BRITISH STANDARD

BS EN 15737:2009

# Timber Structures — Test methods — Torsional resistance of driving in screws

ICS 91.080.20



BSI
British Standards

# National foreword

This British Standard is the UK implementation of EN 15737:2009.

The UK participation in its preparation was entrusted to Technical Committee B/518, Structural timber.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2009



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EUROPEAN STANDARD

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**EN 15737**

August 2009

ICS 91.080.20

English Version

# Timber Structures - Test methods - Torsional resistance of driving in screws

Structures en bois - Méthodes d'essai - Force de torsion et résistance au vissage

Holzbauwerke - Prüfverfahren - Einschraubdrehmoment von Schrauben

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**Management Centre: Avenue Marnix 17, B-1000 Brussels**

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# Foreword

This document (EN 15737:2009) has been prepared by Technical Committee CEN/TC 124, "Timber Structures", the secretariat of which is held by SFS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2010, and conflicting national standards shall be withdrawn at the latest by February 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This test standard provides information how to determine the torsional resistance to insertion of screws into timber with a reference to requirements specified in EN 14592.

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# 1 Scope

This standard specifies a test method to determine the torsional resistance to driving of screws in solid timber or glued laminated timber or other wood based materials.

# 2 Normative references

The following referenced documents are essential to the use 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.

EN 14592:2008, *Timber Structures – Dowel type fasteners - Requirements*

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

ISO 3131, *Wood – Determination of density for physical and mechanical tests*

# 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1**
**Moment cell**
device that records the torque applied

**3.2**
**Test piece**
element or part of an element that will include the driven screw after the test made of solid timber, glued laminated timber or wood based materials or combinations of these materials

# 4 Symbols

$P$ Penetration ratio;

$R_{tor,max}$ maximum screw insertion moment, in Newton millimetre;

$R_{tor,r}$ screw insertion resistance, in Newton millimetre;

$R_{tor,s}$ screw insertion strength, in Newton millimetre;

$d$ nominal diameter, in millimetre;

$l$ is total length of the screw, in millimetre.

# 5 Material requirements

## 5.1 Fasteners

The screws shall comply with the requirements given in 6.3 of EN 14592:2008

# 6 Test Methods

## 6.1 General

The moisture content and density of the test piece shall be determined according to ISO 3130 and ISO 3131.

## 6.2 Conditioning

The test pieces shall be manufactured at an equilibrium moisture content corresponding to (20 ± 2) °C and (65 ± 5) % relative humidity. The material is conditioned when it attains constant mass. Constant mass is considered to be attained when the results of successive weightings, carried out at an interval of 6 h, do not differ, by more than 0,1 % of the mass of the material.

For further investigations other moisture conditioning can be appropriate, and shall be reported.

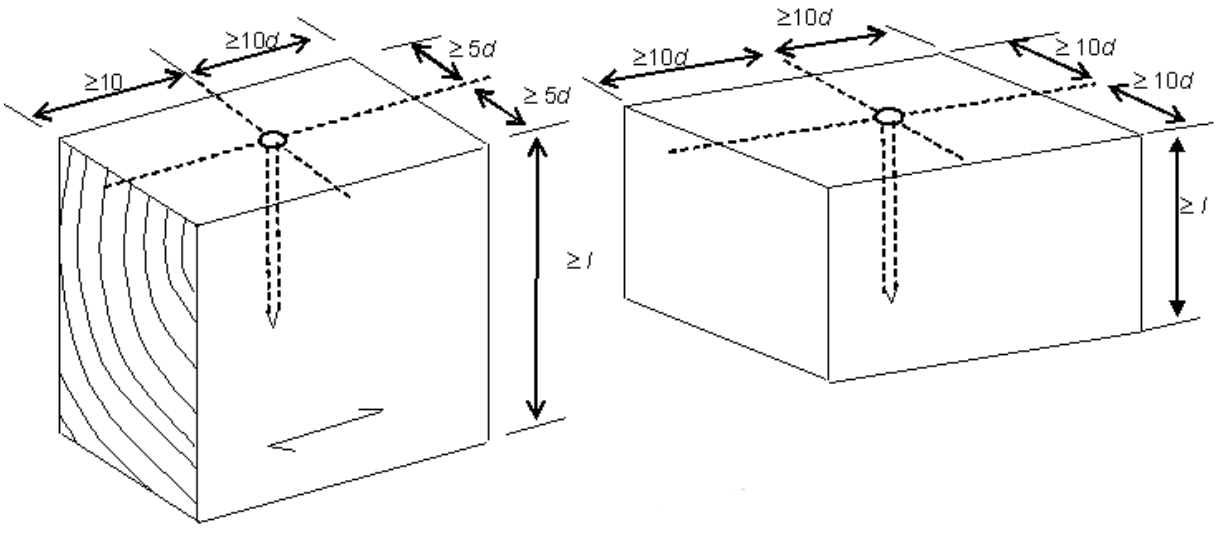
## 6.3 Sampling

The density of the test pieces or components of the test piece shall comply with the density of the grade used in practise.

