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BSI Standards Publication

Wood flooring — Determination of bending strength under static load — Test methods

National foreword

This British Standard is the UK implementation of EN 1533:2010. It supersedes BS EN 1533:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/543, Round and sawn timber.

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

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ICS 79.080

English Version

Wood flooring - Determination of bending strength under static load - Test methods

Planchers en bois - Détermination de la flexion sous charge statique - Méthodes d'essai

Holzfußböden - Bestimmung der Biegefestigkeit unter statischer Beanspruchung - Prüfmethoden

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Foreword

This document (EN 1533:2010) has been prepared by Technical Committee CEN/TC 175 “Round and sawn timber”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by February 2011, and conflicting national standards shall be withdrawn at the latest by February 2011.

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 document supersedes EN 1533:2000.

Compared with EN 1533:2000, the following modifications have been made:

a) modification of accuracy in 5.1;

b) modification of loading equipment for static load (5.2.3);

c) modification and improvement of Figures 1, 2 and 3;

d) simplification and new presentation of Clause 6 regarding test assembly;

e) simplification and new presentation of Clause 7 regarding procedure;

f) simplification and new presentation of Clause 8 regarding expression of results.

This standard is one of a series of standards concerning wood flooring and wood panelling and cladding.

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, Croatia, 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 United Kingdom.

1 Scope

This European Standard specifies methods of determining the bending strength of wood flooring under static load: a method with a static line load and a method with a static point load.

The methods apply to wood flooring installed on a non-continuous support and thus assuming static load-bearing conditions.

2 Normative references

The following referenced documents are indispensable for the application 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 13756:2002, *Wood flooring — Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13756:2002 and the following apply:

3.1
test assembly
set of wood flooring elements assembled according to a defined type or to the instructions of the manufacturer, for the purpose of being tested

3.2
element
smallest individual part (strip or board) of wood flooring

3.3
maximum load
maximum force leading to the failure of the test assembly

3.4
bending strength
result of various values of maximum load expressed as a mean value or a characteristic value, in newton

3.5
static line load
bending force applied to the test assembly by means of a bar whose axis is parallel to the axis of the supports

3.6
static point load
bending force applied to the test assembly by means of a bar whose axis is perpendicular to the plane of the test assembly

3.7
span
distance between the axes of supporting battens or joists

4 Principle

4.1 General

The tests are carried out on a test assembly made up with several elements jointed according to a defined type or in special applications to the manufacturer's instructions.

4.2 Static line load

The bending strength is determined by applying a static line load across the mid span of some test assemblies.

4.3 Static point load

The bending strength is determined by the application of a static point load across the mid span of some test assemblies.

5 Apparatus

5.1 Measuring instrument for dimensions and deflection

For the length of wood flooring elements and for the span, use a measuring instrument with a minimum accuracy of ± 1 mm.

For the width and thickness of wood flooring elements and battens or joists, use a measuring instrument with a minimum accuracy of ± 0,5 mm.

5.2 Loading equipment

5.2.1 Accuracy

It shall be able to measure the load to an accuracy of ± 1 %.

5.2.2 Static line load

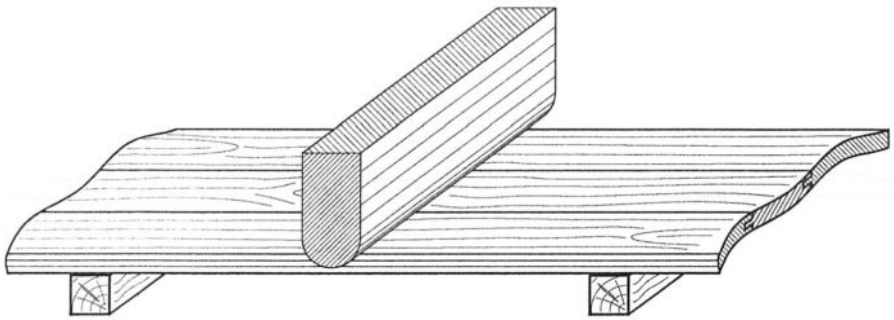
The load shall be applied by a steel loading head, with a contact surface rounded to a radius of (15 ± 0,05) mm, whose length *l* exceeds the width of the test assembly (see Figure 1a)). Its axis shall be parallel to the surface of the test assembly and perpendicular to the length of the elements making it up.

