BRITISH STANDARD

BS EN 636:2003

Plywood — Specifications

The European Standard EN 636:2003 has the status of a British Standard

ICS 79.060.10

BSi
British Standards

National foreword

This British Standard is the official English language version of EN 636:2003. It supersedes BS EN 636-1:1997, BS EN 636-2:1997 and BS EN 636-3:1997 which are withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/541, Wood based panels, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/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.

Cross-references

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Supersedes EN 636-1:1996; EN 636-2:1996; EN 636-3: 1996

English version

Plywood - Specifications

Contreplaqué - Exigences

Sperrholz - Anforderungen

This European Standard was approved by CEN on 18 March 2003.

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 Management Centre or to any CEN member.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Foreword

This document (EN 636:2003) 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of an identical text or by endorsement, at the latest by December 2003, and conflicting national standards shall be withdrawn at the latest by December 2003.

This document supersedes EN 636-1:1996, EN 636-2:1996 and EN 636-3:1996.

Compared to EN 636-1:1996, EN 636-2:1996 and EN 636-3:1996 the following modifications have been made:

a) a classification system for bending strength and bending modulus has been added.

b) the classification of formaldehyde release has been revised in accordance with EN 13986.

Annex A is normative.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the requirements for plywood for general purposes or structural application in dry, humid or exterior conditions. It also gives a classification system based on the bending properties.

NOTE 1 This standard will be called up in EN 13986 for construction applications.

The values listed in this standard relate to product properties but they are not characteristic values to be used in design calculations.

NOTE 2 Such characteristic values (e. g. for use in design calculation in ENV 1995-1-1) are given either in prEN 12369-2 or by the manufacturer, based on testing according to EN 789, EN 1058 and ENV 1156.

Additional information on supplementary properties for certain applications is also given.

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 (including amendments).

EN 310, *Wood-based panels — Determination of modulus of elasticity in bending and of bending strength.*

EN 314-1, *Plywood — Bonding quality — Part 1: Test methods.*

EN 314-2, *Plywood — Bonding quality — Part 2: Requirements.*

EN 315, *Plywood — Tolerances for dimensions.*

EN 318, *Wood-based panels — Determination of dimensional changes associated with changes in relative humidity.*

EN 322, Wood-based panels — Determination of moisture content.

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

EN 324-1, *Wood-based panels — Determination of dimensions of boards — Part 1: Determination of thickness, width and length.*

EN 324-2, *Wood-based panels — Determination of dimensions of boards — Part 2: Determination of squareness and edge straightness.*

EN 326-1, *Wood-based panels — Sampling, cutting and inspection — Part 1: Sampling and cutting of test pieces and expression of test results.*

EN 326-2, *Wood based panels — Sampling, cutting and inspection — Part 2: Quality control in the factory.*

EN 326-3, *Wood based panels — Sampling, cutting and inspection — Part 3: Inspection of a consignment of panels.*

EN 335-3, *Durability of wood and wood-based products — Definition of hazard classes of biological attack — Part 3: Application to wood-based panels.*

EN 594, *Timber structures — Test methods — Racking strength and stiffness of timber frame wall panels.*

EN 596, *Timber structures — Test methods — Soft body impact test of timber framed walls.*

EN 635-1, *Plywood — Classification by surface appearance — Part 1: General.*

EN 635-2, *Plywood — Classification by surface appearance — Part 2: Hardwood.*

EN 635-3, *Plywood — Classification by surface appearance — Part 3: Softwood.*

ENV 635-4, *Plywood — Classification by surface appearance — Part 4: Parameters of ability for finishing — Guideline.*

EN 635-5, *Plywood — Classification by surface appearance — Part 5: Method for measuring and expressing characteristics and defects.*

ENV 717-1, *Wood-based panels — Determination of formaldehyde release — Part 1: Formaldehyde emission by the chamber method.*

EN 717-2, *Wood-based panels — Determination of formaldehyde release — Part 2: Formaldehyde release by the gas analysis method.*

EN 789, *Timber structures — Test methods — Determination of mechanical properties of wood based panels.*

EN 1058, *Wood-based panels — Determination of characteristic values of mechanical properties and density.*

EN 1072, *Plywood — Description of bending properties for structural plywood.*

ENV 1156, *Wood-based panels — Determination of duration load and creep factors.*

EN 1195, *Timber structures — Test methods — Performance of structural floor decking.*

prEN 12369-2, *Wood-based panels — Characteristic values for structural design —Part 2: Plywood.*

EN 13446, *Wood-based panels — Determination of withdrawal capacity of fasteners.*

EN 13810-1, *Wood-based panels — Floating floors — Part 1: Performance specifications and requirements.*

CEN/TS 13810-2, *Wood-based panels — Floating floors — Part 2: Test methods.*

EN 13986, *Wood-based panels for use in construction — Characteristics, evaluation of conformity and marking.*

ENV 14272, *Plywood — Calculation method for some mechanical properties.*

3 Terms and definitions

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

3.1
plywood for use in dry conditions (EN 636-1)
plywood to be used in conditions characterised by a moisture content in the material corresponding to a temperature of 20 °C and a relative humidity of the surrounding air only exceeding 65 % for a few weeks per year. These conditions correspond with service class 1 according to ENV 1995-1-1.

