BRITISH STANDARD

BS EN
1328 : 1997

Cement bonded particleboards — Determination of frost resistance

The European Standard EN 1328 : 1996 has the status of a British Standard

ICS 79.060.020

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee B/541, Wood-based panels, upon which the following bodies were represented:

APA/Engineered Wood Association
Association of British Plywood and Veneer Manufacturers
British Woodworking Federation
Council of the Forest Industries of British Columbia
Department of the Environment (Building Research Establishment)
Finnish Plywood International
Flat Roofing Contractors Advisory Board
Forestry Commission
Furniture Industry Research Association
Institution of Structural Engineers
Local Authority Organizations
Mineral Bonded Board Products Federation
National Federation of Roofing Contractors
National House-building Council
National Panel Products Association
Royal Institute of British Architects
Structural Board Association
Timber Research and Development Association
Timber Trade Federation
Wood Panel Products Federation
Zurich Municipal Building Guarantee

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 April 1997

Amendments issued since publication

Amd. No.	Date	Text affected

The following BSI references relate to the work on this standard:
Committee reference B/541
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Contents

National foreword

This British Standard has been prepared by Technical Committee B/541 and is the English language version of EN 1328 : 1996 *Cement bonded particleboard — Determination of frost resistance* published by the European Committee for Standardization (CEN). EN 1328 was produced as a result of international discussions in which the United Kingdom took an active part.

BS EN 1328 is one of a number of standards which together supersede BS 5669 : Part 4, which will be withdrawn in accordance with CEN Provisions within 6 months of completion of the package of standards covering cement-bonded particleboards. These standards are:

BS EN 310	BS EN 633
BS EN 322	BS EN 634-1
BS EN 323	BS EN 634-2
BS EN 324-1	BS EN 1128
BS EN 324-2	BS EN 1328
BS EN 325	

Cross-references

Publication referred to	Corresponding British Standard
EN 310	BS EN 310 : 1993 *Wood-based panels. Determination of modulus of elasticity in bending and of bending strength*
EN 326-1	BS EN 326 *Wood-based panels. Sampling, cutting and inspection* Part 1 : 1994 *Sampling and cutting of test pieces and expression of test results*

NOTE. Informative reference is also made to EN 633 and EN 634-1, and to EN 634-2, which is currently in preparation.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 6, an inside back cover and a back cover.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1328

August 1996

ICS 79.060.20

Descriptors: Particle boards, binders, materials, cements, tests, determination, freeze–thaw resistance

English version

Cement bonded particleboards — Determination of frost resistance

Panneaux de particules liées au ciment — Détermination de la résistance au gel

Zementgebundene Spanplatten — Bestimmung der Frostbeständigkeit

This European Standard was approved by CEN on 1996-07-04. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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 1328 : 1996 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 112, Wood-based panels, the Secretariat of which is held by DIN.

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 1997, and conflicting national standards shall be withdrawn at the latest by June 1997.

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

Contents

1 Scope

This European Standard specifies a test method for the determination of frost resistance of cement bonded particleboards.

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 310	*Wood-based panels — Determination of modulus of elasticity in bending and of bending strength*
EN 326-1	*Wood-based panels — Sampling, cutting and inspection — Part 1: Sampling and cutting of test pieces and expression of test results*

3 Principle

The frost resistance of the material under test is expressed as the ratio of the bending strength of an untreated control specimen and a matched specimen which has been subjected to freeze–thaw cycles.

4 Apparatus

4.1 A freezer unit having forced air circulation capable of lowering the temperature to (-18 ± 2) °C within 1 h to 2 h when containing the batch of test pieces to be tested.

4.2 A water bath capable of maintaining the contents at a temperature of (20 ± 2) °C and regaining this temperature in not more than 2 h after inserting a full load of frozen test pieces.

NOTE. The dimensions of the bath will need to accommodate 48 test pieces up to 1050 mm long and separated from one another by the distance specified in **6.3**.

4.3 A bending test machine fitted with bending apparatus as described in EN 310.

4.4 A measuring device capable of measuring temperature from −30 °C to +50 °C with a graduation of 1 °C.

4.5 A balance with an error limit of 0,01 %.

4.6 A climate chamber or cabinet capable of maintaining the air at a temperature of (20 ± 2) °C and the relative humidity at (65 ± 5) %.