The upper surface (receiving the point) shall predominantly be radial or tangential.

## 6.4 Test piece dimensions

For solid timber and glued laminated timber test pieces the minimum dimensions are given in Figure 1. For test pieces made of wood based materials or combinations of wood based materials and solid timber or glued laminated timber the dimensions in the direction perpendicular to penetration shall be as minimum 20 *d*, where d is the nominal diameter of the screw. The test piece dimension in penetration direction shall always allow full penetration of the screw.




**Key**

*d* screw nominal diameter

*l* total length of the screw

grain direction

**Figure 1 — Test piece of solid wood (left) and wood based materials (right)**

# 7 Test

## 7.1 Test setup

The test piece is mounted on the base plate of a frame and fixed in such a way as to prevent any movement during the test.

The test rig should allow fixing a moment cell to the screwing device capable of moving in a vertical axis and mounting displacement transducers on either side of the screwing device to measure vertical displacement. An example is given in Figure 2.

The moment cell used shall be capable of measuring the torque to an accuracy of 1 % of the torque applied to the screw.

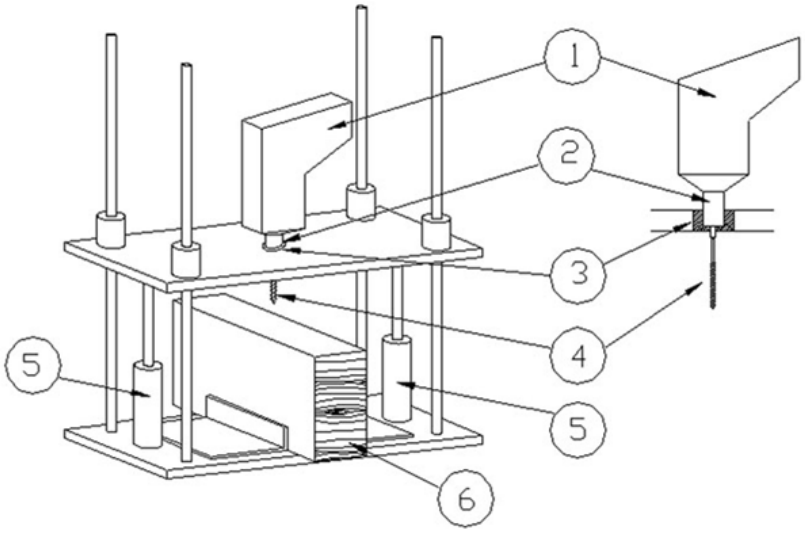
The equipment for measuring displacement shall be capable of measuring to an accuracy of 1 % of the measured value.

## 7.2 Procedure

Fix a drive bit into the moment cell and mount a screw into the bit. The screw should be installed according to the manufacturer's instructions, including any advice on pre-drilling requirements.

Move the cross-head/screw assembly into a position where the screw tip is resting on the top of the test specimen.

Drive the screw into the test specimen, either by using a mechanical drill or screwing machine, or by using a hand screw wrench (≤ 100 revolutions per minute), until the screw is fully embedded along its entire length in the specimen. For countersunk screws this includes the thickness of the head.




**Key**

1 Mechanical drill, screwing machine, or hand screw wrench, screwing device

2 Drill chuck/bit

3 Moment cell

4 Screw

5 Displacement transducers

6 Timber

**Figure 2 — Example of a test arrangement for screw insertion in timber**

The vertical displacement of the cross-head to screw assembly shall be recorded via the displacement transducers, and the screw insertion moment shall be recorded via the moment cell.

### 7.3 Results

Determine for each specimen the maximum value of the screw insertion moment, $R_{tor,max}$ prior to the point at which the screw head comes into contact with the test piece surface given by the moment cell.

## 8 Test report

### 8.1 Test piece

The following information shall be given:

a) technical specification of the screw and relevant information on their sampling;

b) description of the test piece, specification of the material, species or type, grade, density, moisture content, deviations from specifications, characteristics near the insertion point that might affect the result;

c) sizes of the test pieces;

d) method of conditioning;

e) position and orientation of the screw;

f) details of predrilling (including any countersink);

g) any other information, which may have influenced the test results.

### 8.2 Test method

The following information shall be given:

a) reference to this test standard;

b) test method applied - insertion method and speed;

c) temperature and relative humidity at the time of test;

d) description of the testing device, the test equipment and the measuring instruments;

e) any other information which may have influenced the test results.

### 8.3 Test results

The following information for each test piece shall be given:

a) maximum value of the screw insertion moment;

b) moisture content of the test piece material;

c) actual dimensions, position of the insertion point;

d) location of failure if any in the test piece or screw;

e) plot of the moment to penetration depth for each specimen;

f) any other information, which may have influenced the test results.

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