Boards of this type are suitable for use in biological hazard class 1 of EN 335-3

3.2
plywood for use in humid conditions (EN 636-2)
plywood to be used in conditions characterised by a moisture content in the material corresponding to a temperature of 20 °C and relative humidity of the surrounding air only exceeding 85 % for a few weeks per year. These conditions correspond with service class 2 according to ENV 1995-1-1.

Boards of this type are suitable for use in biological hazard class 1 and 2 of EN 335-3

NOTE This plywood is appropriate for protected external applications (e.g. behind cladding or under roof coverings), but is also capable of resisting weather exposure for short periods (e.g. when exposed during the construction). It is also suitable for interior situations where the service moisture condition is raised above humidity of dry conditions.

3.3
plywood for use in exterior conditions (EN 636-3)
plywood to be used in climatic conditions leading to higher moisture contents than in service class 2. These conditions correspond with service class 3 according to ENV 1995-1-1.

Boards of this type are suitable for use in biological hazard class 1, 2 and 3 of EN 335-3

NOTE It is capable of withstanding exposure to weathering conditions and liquid water, or water vapour in a damp but ventilated location, under consideration of 8.2.

4 Classification system

For the purpose of this standard, all types of plywood can be classified under a system independent of the composition factors (species, number of plies, thickness of the plies etc.) and based on the bending properties.

This classification system may be used to provide characteristic values for structural uses without testing semi-size test pieces referring to prEN 12369-2.

The values given in Tables 1 and 2 correspond to 5 percentile values based on the mean values, determined according to EN 310 and EN 326-2 for individual boards and calculated in accordance with EN 326-1.

These values shall not be used for structural design.

For the determination of the bending properties, see 5.2.

Table 1 — Bending strength classes for plywood

Bending strength		
Class		Lower limit value (N/mm^2)
$f_{m\,0,5}$	F 3	5
	F 5	8
	F 10	15
	F 15	23
	F 20	30
	F 25	38
	F 30	45
	F 40	60
	F 50	75
	F 60	90
	F 70	105
	F 80	120

Table 2 — Bending modulus classes for plywood

Bending modulus		
Class		Lower limit value (N/mm^2)
$E_{m\,0,5}$	E 5	500
	E 10	1 000
	E 15	1 500
	E 20	2 000
	E 25	2 500
	E 30	3 000
	E 40	4 000
	E 50	5 000
	E 60	6 000
	E 70	7 000
	E 80	8 000
	E 90	9 000
	E 100	10 000
	E 120	12 000
	E 140	14 000

For a given plywood, the 4 classes shall be given according to the following sequence:

Strength in length direction / strength in width direction / modulus in length direction / modulus in width direction

EXAMPLE For plywood with the following bending strengths and moduli values:

$f_{m,0}$ = 22,4 N/mm^2, $f_{m,90}$ = 36,9 N/mm^2, $E_{m,0}$ = 3 850 N/mm^2 and $E_{m,90}$ = 4 200 N/mm^2,

the classes shall be expressed as: F 10/20 E 30/40

5 General requirements

5.1 Tolerances on dimensions

The tolerances on dimensions shall be as specified in EN 315.

5.2 Mechanical characteristics

5.2.1 General

Bending properties shall be determined on small test pieces in accordance with EN 310 and calculated according to EN 326-1.

5 percentile values are determined from minimum 30 panels of the same product type according to EN 326-2.

The bending properties are expressed according to clause 4. The 5 percentile values shall be at least equal to the lower limit of the classes given in Tables 1 and 2.

5.2.2 Structural application

In addition to 5.2.1, the characteristic values of the mechanical properties shall be determined according to EN 1058, from EN 789 test results. Provided that the mechanical properties of all the wood species involved in an untested composition have been derived from single species plywood panels, in accordance with EN 1058 and EN 789, the extrapolation of these test results to this untested composition shall be made using ENV 14272.

Tabulated minimum characteristic values of the mechanical properties for a number of classes, are given in prEN 12369-2.

The bending properties shall be used to identify the plywood according to EN 1072.

