

Printed in Switzerland

Wood — Testing in compression perpendicular to grain

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method of testing wood in compression perpendicular to the grain to determine the proportional limit (conventional ultimate strength), the load being applied to the whole surface (radial or tangential) of the test piece.

2 REFERENCES

ISO 3129, *Wood — Sampling methods and general requirements for physical and mechanical tests.*

ISO 3130, *Wood — Determination of moisture content for physical and mechanical tests.*

3 PRINCIPLE

Determination, from a load-deformation diagram, of the ordinate of the point where the tangent of the angle formed by the tangent to the curve with the load axis is 50 % greater than its value in the linear portion of the diagram. Estimation of the stress at the load corresponding to the ordinate.

4 APPARATUS

4.1 Testing machine with a device graduated in intervals of not more than 50 N/mm to record load and graduated in intervals of not more than 0,01 mm/mm to record the deformation of the test piece. A testing machine measuring the load to an accuracy of 1 % and a device measuring the deformation of the test piece to an accuracy of 0,01 mm shall be used in cases where a machine with a recording device is not available.

4.2 Uniform-loading device consisting of two self-aligning plates of hardened steel, whose spherical surfaces are in contact.

4.3 Measuring instrument capable of determining the dimensions of the test pieces to an accuracy of 0,1 mm.

4.4 Equipment for the determination of moisture content in accordance with ISO 3130.

5 PREPARATION OF TEST PIECES

5.1 Test pieces shall be prepared in the form of right prisms having a square cross-section of side 20 mm and length along the grain from 30 to 60 mm. When testing wood with growth rings more than 4 mm wide, the cross-sectional dimensions may be increased so that the test piece has not less than five rings.

5.2 The preparation, moisture content and number of test pieces shall be in accordance with ISO 3129.

6 PROCEDURE

6.1 Measure, to an accuracy of 0,1 mm, the widths (in a tangential direction for radial compression or in a radial direction for tangential compression) and length of the test pieces along their axes of symmetry.

6.2 Load the test piece using the uniform-loading device (4.2). 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 proportional limit (conventional ultimate strength) is reached in 1,5 ± 0,5 min after the start of loading.

6.3 When using a testing machine without a recording device, determine the deformation of the test piece by the dial gauge to an accuracy of 0,01 mm at equal intervals of load increase. The interval shall be at least 10 times smaller than the load corresponding to the proportional limit. Load increase intervals of 200 N for soft wood and 400 N for hard wood may be used.

6.4 Continue the test until the proportional limit (conventional ultimate strength) has obviously been exceeded, as can be seen in the diagram of the testing machine or by an appreciable increase in the rate of deformation of the test piece.

6.5 After the test has been carried out, determine the moisture content, when required, according to ISO 3130.

Take a central portion of the test piece 25 ± 5 mm long as the sample for determination of moisture content. To determine the mean moisture content, it is permissible to use only some of the test pieces. Calculate the minimum number of the test pieces to be used for the determination of moisture content in accordance with ISO 3129.

7 CALCULATION AND EXPRESSION OF RESULTS

7.1 The load corresponding to the proportional limit (conventional ultimate strength) shall be determined from the diagram of compression perpendicular to grain as the ordinate of the point where the tangent of the angle formed by the tangent to the curve with the load axis is 50 % greater than its value in the linear portion of the diagram.

When a testing machine without recording device is used a graph shall be plotted, using a scale of not more than 50 N/mm on the load axis (ordinates) and of not more than 0,01 mm/mm on the deformation axis (abscissae).

7.2 The proportional limit in compression perpendicular to the grain, σ_{yW}, (conventional ultimate strength) at the moisture content W at the time of test is given, in megapascals, by the formula :

$$\sigma_{yW} = \frac{P}{al}$$

where

P is the load, in newtons, corresponding to the proportional limit in compression perpendicular to the grain (conventional ultimate strength);

a and l are respectively the width and length, in millimetres, of the test piece.

Express the result to the nearest 0,1 MPa.

7.3 When necessary, the proportional limit (conventional ultimate strength), σ_{yW}, shall be adjusted to a 12 % moisture content to an accuracy of 0,1 MPa according to the formula :

$$\sigma_{y12} = \sigma_{yW}\,[1 + \alpha(W - 12)]$$

where

α is the correction factor for the moisture content, whose value shall be obtained from national standards;

W is the moisture content of the wood, calculated according to ISO 3130.

7.4 The proportional limit (conventional ultimate strength) of the test pieces cut out from one piece of the selected material shall be calculated to an accuracy of 0,1 MPa as the arithmetic mean of the test results of the individual test pieces.

8 TEST REPORT

The test report shall contain the following particulars :

a) a reference to this International Standard;

b) details concerning sampling of the test pieces;

c) the length of the test piece;

d) details in accordance with clause 7 of ISO 3129;

e) the test results calculated as specified in clause 7, and their statistical values;

f) the value of the coefficient α used for the adjustment of the test results to a 12 % moisture content.