BRITISH STANDARD

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Amendment No. 1

Timber structures — Test methods — Performance of structural floor decking

The European Standard EN 1195 : 1997 has the status of a British Standard

ICS 91.060.30; 91.080.20

National foreword

This British Standard is the English language version of EN 1195 : 1997.

The UK participation in its preparation was entrusted by Technical Committee B/518, Structural timber, to Subcommittee B/518/1, Test methods, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

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This British Standard, having been prepared under the direction of the Sector Board for Building and Civil Engineering, was published under the authority of the Standards Board and comes into effect on 15 February 1998

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN 1195

October 1997

ICS 91.060.30; 91.080.20

Descriptors: Timber construction, wooden floors, tests, impact tests, static tests, loadings, stiffness tests, comparative tests, test results

English version

Timber structures — Test methods — Performance of structural floor decking

Structures en bois — Méthodes d'essais — Comportement des planchers structuraux

Holzbauwerke — Prüfverfahren — Tragverhalten tragender Fußbodenbeläge

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 1195 : 1997 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 124, Timber structures, the Secretariat of which is held by DS.

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of an identical text or by endorsement, at the latest by April 1998, and conflicting national standards shall be withdrawn at the latest by April 1998.

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

Contents

1 Scope

This standard specifies test methods for determining the performance of structural floor decking subjected to:

– specified concentrated static load (due e.g. to imposed action from persons, furniture and equipment); and

– specified impact loads (produced e.g. by human motion).

The decking considered is constructed of boards, laminated boards or wood-based panel products supported on timber joists.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 322 *Wood-based panels — Determination of moisture content*

EN 323 *Wood-based panels — Determination of density*

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 set

Residual deformation of the test floor after the removal of the applied load.

3.2 differential set

Differing residual deformations at joints in the decking after the removal of the test load.

3.3 structural floor decking

Specified assembly of decking of boards or wood-based panel products. The characteristic of the decking is that it is supported by joists and, when subjected to load, free to deflect between the joists.

3.4 board

Floor decking material of sawn and processed solid timber.

3.5 panel

Floor decking material of wood-based panel products (e.g. particleboard or plywood).

3.6 method of support

The way in which the floor decking material is supported (e.g. simply or continuously supported), together with the form of fixing the floor decking material to the supports (e.g. nailing, screwing and/or gluing).

4 Symbols

F	applied load, in newtons;
F_{max}	maximum load, in newtons;
$F_{max,est}$	estimated maximum load, in newtons;
R	stiffness of the structural floor decking, in newtons per millimetre;
w	deformations, in millimetres;
w_m	mean value of the deformations in a test, in millimetres.

5 Requirements

The manufacture and assembly of the test floor decking shall comply with the manufacturer's specification.

NOTE. Typical types of test floor deckings are shown in annex A.

6 Test methods

6.1 Principle

The test floor decking shall be placed horizontally on a rigid base, the appropriate static or impact loads shall be applied and the corresponding deformations measured, and damage observed.

6.2 Apparatus

6.2.1 *Static load test*

The loading equipment used shall be capable of measuring the load to an accuracy of 2 % of the load applied or, for loads less than 10 % of the maximum load, with an accuracy of 0,2 % of the maximum load. The deformations shall be measured to within an accuracy of:

0,05 mm for values of up to 2,5 mm; and

0,1 mm for values greater than 2,5 mm.

The test apparatus, shown diagramatically in annex A (which is used primarily to show a typical set up of the test floor decking) consists of the following:

a) rigid base of structural steel (or equivalent) members positioned under, and providing continuous support to, the test floor joists. The test floor joists shall be fixed to the supports;

b) device for applying a vertical concentrated static load. The load shall be applied through a flat steel surface with a diameter of $(25 \pm 0{,}1)$ mm and with the edge of the contact surface rounded with a radius of 2 mm;

NOTE. The load will normally be transferred to the test floor by means of a steel frame (yoke), see figure A.3. This frame should normally have a length of at least 250 mm to ensure that only insignificant horizontal forces occur;

c) equipment for measuring deformations of the board or panel relative to the supporting joists at the point of application of the loads;

d) equipment for recording loads and deformation according to the loading procedures specified, see **6.4**. Alternatively equipment for measuring deformations at chosen loads may be used, provided the measurements can be carried out without significantly influencing the continuity of the load application;

e) device for measuring the set of the upper surface of the test floor at the point of application of the load. The set shall be measured, in relation to the upper surface, at points vertically above the supports;

f) device for measuring the differential set and deformation at joints measured on the upper surface.