NOTE If it is made known by the purchaser that the boards are intended for specific use in flooring, walls or roofing the performance standard EN 12871 also has to be considered. This might result in additional requirements having to be complied with.

5.3 Formaldehyde release

5.3.1 Classification

For use in construction, refer to EN 13986.

For use in non constructional applications, the following applies :

Formaldehyde release of plywood for exterior use may be not determined. In this case, information shall be given that it shall be used only for exterior application.

Plywood for internal use shall be tested and classified into one of two classes: E 1 or E 2.

The test requirements for both initial type testing and factory production control/continuous surveillance are laid down in Table 3 for E 1 products and table 4 for E 2 products.

NOTE 1 Boards of Class E 1 can be used without causing an indoor air concentration greater than 0,1 ppm HCHO in conditions according to ENV 717-1.

The test requirement does not apply to plywood to which no formaldehyde containing material were added during production or in post-production processing. These may be classified E 1 without testing.

NOTE 2 Example of such plywood is uncoated, coated or overlaid plywood glued with resins emitting either no formaldehyde or negligible amounts of formaldehyde after production as e. g. isocyanate, or phenolic glue.

NOTE 3 The limit values for the class E 1 are given in Table 3 and for class E 2 are given in Table 4.

5.3.2 Conditioning of test pieces

5.3.2.1 Factory production control

For factory production control by gas analysis, a test may be carried out within 3 days of production. A value of ≤ 5 mg/m^2 (release class E 1) or ≤ 12 mg/m^2 (release class E 2) gives an indication that the plywood will probably conform to the values given in Tables 3 and 4 after conditioning for 4 weeks. The manufacturer has to ensure this correlation.

5.3.2.2 External control

The test pieces shall be conditioned for 4 weeks at (20 ± 2)°C and (65 ± 5) % relative humidity before testing.

Table 3 — Definition of formaldehyde class E 1

Initial type testing[a]	Test method	ENV 717-1
	Requirement	Release ≤ 0,124 mg/m^3 air
Factory production control	Test method	EN 717-2
	Requirement	Release ≤ 3,5 mg/m^2 h or ≤ 5 mg/m^2 h within 3 days after production

[a] For established products, initial testing may also be done on the basis of existing data with EN 717-2 testing, either from factory production control or from external inspection.

Table 4 — Definition of formaldehyde class E 2

Initial type testing	either	Test method	ENV 717-1
		Requirement	Release > 0,124 mg/m^3 air
	or	Test method	EN 717-2
		Requirement	Release > 3,5 mg/m^2 h to ≤ 8 mg/m^2 h or > 5 mg/m^2 h to ≤ 12 mg/m^2 h within 3 days after production
Factory production control		Test method	EN 717-2
		Requirement	Release > 3,5 mg/m^2 h to ≤ 8 mg/m^2 h or > 5 mg/m^2 h to ≤ 12 mg/m^{2}h within 3 days after production

6 Requirements for plywood for use in dry conditions (EN 636-1)

6.1 Bonding quality

The bonding quality shall comply with the requirements of bonding class 1 of EN 314-2.

6.2 Biological durability

Plywood shall be appropriate for prevailing climatic conditions. The risk of attack is outlined in hazard class 1 of EN 335-3.

NOTE Guidance on factors affecting durability and on precautionary measures which may be considered as necessary can be found in ENV 1099.

7 Requirements for plywood for use in humid conditions (EN 636-2)

7.1 Bonding quality

The bonding quality shall comply with the requirements of bonding class 2 of EN 314-2.

7.2 Biological durability

Plywood shall be appropriate for prevailing climatic conditions. The risk of attack is outlined in hazard class 2 of EN 335-3.

NOTE Guidance on factors affecting durability and on precautionary measures which may be considered as necessary can be found in ENV 1099.

8 Requirements for plywood for use in exterior conditions (EN 636-3)

8.1 Bonding quality

The bonding quality shall comply with the requirements of bonding class 3 of EN 314-2.

8.2 Biological durability

Plywood shall be appropriate for prevailing climatic conditions. The risk of attack is outlined in hazard class 3 of EN 335-3. In this hazard class, the performance of most plywood will be compromised if suitable preservative treatment and/or relevant surface and edges coating is not applied and if the panels are not properly maintained and installed.

NOTE Guidance on factors affecting durability and on precautionary measures which may be considered as necessary can be found in ENV 1099.

9 Supplementary properties

For certain applications information on some supplementary properties can be required. Some of these supplementary properties are listed in Table A.1. On request this information should be provided by the supplier.

These properties shall be determined according to the European Standards listed in Table A.1. If there is no European Standard available the method used shall be fully described in the test report.

10 Verification of compliance

10.1 General

Verification of compliance with this European Standard shall be carried out using the test methods listed in Table 5.