5.2.3 Static load

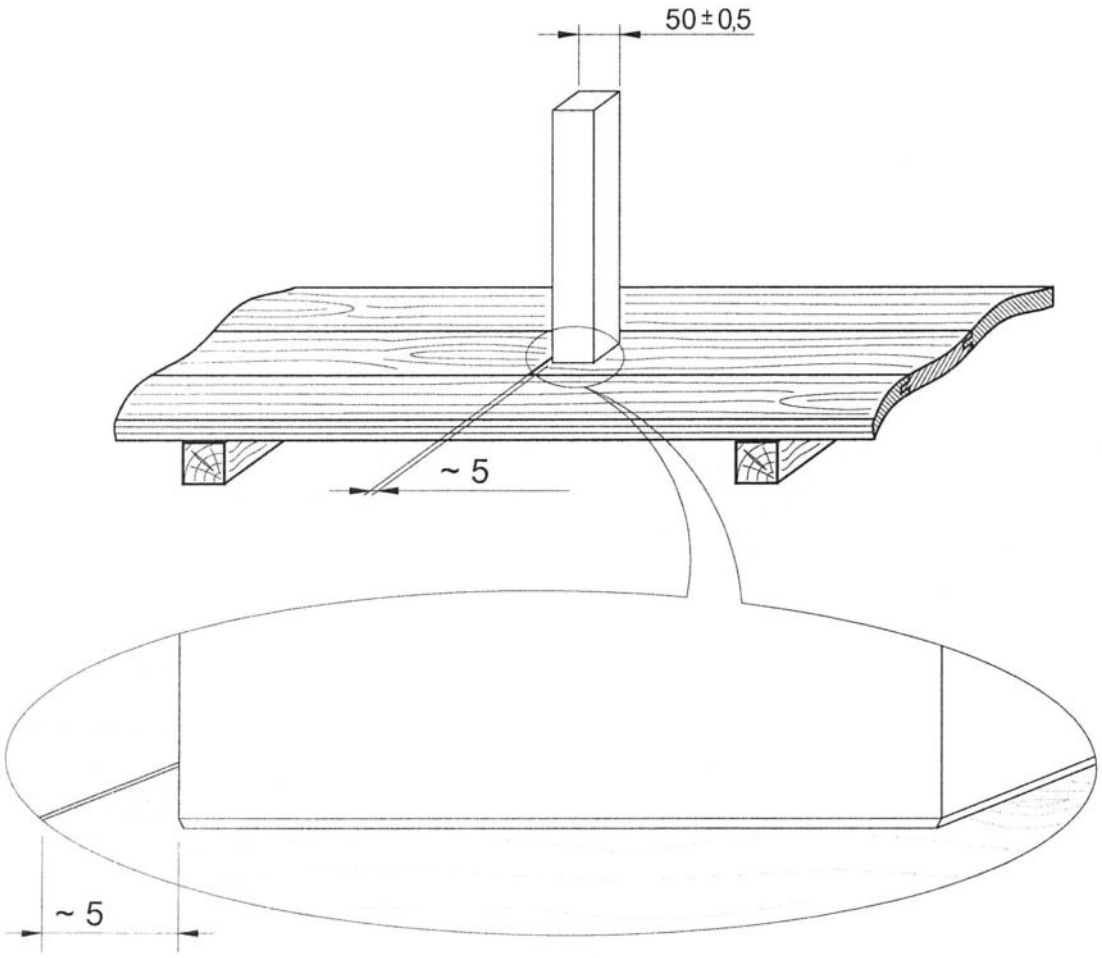
The load shall be applied by a steel loading head with a squared contact face of (50 x 50) mm; the edge of the contact surface shall be rounded or bevelled. Its axis shall be perpendicular to the face of the test assembly. (see Figure 1b)).

NOTE The loading head described above is according to EN 1991-1-1 where it is defined.

Dimensions in millimetres



a) Static line loading head



b) Static point loading head

Figure 1 — Loading equipment

5.3 Support

A flat rigid table with devices, adjustable in span, to fix the battens of the test assembly (see Figure 2).

The support is stiff enough if, under the load applied in the test, its deflection is less than 0,1 mm in the direction of the applied force.