NOTE. An example of a suitable device is shown in annex A.

6.2.2 *Impact load test*

The impact load test apparatus consists of the following:

a) leather bag containing a thin polyethylene bag of the same form and size and filled with hardened solid glass spheres of $(3 \pm 0{,}5)$ mm diameter and having a mass of $(30 \pm 0{,}6)$ kg and (250 ± 2) mm in diameter.

NOTE. A form of bag which can be used is shown in annex B;

b) device for hoisting and instantaneous release of the bag;

c) measuring rods with lengths equal to the prescribed drop heights ± 1 mm;

d) device for measuring the set, to the nearest 0,1 mm, of the upper surface of the floor at the point of impact. The set shall be measured in relation to the points vertically above the supports;

e) device for measuring differential set at joints to the nearest 0,1 mm, measured on the upper surface of the test floor.

Sufficient free space shall be available under the test floor so as to permit the bottom of the bag to penetrate the flooring material at failure.

6.3 Preparation of specimens

6.3.1 *Conditioning*

The tests shall be carried out on structural floor decking made from material which has been conditioned at the standard environment of (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 two successive weighings, carried out at an interval of 6 h, do not differ by more than 0,1 % of the mass of the test specimen.

The density of the structural floor decking materials shall be determined in accordance with EN 323. The moisture content of the structural floor decking materials shall be determined in accordance with EN 322.

Where the material to be tested is not readily conditionable to the above standard environment (e.g. for hardwoods with high densities), that fact shall be reported.

The tests shall be carried out within 48 h of removal of the floor decking material from the conditioning environment. During this period (48 h max.) the floor shall be kept in an environment of (20 ± 5) °C and (60 ± 20) % relative humidity.

6.3.2 *Test laboratory*

The test laboratory shall normally be maintained at the standard environment of (20 ± 2) °C and (65 ± 5) % relative humidity, but when other conditions apply, they shall be reported.

6.4 Procedure

6.4.1 *Static load*

Points of loading closer to the end beams, see figures A.1a and A.1b, than 300 mm for boards and 600 mm for panels shall not be used. The set at the point of loading and the differential set and deflection at joints shall be recorded. The points of loading shall be chosen at the most vulnerable points on the test floor.

6.4.1.1 *Stiffness test*

The test floor shall be placed horizontally on its supports and fixed (see **6.2.1**). The loading procedure used shall be as shown in figure 1a, using one of the following methods for measuring deformations at points 01, 04, 14, 11, 21 and 24:

a) on the underside of the board or panel. A displacement transducer shall be placed in the centre of the load; or

b) taken as the displacement of the loading disc relative to the bearing.

The procedure shall include the measurement of the initial set and the differential set.

6.4.1.2 *Strength test*

The loading procedure used shall be as shown in figure 1b. The load F shall be applied at a constant rate of deflection and so adjusted that the maximum load F_{max} is reached in (300 ± 120) s. The objective is that the average time to reach the load F_{max} for similar tests is 300 s.

6.4.2 ***Impact load***

The test floor shall be placed horizontally on its supports with the minimum bearing and the method of support and span specified in the manufacturer's specification (see figure 2 and figure A.2). The test floor shall be supported in the test rig on a rigid base (see **6.2.1**). The test floor shall be fixed to the rigid beams in the test rig.

The points of loading shall be chosen at the most vulnerable points on the test floor.

Before an impact load is applied, the bag shall be rolled to loosen the glass spheres. The bag shall be hoisted to the prescribed height over the chosen point of impact. The height shall be checked using a measuring rod. The bag shall then be released, and allowed to fall freely on to the floor decking.

