

INTERNATIONAL
STANDARD

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**Wood — Determination of nail and screw
holding power under axial load application**

*Bois — Détermination de la résistance à l'arrachement des pointes et des
vis à bois à l'application axiale de la charge*

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Reference number
ISO 9087:1998(E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9087 was prepared by Technical Committee ISO/TC 165, *Timber structures*.

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Wood — Determination of nail and screw holding power under axial load application

1 Scope

This International Standard specifies a method for determining the specific resistance of wood to the extraction of nails and screws.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3129:1975, *Wood — Sampling methods and general requirements for physical and mechanical tests.*

ISO 3130:1975, *Wood — Determination of moisture content for physical and mechanical tests.*

ISO 3131:1975, *Wood — Determination of density for physical and mechanical tests.*

3 Principle

Determination of the maximum axial force required to extract a nail or a screw, and calculation of the specific resistance of the wood as a ratio of this force to the depth of nail or screw penetration.

4 Apparatus

4.1 Testing machine, capable of measuring the load to an accuracy of ± 1 %.

4.2 Device for extracting nails and screws, capable of ensuring the application of the extraction force along their axes.

4.3 Measuring instrument, capable of measuring the diameter of nails and screws to an accuracy of $\pm 0,1$ mm.

4.4 Measuring instrument, capable of measuring linear dimensions to an accuracy of ± 1 mm.

4.5 Equipment for determining the moisture content, in accordance with ISO 3130.

5 Preparation of test pieces

5.1 Test pieces shall be cut in the form of a rectangular prism with square sections having dimensions no smaller than those shown in figure 1.

Dimensions in millimetres

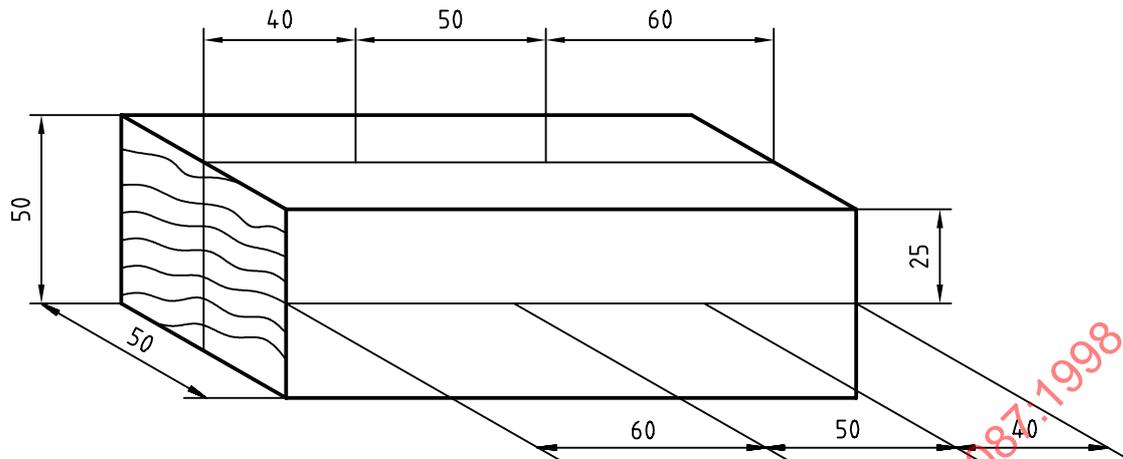


Figure 1 — Marking of test piece for insertion of nails or screws

When test pieces of other dimensions are used, the area for the insertion of nails or screws shall be as close as possible to the central vertical axis of the test piece. Test pieces shall have sufficient dimensions to avoid splitting when the nails or screws are being hammered or screwed.

5.2 Holes for screws shall be drilled so as to ensure insertion of the screws by hand. Diameters of the holes shall be of a size which provides optimal screwing force consistent with maximum resistance to extraction. The drilling depth shall not be less than the length of the screw thread.

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

5.4 The characteristics of the nails or screws shall be recorded in the test report. Nails and screws selected shall be free of oil or grease.

It is not permissible to use rusted, distorted, blunted, or asymmetric (in relation to the head) nails and screws.

Each nail or screw shall be used for only one test.

6 Procedure

6.1 Drive two nails or two screws into the test piece at a right angle to the surface in the radial and tangential directions and in the direction along the grain, in accordance with the layout shown in figure 1. The depth of nail penetration, disregarding a sharpened tip, shall be two-thirds of the nail length, and for screw penetration the length of their thread (with screws threaded up to the head, the depth of penetration shall be two-thirds of the threaded length, taking a sharpened tip into consideration). The depth of penetration of nails and screws shall be measured to an accuracy of ± 1 mm.

6.2 Extract the nails or the screws between 2 h and 3 h after their insertion.

Place the test piece with the nails or the screws in the device (4.2) so as to ensure the axial application of the load. Extract the nails or the screws with a continuous movement of the head of the testing machine at a constant rate. The rate of movement shall be such that the time taken for extraction is between 1 min and 2 min. Calculate the maximum load, F_{\max} , to an accuracy of ± 1 %.

6.3 After completion of testing, determine the moisture content of the test pieces in accordance with ISO 3130. Take as a sample a length of 5 mm, cut from the central portion of the test piece. The minimum number of test pieces for determination of moisture content shall be in accordance with ISO 3129.

Test pieces with a moisture content which differs from the standardized value by more than 2 % shall be rejected.