INTERNATIONAL STANDARD 3351

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Wood — Determination of resistance to impact indentation

Bois — Détermination de la résistance à la pénétration dynamique

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FOREWORD

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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 3351 was drawn up by Technical Committee ISO/TC 55, *Sawn timber and sawlogs,* and circulated to the Member Bodies in February 1974.

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

Belgium	India	Spain
Bulgaria	Ireland	Sweden
Canada	Netherlands	Turkey
Czechoslovakia	New Zealand	United Kingdom
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The Member Body of the following country expressed disapproval of the document on technical grounds :

Germany

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Wood — Determination of resistance to impact indentation

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for determining the resistance of wood to impact indentation.

2 REFERENCES

ISO 3129, *Wood — Sampling methods and general requirements for physical and mechanical tests.* [1)]

ISO 3130, *Wood — Determination of moisture content in physical and mechanical tests.* [1)]

3 PRINCIPLE

Determination of the resistance of the surface layer of a test piece to impact indentation by a steel ball.

4 APPARATUS

4.1 Device consisting of

a) a steel ball (density 7,8 g/cm^3) 25 ± 0,05 mm in diameter;

b) an arrangement for dropping the ball from a height of 500 ± 1 mm;

c) a massive base-plate;

d) a mechanism for pressing the test piece against the plate.

4.2 Measuring device for determining the diameter of indentations to an accuracy of 0,1 mm.

4.3 Carbon paper.

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

5 PREPARATION OF TEST PIECES

5.1 The 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 150 mm.

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

6 PROCEDURE

6.1 Press the test piece, with the carbon paper placed on it, closely against the base-plate of the device (4.1). Make three indentations on a radial surface of the test piece and three on a tangential surface, by the impact of the steel ball falling freely from a height of 500 mm (measured from the lowest point of the ball surface). The distance between the centres of the indentations shall be about 40 mm.

6.2 Measure, to an accuracy of 0,1 mm, the dimensions, parallel and perpendicular to the grain, of the impressions left on the test piece by the carbon paper after the impact of the steel ball.

6.3 After completing the test, determine the moisture content of the test pieces according to ISO 3130.

Take a portion of the test piece 100 mm long and 5 mm thick having indentation marks 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. The minimum number of test pieces for moisture content determination shall be in accordance with ISO 3129.

7 CALCULATION AND EXPRESSION OF RESULTS

7.1 The resistance of each test piece to impact indentation, H_{WV}, at a moisture content W at the time of test is given, in kilojoules per square metre, by the formula :

$$H_{WV} = \frac{4\,000\,mgh}{\pi\,d_0^2}$$

where

m is the mass of the ball, in kilograms;

g is the acceleration due to gravity, in metres per second squared;

1) At present at the stage of draft.

h is the height through which the ball falls, in metres;

d_0 is the average diameter of the identation, in millimetres, to an accuracy of 0,01 mm, given by the formula

$$d_0 = \sqrt{d_1 d_2}$$

where d_1 and d_2 are the dimensions of the indentation parallel and perpendicular to the grain, in millimetres.

Calculate the arithmetic mean of the results of three determinations on the same test piece and express the result to an accuracy of 0,1 kJ/m².

7.2 When necessary the resistance to impact indentation, H_{Wv}, shall be adjusted to a 12 % moisture content to an accuracy of 0,1 kJ/m² by the following formula which is valid for a moisture content of 12 ± 3 % :

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

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

7.3 The average resistance to impact indentation of the test pieces shall be calculated to an accuracy of 0,1 kJ/m² as the arithmetic mean of the test results obtained on the individual test pieces.

7.4 The dissimilarity ratio β of the resistance to impact indentation of a test piece is given by the formula :

$$\beta = \left(\frac{d_1'}{d_2'} \right)^2$$

where

d_1' is the arithmetic mean of the dimensions of three indentations measured perpendicular to the grain, in millimetres;

d_2' is the arithmetic mean of the dimensions of three indentations measured parallel to the grain, in millimetres.

Express the result to an accuracy of 0,01.

7.5 The dissimilarity ratio of the resistance to impact indentation of the test pieces shall be calculated to an accuracy of 0,01 as the arithmetic mean of the dissimilarity ratios of individual test pieces.

8 TEST REPORT

The test report shall include the following particulars :

a) a reference to this International Standard;

b) details in accordance with 6.4 of ISO 3129;

c) a description and the volume of the material submitted (the stand and the number of trees sampled, the lot of sawn timber and the number of boards sampled);

d) the number of test pieces tested;

e) the direction of impact of the ball (radial or tangential);

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

g) if necessary, the value of the coefficient α used in 7.2 for the adjustment of the test results to a 12 % moisture content;

h) the date when the test was carried out;

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

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