The set at the point of impact and the differential set at the joints, if any, shall be recorded.

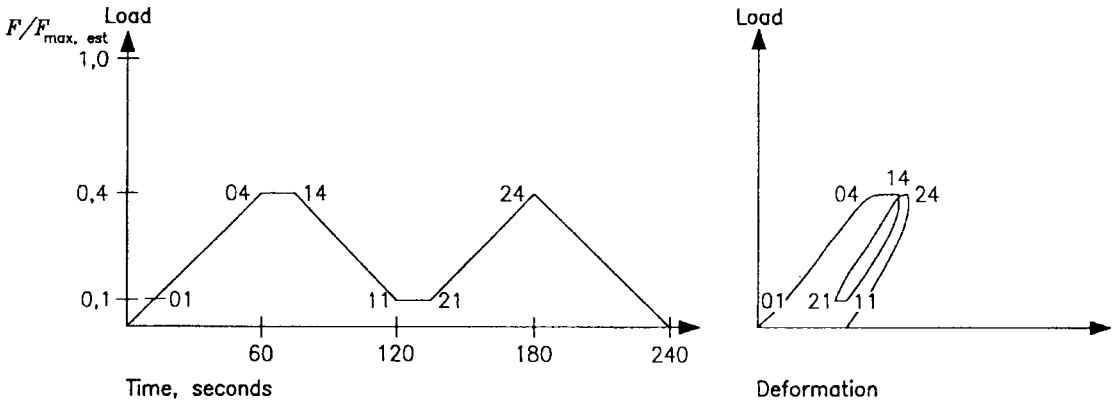


Figure 1a. Loading procedure — Static load and deformation — Stiffness test

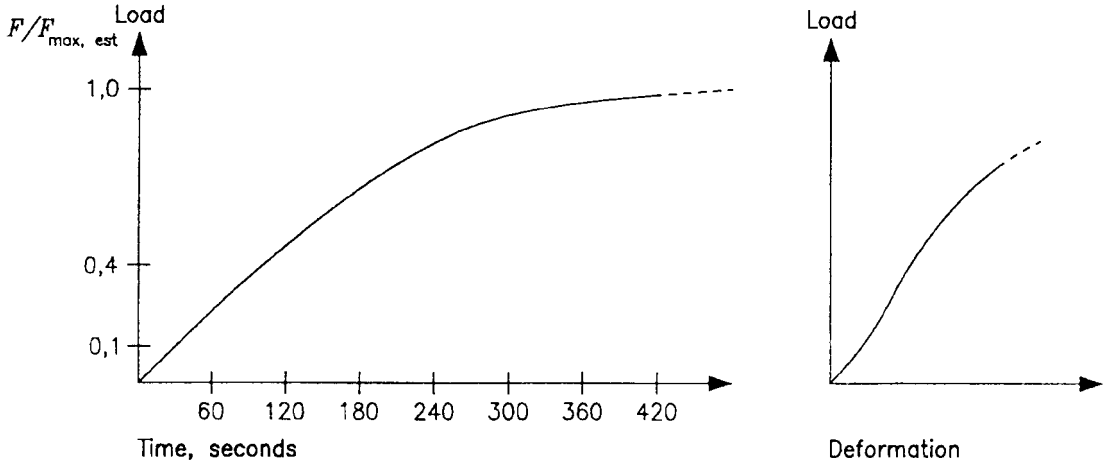


Figure 1b. Loading procedure — Static load and deformation — Strength test

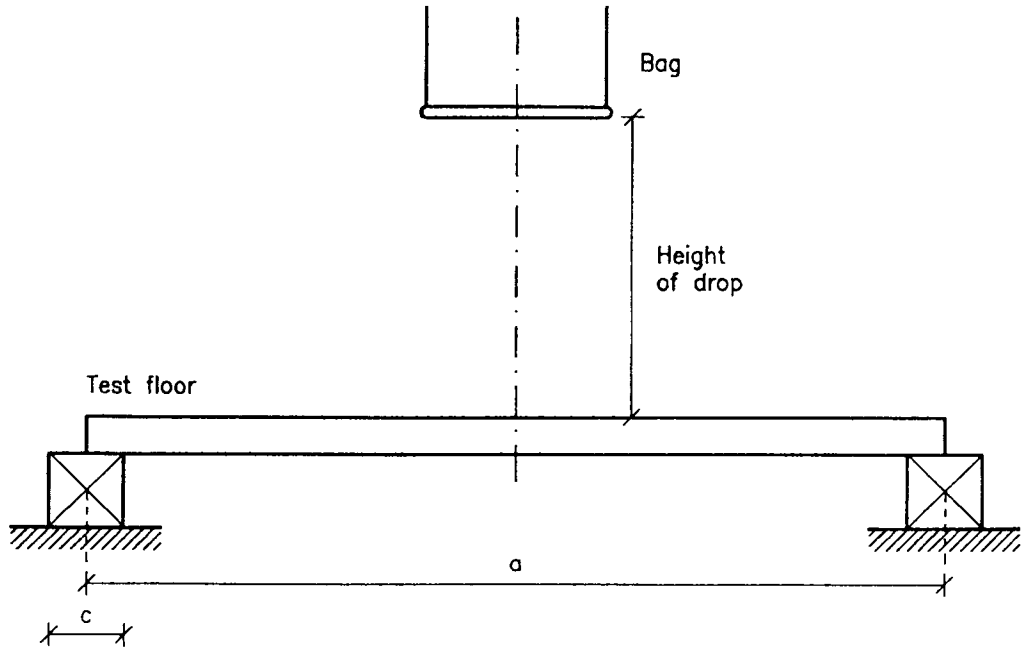


Figure 2. Example of impact load test

6.5 Results

6.5.1 *Static load*

For each loading point the following results shall be reported:

a) deformation at the load $0{,}4F_{max,est}$ calculated as the average of the first and second loadings, as follows:

$$w_m = \frac{4}{3}\left[\frac{(w_{04} - w_{01}) + (w_{24} - w_{21})}{2}\right] \text{mm}$$

where:

w_{01}, w_{04}, w_{21} and w_{24} are the deformations recorded at the points 01, 04, 21 and 24 in figure 1a;

b) set at the point of loading and the differential set at joints at the load $0{,}4\,F_{max,est}$;

c) recorded value of F_{max} with a description of the mode of failure of the structural floor decking;

d) stiffness of the structural floor decking, calculated from the equation:

$$R = \frac{F_{24} - F_{21}}{w_{24} - w_{21}} \text{ N/mm}$$

where:

F_{24} is the load (in the stiffness test) of $0{,}4\,F_{max,est}$;

F_{21} is the load (in the stiffness test) of $0{,}1\,F_{max,est}$;

w_{24} and w_{21} are the deformations determined at those loads;

e) load deformation curve.

6.5.2 *Adjustments*