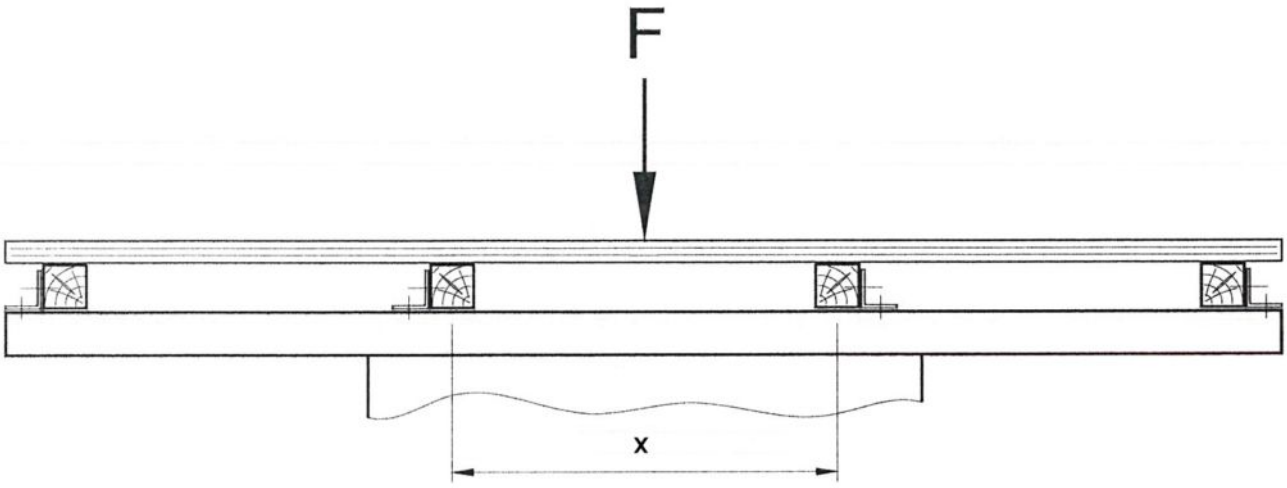
The clearance between the back of the test assembly and the support shall be consistent with the deflection under failure load. The thickness of the battens or joists shall be suitable for that purpose.

The length of the table shall be consistent with the length of the test assembly (about 1,50 m).

The end-supports can be independent of the two supports of the central span, but they shall not move relative to the central supports.

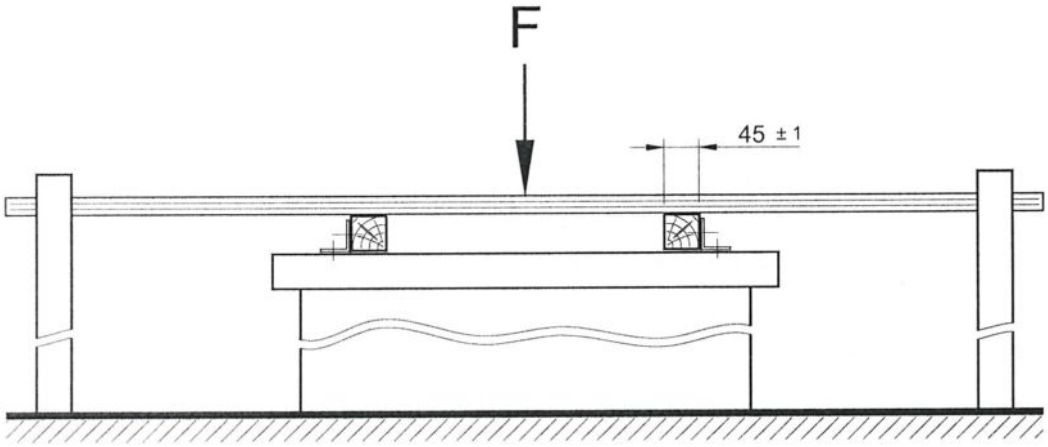
The load can be applied by movement of either the loading head or of the supporting table.

Dimensions in millimetres



a) Movement by loading head

Distance "x" is determined by the manufacturer installation guideline.