5 Test pieces

5.1 Dimensions

Test pieces according to EN 310.

5.2 Sampling

Take six pairs of side-matched test pieces from each of eight panels of a single thickness. All test pieces shall be taken with their long axes in the same direction of the panel and their position within the panel selected at random.

Each individual pair shall be given the same number for later comparison of results.

6 Procedure

6.1 Divide the paired test pieces to form two batches of 48 test pieces each, the test pieces of the first batch are used as control test pieces.

6.2 Submit the first batch of test pieces to the bending test according to EN 310.

6.3 Immerse the second batch of test pieces in water at room temperature (20 ± 2) °C for 48 h, then subject this batch of test pieces to a sequence of freeze–thaw cycles. Each immersion cycle shall be carried out in new water.

– Place the test pieces in the freezer at (-18 ± 2) °C (which shall regain a temperature of (-18 ± 2) °C within 1 h to 2 h after insertion of the test pieces) and hold at this temperature for a further 1h after the specified temperature has been regained.

– Remove the test pieces from the freezer, place them in a water bath at (20 ± 2) °C and apply heat in order to maintain the temperature of the water bath at this level over 1 h to 2 h. The test pieces shall be placed on edge, and there shall be 20 mm to 25 mm of water above the upper edge. After each cycle the test pieces shall be inverted.

During both the cooling and heating (freezing and thawing) cycles, the test pieces shall be positioned to enable free circulation of the conducting medium (air in the freezer or water in the bath) around them. The clearance between any edge or face, with the exception of contact with discontinuous supports, shall be at least 10 mm.

Each freeze–thaw cycle shall take between 4 h and 6 h. To provide buffer time between two cycles, as in the case of manual operation, this duration can be extended by storage of the test pieces, for up to 72 h, in the freezer as defined in **4.1**.

The freeze–thaw cycle shall be repeated 50 times unless otherwise specified.

NOTE 1. It is recommended that panels should be at least 28 days old prior to commencement of the cyclic pre-treatment.

NOTE 2. Control of the freeze–thaw cycles can be automatic or manual. Continuous automatic cycling is preferable. For manual control the completion of each cycle should be recorded.

After the cycles are completed, the test pieces shall be conditioned to constant mass in an atmosphere with a relative humidity of (65 ± 5) % and a temperature of (20 ± 2) °C. Constant mass is considered to be reached when the results of two successive weighing operations, carried out at an interval of 24 h, do not differ by more than 0,1 % of the mass of the test piece. At the end of this procedure carry out the bending test as specified in EN 310, including the determination of dimensions of the test piece after cyclic treatment.

7 Expression of results

For each pair of test pieces i (i is between 1 and 48), calculate the individual ratio, R_i, to two significant figures as follows:

$$R_i = f_{2i} / f_{1i} \qquad (1)$$

where

f_{1i} is the bending strength in newtons per square millimetre of the test piece of the first batch from the i^{th} pair tested and calculated from dimensions prior to cyclic treatment

f_{2i} is the bending strength in newtons per square millimetre of the test piece of the second batch from the i^{th} pair after freeze–thaw cycling and calculated from dimensions following cyclic treatment.

Calculate the average of R and standard deviation s, of the individual ratios R_i. Calculate the 95 % lower confidence estimate R_L of the average ratio, to two significant figures as follows:

$$R_L = R - 0{,}24\, s \qquad (2)$$

NOTE. A value of ratio R_L of 0,7 is regarded as providing satisfactory external performance.

8 Test report

This shall be set out as described in EN 326-1, and the following shall be recorded:

– the direction from which the test pieces were removed from the panel;

– the value of R_L;

– the full climatic history of the panels up to time of testing;

– the date of manufacture of the panel (where known);

– the date of test.

Annex A (informative)
Bibliography

prEN 326-2	*Wood-based panels — Sampling, cutting and inspection — Part 2: Quality control in the factory*
prEN 326-3	*Wood-based panels — Sampling, cutting and inspection — Part 3: Inspection of a consignment of panels*
EN 633	*Cement bonded particleboards — Definition and classification*
EN 634-1	*Cement bonded particleboards — Specifications — Part 1: General requirements*
prEN 634-2	*Cement bonded particleboards — Specifications — Part 2: Basic requirements*

List of references

See national foreword.

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British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

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