The estimated maximum load $F_{max,est}$ shall be determined on the basis of experience, calculation or preliminary tests and shall be adjusted as necessary. If $F_{max,est}$ for a test deviates by more than 20 % from a mean value of F_{max} obtained for similar tests, the values of w and R for that test shall be reported separately.

6.5.3 *Impact load*

After each impact the following results shall be reported:

a) set at the point of impact and the differential set at joints;

b) whether a visual examination of the floor decking shows failure or penetration;

c) description of the mode and type of failure, if any.

6.6 Test report

The test report shall include the following:

a) sampling procedure;

b) description of the structural floor decking materials, including moisture content and density;

c) conditioning environment of the structural floor decking materials;

d) test loads sustained during the tests together with the corresponding deformations at all measurement positions;

e) values of w_m and F_{max} and R;

f) specification and quality of material used in the manufacture of the test floor decking with a note of any defects;

g) description of the set up, including gluing, fixings etc. of the test floor decking;

h) description of the loading of the structural floor decking and of measuring the deformations;

i) type and position of any failure;

j) gap (if any) between the boards or sheets in the structural floor decking;

k) direction of greater strength of the structural floor decking;

l) if glue is used in the fabrication of the test floors, the time between fabrication and testing;

m) in case of static test, the average time to reach maximum load.

