BRITISH STANDARD

BS EN 15736:2009

Timber Structures — Test methods — Withdrawal capacity of punched metal plate fasteners in handling and erection of prefabricated trusses

ICS 91.080.20

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 15736:2009.

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.

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Timber Structures - Test methods - Withdrawal capacity of punched metal plate fasteners in handling and erection of prefabricated trusses

Structures en bois - Méthode d'essai - Résistance à l'arrachement des connecteurs à plaque métallique emboutie

Holzbauwerke - Prüfverfahren - Ausziehwiderstand von Nagelplatten unter Transport- und Montagezuständen in vorgefertigten Fachwerkträgern

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 15736:2009) 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of an identical text or by endorsement, at the latest by February 2010, and conflicting national standards shall be withdrawn at the latest by February 2010.

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For safe handling of trusses with punched metal plate fasteners accidental loads during the time between productions and erection should not cause damage that impairs the structural performance as outlined 9.2.1 (7)P of EN 1995-1-1:2004. This test method provides information about the sensitivity of the punched metal plate fasteners to resist these types of actions.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies a test method to determine the withdrawal behaviour of punched metal plate fasteners.

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 1075:1999, *Timber Structures – Test methods – Joints made with punched metal plate fasteners*

EN 14250, *Timber Structures –Product requirements for prefabricated structural members assembled with punched metal plate fasteners*

EN 14545, *Timber Structures – Connectors requirements*

EN 26891, *Timber Structures – Joints with mechanical fasteners – General principles for the determination of strength and deformation characteristics (ISO 6891:1983)*

EN 28970, *Timber Structures – Testing of joints with mechanical fasteners – Requirements for wood density (ISO 8970:1989)*

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
Depth
refers to the depth of the test piece and testing in bending. As the tests are conducted in flat wise bending this will relate to the thickness of the timber and therefore to the smallest cross-sectional dimension

3.2
Width
refers to the width of the test piece as tested; the largest cross-sectional dimension

4 Symbols

h depth;

b width;

w_m centre span displacement in the bending test, in millimetre;

w_v relative displacement in the shear test, in millimetre.

5 Material requirements

5.1 Timber

Timber members shall comply with the requirements given in EN 14250.

The timber shall be selected in accordance with EN 28970.

5.2 Fasteners

The punched metal plate fasteners shall comply with the requirements given in EN 14545.

6 Test Methods

6.1 General

The moisture content and density of the timber at test shall be determined as specified by ISO 3130 and ISO 3131 as appropriate.

6.2 Conditioning

The test pieces shall be manufactured with the timber 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 Production of the test pieces

The fabrication of the joints shall comply with EN 14250.

6.4 Sampling

Void

7 Test procedure

7.1 General

This European Standard specifies two methods for testing.

7.2 Method 1 – Four point bending

7.2.1 Test piece

The test piece consists of two timber members of equal length and cross-section, which are joined by symmetrically positioned punched metal plates (see Figure 1 and Figure 2). The requirements of 6.1 and 6.3 of EN 1075:1999 apply. The test piece shall be fabricated so that the pieces of timber in the test piece are separated by a gap of not less than 4 mm. The test piece shall have a minimum length of 19 times the depth of the cross-section. When this is not possible, the span to depth ratio shall be reported.

7.2.2 Procedure

The test piece shall be symmetrically loaded in flat wise bending at two points over a span of 18 times the depth of the timber as shown in Figure 1. If the test piece and equipment do not permit these conditions to be achieved exactly, the distance between the load points and supports may be changed by an amount not greater than 1,5 times the piece depth, and the span and the test piece length may be changed by an amount not greater than 3 times the piece depth, while maintaining the symmetry of the test. The joint is positioned centrally between the supports.

The test piece shall be simply supported.

NOTE 1 Small steel plates of length not greater than the depth of the test piece may be inserted between the piece and the loading heads or supports to minimize local indentation

Load shall be applied according to EN 26891.

NOTE 2 The loading rate should be determined from the results of preliminary tests.

The loading equipment used shall be capable of measuring the load to an accuracy of 1 % of the maximum load applied to the test piece.

The deformation, w_m shall be taken as the average of the measurements on both faces at the neutral axis, and shall be measured at the centre of the span (see Figure 1).

The measurement equipment used shall be capable of measuring deformation to an accuracy of 1 % or, for deformations less than 2 mm, with an accuracy of 0,02 mm.

If the test configuration differs from the above in any way then these differences are recorded.

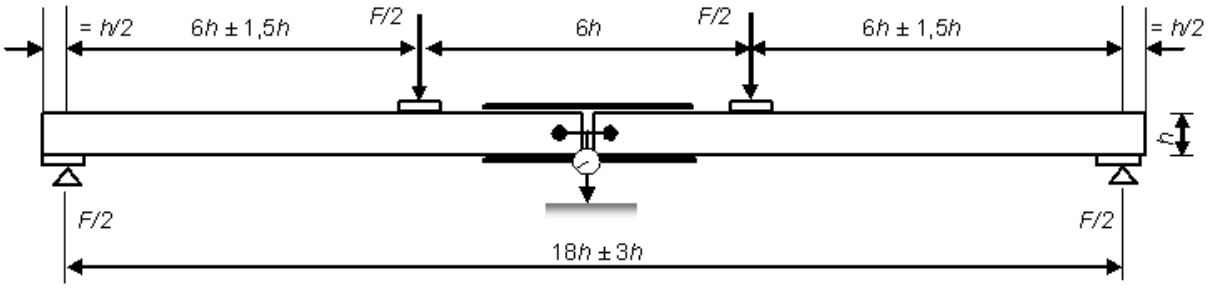
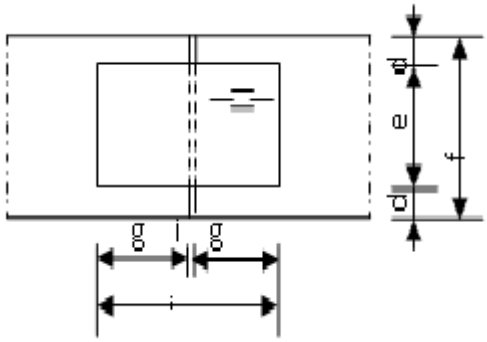


Figure 1 — Test arrangement for measuring the local withdrawal in bending

The withdrawal bending load is defined as the maximum load before the gap is closed at the compression size of the connection.