10.2 External control

External control of the factory, if any, shall be carried out according to EN 326-2.

Inspection of isolated lots shall be carried out according to EN 326-3.

In the case of formaldehyde release determined by EN 717-2 method, however, for both external control and inspection of isolated lots of panels, the respective requirements set out in 5.3 shall be the arithmetic mean value of at least three boards. Additionally, no individual board shall exceed an upper tolerance limit of + 10 %.

10.3 Factory production control

Factory production control shall be carried out according to EN 326-2.

The properties listed in table 5 shall be controlled using at least the frequencies of testing given in Table 5. Sampling shall be carried out at random. Alternative test methods and/or unconditioned test pieces may be used if a valid correlation to the specified test methods can be proven (see EN 326-2).

The frequencies of testing given in Table 5 are related to a production under statistical control.

Each requirement relating to formaldehyde release shell be met by the 95 percentile value based on test values of individual boards. The 95 percentile value shall be equal to or less than the respective tabulated values given in Tables 3 or 4.

Table 5 — Minimum frequencies of testing for each factory

Property	Test method	Minimum frequency of testing
Dimensional tolerances	EN 324-1 EN 324-2	One panel per 8 h or per shift.
Bending properties — non-structural panels — structural panels	EN 310	 Two panels per month whatever the lay-up. One panel per 1 000 panels produced, but not more than one per shift.
Density structural panels	EN 323	One panel per 1 000 panels product, but not more than one per shift.
Bonding quality	EN 314-1	For plywood for use in dry, humid or exterior conditions, one pair of glue-lines per every 10 000, 5 000 or 2 000 pairs of glue-lines produced respectively, whatever the lay-up of the panel, but not more than one per shift.
Formaldehyde release	EN 717-2	One panel per week[a].

[a] Certain types of plywood release little or no formaldehyde. In these cases, the test interval may be increased. However, it remains the responsibility of the manufacturer to ensure compliance with the declared formaldehyde class.

11 Marking, identification and documentation

The marking and the accompanying information shall be placed on the product itself, on a label attached to it, on its packaging, or in the accompanying commercial documents.

Insofar as these data have not been given by other marking rules, panels, or possibly packages, which comply with this standard shall be marked to provide the following information:

— the name (or logo) or code of the manufacturer;

— the number of this European Standard, EN 636 and the conditions of use (-1 for use in dry conditions, -2 for use in humid conditions or -3 for use in exterior conditions);

— the letter corresponding to the intended application: "S" for structural application or "G" for general application;

— the formaldehyde release class or "for exterior use only" (for plywood for use in exterior conditions, if class not determined);

and optionally:

— the nominal dimensions in millimetres;

— the bending strength and modulus classes;

— the quality label and the certification body, if any;

— the batch number, or the production week and year.

NOTE 1 Further documents, if requested, will be provided by the manufacturer.

NOTE 2 In case of cut-size panels, where the first purchaser is the user of the product and where he agrees that marking (other than on the package) is unnecessary, the marking of such individual panels in the package need not be undertaken.

Annex A
(normative)

Supplementary properties

Table A.1 lists the main supplementary properties together with the appropriate references.

Table A.1 — Supplementary properties

Physical properties	Test method	
— Dimensional changes	EN 318	
— Moisture content	EN 322	
— Density	EN 323	
Mechanical properties	**Test method**	
— Tension properties	EN 789	
— Shear properties	EN 789	
— Compression properties	EN 789	
— Resistance to withdrawal of fasteners	EN 13446	
Performance properties	**Test method**	**Reference document**
— Flooring	EN 1195	EN 12871
— Floating floors	CEN/TS 13810-2	EN 13810-1
— Walling	EN 594 and EN 596	EN 12871
— Roofing	EN 12871	EN 12871
— Duration of load and creep factors	ENV 1156	
Other properties	**Test method**	**Reference document**
— Classification by surface appearance	EN 635-5	EN 635-1 EN 635-2 EN 635-3
— Ability for finishing		ENV 635-4

NOTE For certain applications, information on additional properties not specified in Table A.1 can be required. More information about the corresponding test methods (or tabulated values) can be found in EN 13986.

Bibliography

EN 313-1, *Plywood — Classification and terminology — Part 1: Classification.*

EN 313-2, *Plywood — Classification and terminology — Part 2: Terminology.*

ENV 1099, *Plywood — Biological durability — Guidance for the assessment of plywood for use in different hazard classes.*

ENV 1995-1-1, *Eurocode 5 — Design of timber structures — Part 1—1: General rules and rules for buildings.*

EN 12871, *Wood-based panels — Performance specifications and requirements for load bearing boards for use in floors, walls and roofs.*