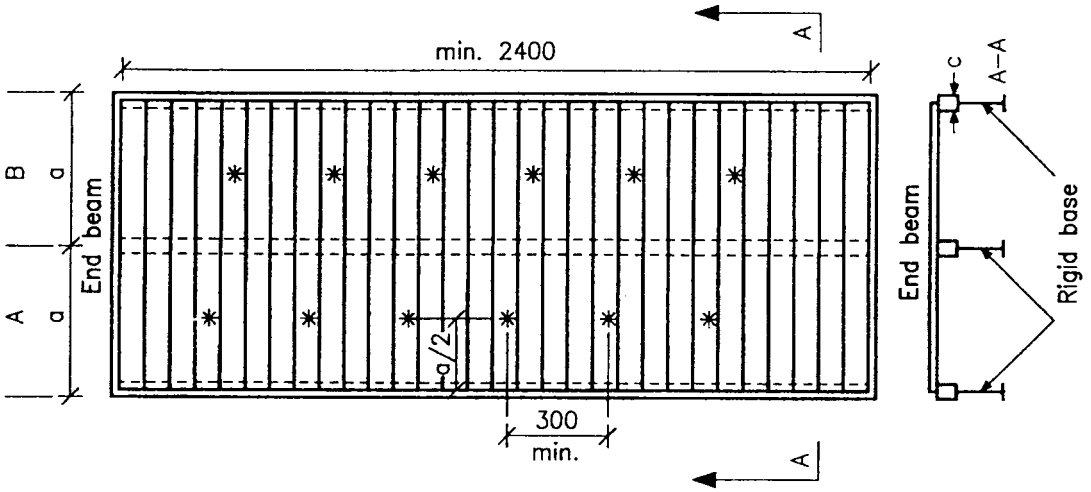
Annex A (informative)
Typical form of test floors

In this annex, the following symbols are used:

a distance between joist centres, in millimetres;

b width of the board or panel, measured perpendicularly to the span, in millimetres;

c width of the supporting joists, in millimetres.



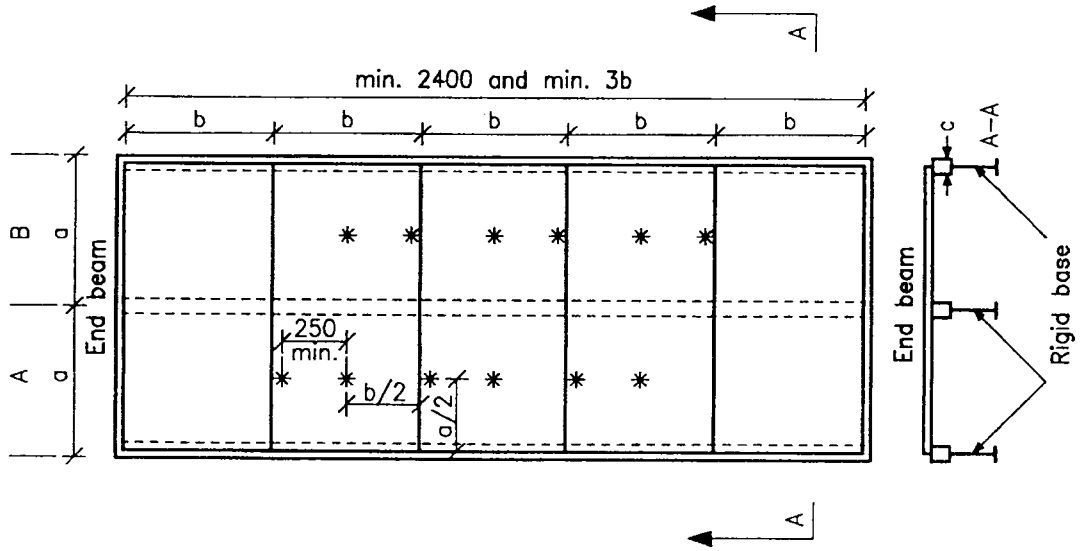
Dimensions in millimetres

NOTE 1. Loading points on span A on the right hand edge of the board.