Key

d	edge distance	g	overlap
e	plate width	i	gap
f	timber width	j	total plate length

Figure 2 — Top view of specimen at mid span

7.3 Method 2 – Shear test

7.3.1 Test piece

The test piece consists of two timber pieces of equal depth that are joined together at right angles by punched metal plates forming a symmetrical T-shape test specimen (see Figure 3). The requirements of 6.1 and 6.3 of EN 1075:1999 apply. The member with the largest length shall have a minimum length of 10 times the depth of the cross-section. The short member is centrally joined by punched metal plates to the long member at right angles and is simply supported at both ends. A gap of 10 ± 2 mm exist between support and the longest member (see Figure 3). The total length of the short piece equals the width of the large member plus twenty millimetres plus twice the support length. The support length is equal to the width of the short member. When this is not possible the other dimensions shall be shall be reported.

7.3.2 Procedure

The test piece shall be loaded at a distance of 4 times the depth of the timber from the gap between the large and short member (see Figure 3). The distance between the load point and support may be changed by an amount not greater than the depth if the test piece and equipment do not permit these conditions to be achieved exactly.

For the same reason, the support length of the smallest piece may be changed by an amount not greater than 0,2 times the width, while maintaining the symmetry of the test.

NOTE 1 Small steel plates of length not greater than the depth of the test piece may be inserted between the piece and the loading heads or supports to minimize local indentation.

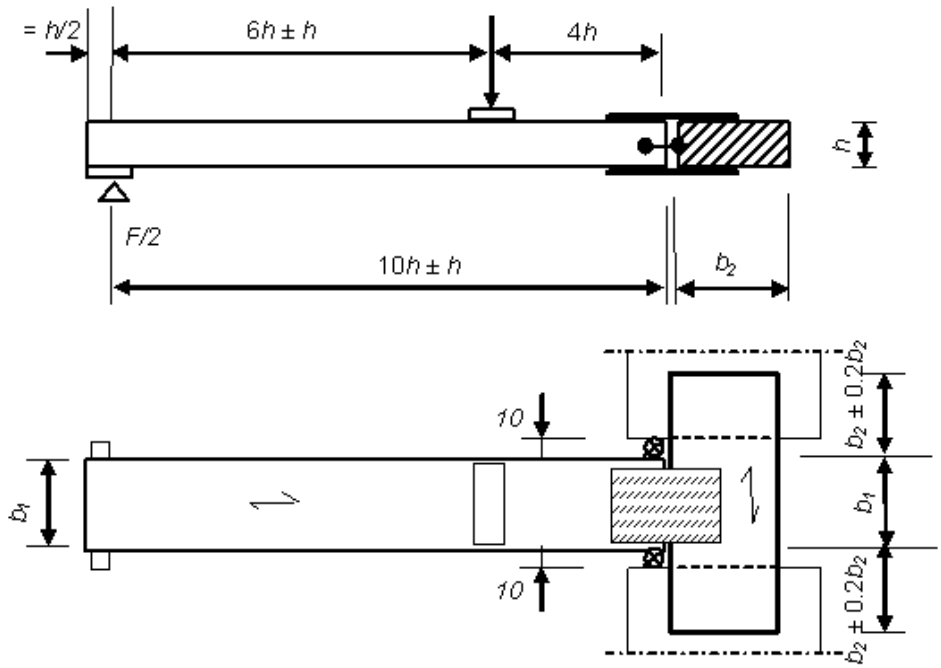
Load shall be applied according to EN 26891.

NOTE 2 This rate should be determined from the results of preliminary tests. The objective is that the time to reach maximum load for each piece is 300 s ±120 s.

The loading equipment used shall be capable of measuring the load to an accuracy of 1 % of the load applied to the test piece.

The deformation, w_s shall be taken as the average of the measurements on both faces at the neutral axis, and shall be measured at the shear plane of the connection and measure the relative displacements between the long and short member (see Figure 3).

The withdrawal shear load is defined as the maximum load before the shear load displacement curve exhibit a pronounced hardening.



Key

relative displacement of members to be measured

top view of transducer

Figure 3 — Top and side view of shear test specimen

8 Test report

The test report shall include details of the test piece, the test method used and the test results.

8.1 Test piece

The following information shall be given:

a) technical specification of the punched metal plates;

b) moisture content at time of test;

c) technical specification of the timber and punched metal plate;

d) dimensions of the timber members and punched metal plates;

e) deviations from specifications, strength reducing characteristics near the joint;

f) method of conditioning;

g) moisture content of the timber at test;

h) position and orientation of the punched metal plate, overlap, gap, edge distance, production method;

i) 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;

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

d) description of the load 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) location of failure of the punched metal plate or timber if any;

b) load applied in relation to the recorded displacements taken during the test; load displacement graphs;

c) maximum load of each test specimen;

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

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