b) Movement by supporting table

Key

F force

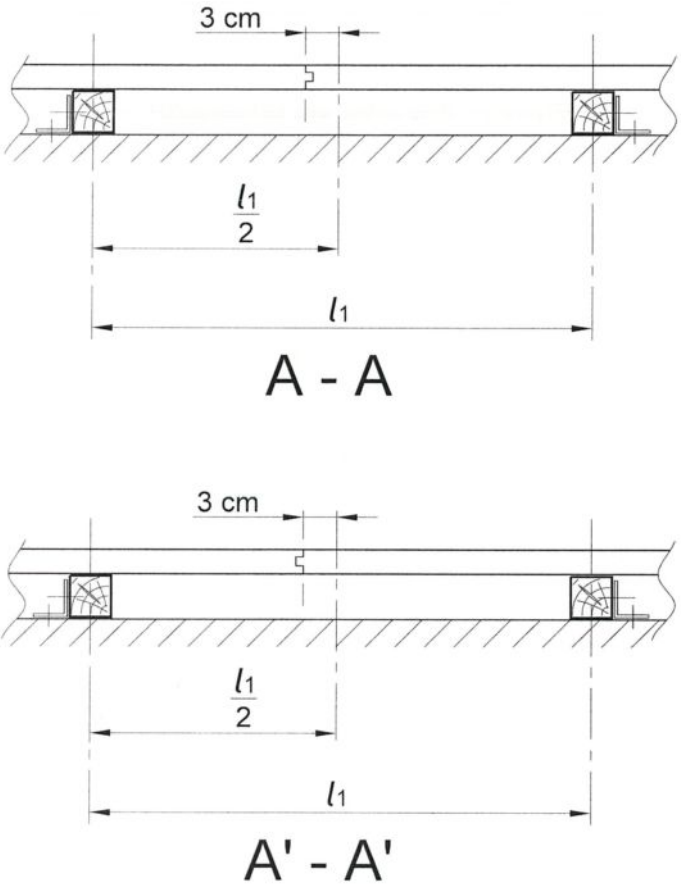
Figure 2 — Support

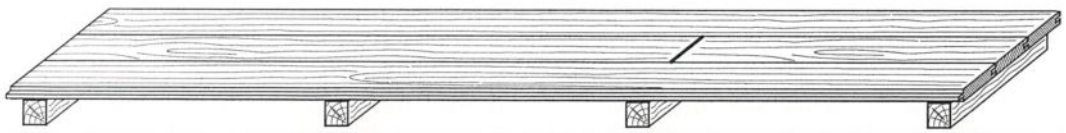
6 Test assembly

6.1 Preparation of a test assembly

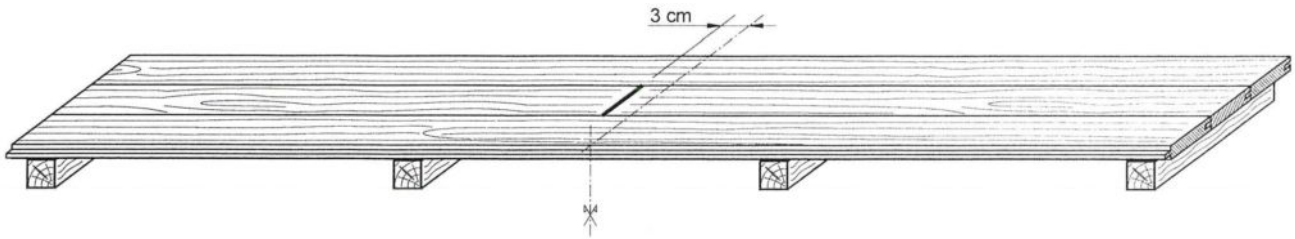
6.1.1 General

See Figure 3.





a) Section view



b) Assembled elements

Key

l_1 width of element

Figure 3 — Preparation of a test assembly

A set of four elements shall be assembled as defined below:

For special applications, more elements can be added.

The elements shall be fixed on the battens by nailing or according to the manufacturer's instructions.

The battens shall be made of timber with a density of at least 400 kg/m^3. Their width shall be (45 ± 1) mm, their depth shall be at least 45 mm and, if necessary, adjusted to the stroke of the loading head between the contact point on the test specimen and the failure point.

NOTE When required as supports for a defined end-use, joists, instead of battens, can be used to make up the assembly.

6.1.2 Wood flooring of which the ends of the elements are supported by the battens

A set of four elements shall be assembled as defined bellow:

One element on each side of two end-jointed elements, the end joint shall be roughly in line with the middle of one of the central batten.

6.1.3 Wood flooring of which the ends of the elements are not supported by the battens

One element on each side of the two end-jointed elements, the end joint shall be roughly distant of 3 cm from the middle of the span of the two central battens.

NOTE The manufacturer's instructions can specify the span and the type of fixing.

6.2 Sampling

The samples, taken at random, shall be defined for a given type of wood flooring as they are defined in the corresponding product standard.

The samples can be coated or not.