NOTE 2. Loading points on span B on the left hand edge of the board.

NOTE 3. The outer edges of the test floors are not tested. Any end joints in boards are not shown.

Figure A.1a Test floor of boards



Dimensions in millimetres

* Points of application of loads and points of deformation measurements. The end joints in panels are not shown.

Figure A.1b Test floor of panels

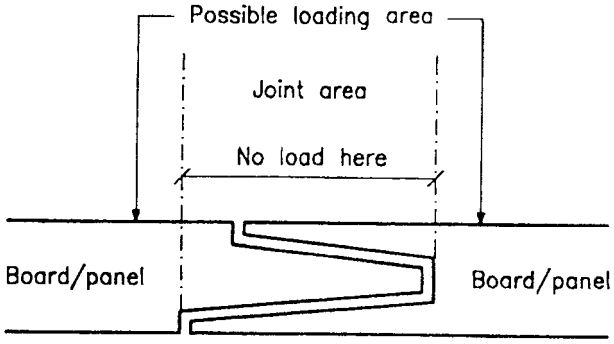
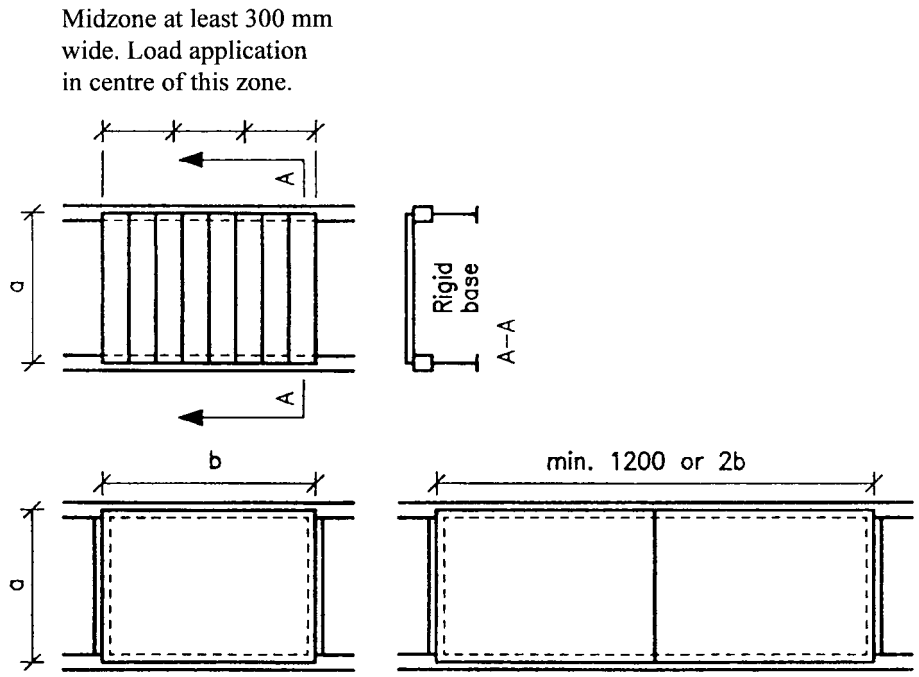


Figure A.1c Static loading at joints

Figure A.1 Set up of test floors



Dimensions in millimetres

Figure A.2 Example of a device for the measurement of differential set and deformation at joints — Static load

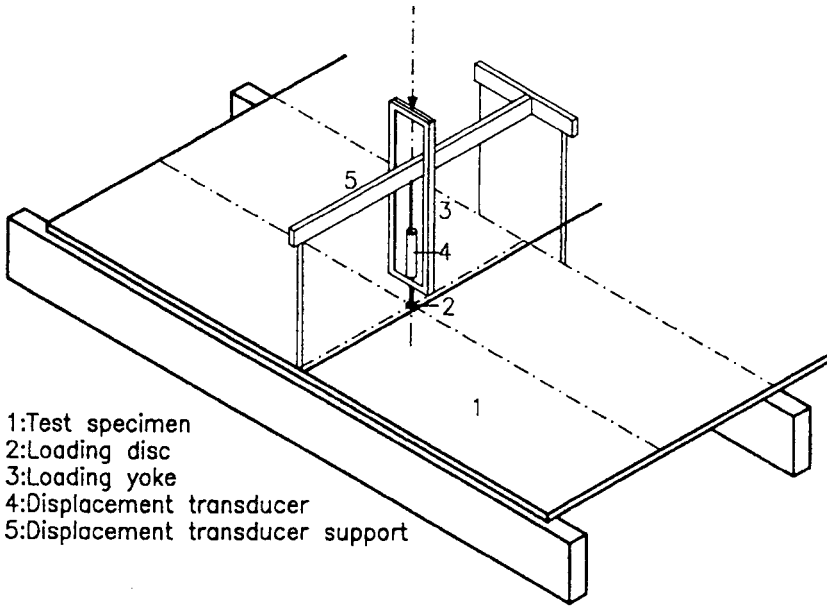
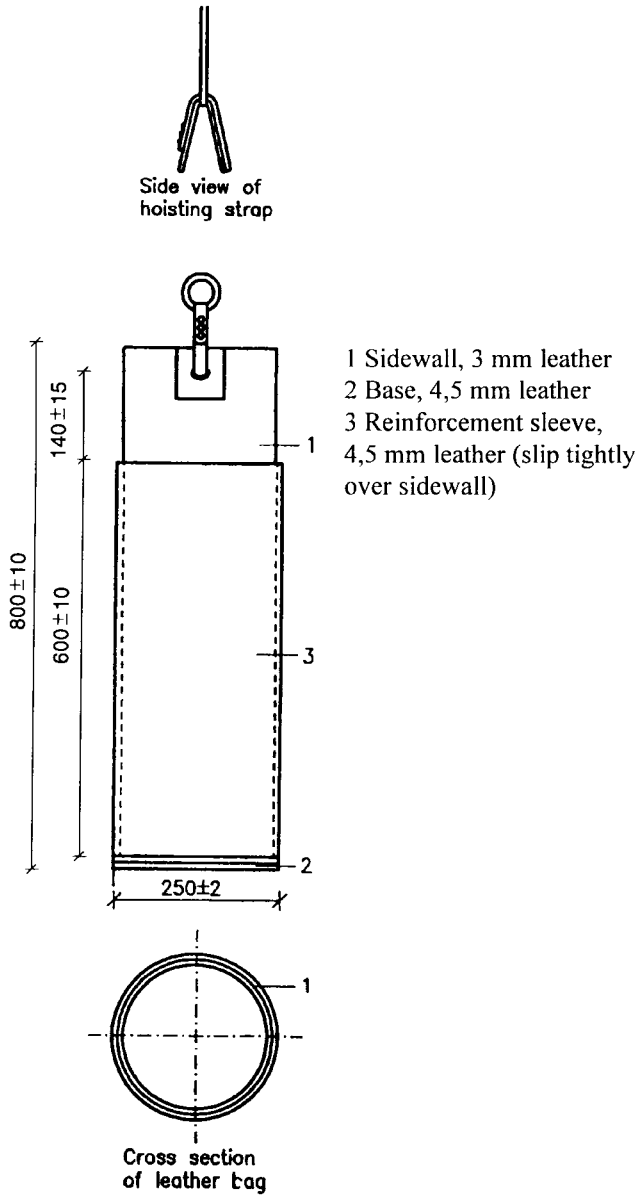


Figure A.3 Example of a device for the measurement of deformation — Static load

Annex B (informative)

Impact loading body

The testing of structural floor decking to resist impact loads can be carried out using a bag having the following form and dimensions:



Dimensions in millimetres

Figure B.1 Leather bag for impact testing

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