The number of elements necessary to make at least six assemblies shall be sampled to determine the bending strength.

6.3 Conditioning

The test specimen shall be conditioned either in:

- climate A, defined by a relative humidity of (65 ± 5) % and a temperature of (20 ± 2)°C,

or

- climate B, defined by a relative humidity of (50 ± 5) % and a temperature of (23 ± 2)°C.

7 Procedure

7.1 General

Measure the width and thickness of the elements with the apparatus as defined in 5.1.

Check out the span and the width of the battens with the apparatus as defined in 5.1.

7.2 Placing of the test assembly

7.2.1 General

Place the test assembly flat on the supporting table, the face facing the central loading head, with its longitudinal axis at right angles to that of the supports with the centre point under the load. The battens shall be properly clamped in a fixed position relative to the support.

7.2.2 Static line load

Adjust the loading head relative to the battens in the middle of the central span to ± 1 mm along the loading line (see Figure 1a)).

7.2.3 Static point load

The axis of the loading head shall be adjusted within ± 1 mm to the mid span and shall be adjusted within ± 1 mm to the mid width of the element to be loaded (see Figure 3).

7.3 Determination of the maximum load for the test assembly

To determine the maximum load for the test assembly, apply a load, increasing at a rate to give a uniform movement of the loading head, until failure of the test assembly occurs. The rate shall also be such that failure occurs in (300 ± 120) s. Record the maximum load F_{max} in newton to an accuracy of 1 % and the mode of failure of the test assembly.

8 Expression of the results for a sample

8.1 Common statistical methods

8.1.1 Mean value

A normal distribution is assumed.

$$m = \frac{\sum_1^n P_i}{n}$$

where

m is the mean value of the performance of the sample;

P_i is the performance of "*i*-th" test assembly;

n is the number of test assemblies in the sample.

8.1.2 Standard deviation

$$s = \left[\frac{\sum_1^n (P_i - m)^2}{n-1} \right]^{\frac{1}{2}}$$

where

s is the standard deviation.

All the other parameters are defined in 8.1.1.

8.1.3 Characteristic values

Depending of the property, the characteristic values are either the 5th percentile or the 95th percentile of the assumed normal distribution.

A characteristic value is given by the following formula:

$$X_k = m + (\alpha \text{ x } t_{05} \text{ x } s)$$

where

X_k is the characteristic value;

α is the coefficient equal to: + 1 for the 95th percentile;

- 1 for the 5th percentile;

t_{05} is the Student coefficient for a one sided 5 % probability.

All the other parameters are defined in 8.1.1 and 8.1.2.

Table 1 — Student coefficient for a range of value of n

Number of test assemblies n	Student coefficient t_{05}
6	2,02
7	1,94
8	1,90
9	1,86
10	1,83
11	1,81
12	1,80
13	1,78
14	1,77
15	1,76
16	1,75
17	1,75
18	1,74
19	1,73
20	1,73
21	1,72
22	1,72
23	1,72
24	1,71
25	1,71
26	1,71
27	1,71
28	1,70
29	1,70
30	1,70
40	1,68
60	1,67
120	1,66
∞	1,645

8.2 Final results

The values shall be expressed to three significant figures.

If required, the characteristic values shall be calculated in accordance with 8.1.3 (5th percentile value for bending strength).

9 Test report

The test report shall contain the following information:

a) The name and address of the laboratory,

b) The name and address of the company requesting the test,

c) The sampling procedure and the identification of the sample,

d) The date of delivery,

e) The date of period of the test(s),

f) The type (the brand if any) and the full description of the elements (e.g.: lay-up, face appearance), face view and cross sections at scale 1/1,

g) If relevant, the characteristics of elements at the time of delivery,

h) The conditioning applied to the elements prior to their assembly and testing,

i) The description of the assembly (e.g. if the ends of the elements are or are not supported by the battens),

j) The description of the jointing procedure to achieve that assembly,

k) The climatic conditions within the laboratory during the test(s),

l) The reference to this standard EN 1533 and, if any, the deviations,

m) A short description of the apparatus involved in the test,

n) The span between the battens (or joists),

o) The width of the test assembly,

p) The loading case,

q) Each individual result according to this test method, including the mode of failure,

r) The results (the mean value and, if required, the characteristic value).

Bibliography

[1] EN 1991-1-1, *Eurocode 1: Actions on structures — Part 1-1: General actions — Densities, self-weight, imposed loads for buildings*

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