
Lesne plošče - Lastnosti in zahteve za specifikacijo sendvič plošč za pohištvo

Wood-based panels - Determination of performance characteristics for specification of sandwich boards for furniture

Holzwerkstoffe - Bestimmung der Leistungseigenschaften von Sandwich-Platten für Möbel

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Panneaux sandwichés pour meubles (SWB-F) - Produits manufacturés - Définition, classification et méthodes d'essai pour la détermination des propriétés fonctionnelles

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Ta slovenski standard je istoveten z: CEN/TS 16526:2013

ICS:

79.060.01	Lesne plošče na splošno	Wood-based panels in general
97.140	Pohištvo	Furniture

SIST-TS CEN/TS 16526:2014**en,fr,de**

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TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CEN/TS 16526

November 2013

ICS 79.060.01

English Version

**Sandwich boards for furniture (SWB-F) - Factory made products
- Definition, classification and test methods for determination of
performance characteristics**

Panneaux sandwichés pour meubles (SWB-F) - Produits
manufacturés - Définition, classification et méthodes d'essai
pour la détermination des propriétés fonctionnelles

Sandwichplatten für Möbel (SWB-F) - Werkmäßig
hergestellte Produkte - Definition, Klassifizierung und
Prüfverfahren zur Bestimmung der Leistungseigenschaften

This Technical Specification (CEN/TS) was approved by CEN on 15 June 2013 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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CEN/TS 16526:2013 (E)**Foreword**

This document (CEN/TS 16526:2013) has been prepared by Technical Committee CEN/TC 112 “Wood-based panels”, the secretariat of which is held by DIN.

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1 Scope

This European Technical Specification defines terms, establishes a classification and specifies test methods for flat, factory made, non-structural, faced and unfaced sandwich boards for use in furniture manufacturing (SWB-F) for dry (service class 1) and humid conditions (service class 2). This European Technical Specification does not specify requirements.

Guidance is provided for the selection of board properties which are relevant for specific board applications.

This European Technical Specification is not applicable to products which are already covered by existing standards.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 311, *Wood-based panels - Surface soundness - Test method*

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

EN 320, *Particleboards and fibreboards - Determination of resistance to axial withdrawal of screws*

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

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 325, *Wood-based panels - Determination of dimensions of test pieces*

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: Initial type testing and factory production control*

EN 326-3, *Wood-based panels - Sampling, cutting and inspection - Part 3: Inspection of an isolated lot of panels*

EN 438-2, *High-pressure decorative laminates (HPL) - Sheets based on thermosetting resins (usually called Laminates) - Part 2: Determination of properties*

EN 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 826, *Thermal insulating products for building applications - Determination of compression behaviour*

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EN 950, *Door leaves - Determination of the resistance to hard body impact*

EN 1294, *Door leaves - Determination of the behaviour under humidity variations in successive uniform climates*

EN 1383, *Timber structures - Test methods - Pull through resistance of timber fasteners*

EN 1464, *Adhesives - Determination of peel resistance of adhesive bonds - Floating roller method*

EN 1995-1-1, *Eurocode 5: Design of timber structures - Part 1-1: General - Common rules and rules for buildings*

EN 14323:2004, *Wood-based panels - Melamine faced boards for interior uses - Test methods*

EN 14727:2005, *Laboratory furniture - Storage units for laboratories - Requirements and test methods*

DIN 53293, *Testing of sandwiches - Bending test*

3 Terms and definitions

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

3.1**sandwich board****SWB**

laminar composite product consisting of at least two skins positioned on either side of a core, which is firmly connected to the skins (e.g. by bonding, by core-generated adhesion) so that the three (or more) components act compositely when under load

Note 1 to entry: Wood or other lignocellulosic materials constitute at least one of the components.

3.2**skin**

flat sheet firmly connected to the core and designed to support in-plane tensile or compressive loads in a sandwich board

Note 1 to entry: Sheets used as skins can consist of composite materials.

Note 2 to entry: Skins in sandwich boards for furniture commonly consist of particleboard (EN 309), fibreboard (EN 316), plywood (EN 636) etc.

Note 3 to entry: If skins consist of or contain veneers (excluding decorative veneer applied to skins in faced SWB-F) or plywood, this SWB can be considered as a core or composite plywood as defined in EN 313–2. The corresponding standards can apply in particular, the requirements and test methods pertaining to the bonding quality.

3.3**core**

centrally positioned layer of material, generally low in density, which is bonded between two skins and is designed to support normal compressive and tensile loads and to transfer shear loads in a sandwich board

3.4**core material**

homogeneous or inhomogeneous material used in manufacturing the core

Note 1 to entry: Homogeneous and inhomogeneous core materials provide continuous and discontinuous supports of the skins, respectively. Homogeneous (e.g. balsa wood, foams) or inhomogeneous (e.g. honeycomb cores) core materials can be isotropic or anisotropic.

Note 2 to entry: Core materials in sandwich boards for furniture are commonly lightweight materials such as paper, metal or composite honeycomb, open and closed cell foam, corrugated material, bonded composite tubes, or naturally occurring materials such as balsa wood or lightweight (wood) fibre-based boards.

3.5

homogenous material

material in which on a macroscopic scale relevant properties are not a function of the position within the material itself but may be a function of such parameters as time, direction, temperature, etc.

3.6

inhomogeneous material

material, also often referred to as non-homogeneous or structured in which on a macroscopic scale relevant properties are a function of the position within the material itself and relevant properties may be a function of such parameters as time, direction, temperature, etc.

3.7

isotropic

exhibiting the same physical and mechanical properties along different axes

3.8

anisotropic

not isotropic

exhibiting different physical and mechanical properties along different axes

3.9

x-axis

in sandwich boards, an axis in the plane of the skins which is used as the 0 degree reference or major axis

Note 1 to entry: The board dimension in the direction of the x-axis is referred to as the length of the board.

3.10

x-y plane

in sandwich boards, the reference plane parallel to the plane of the skins

3.11

y-axis

in sandwich boards, the axis in the plane of the skins which is perpendicular to the x-axis and which is referred to as the minor axis

Note 1 to entry: The board dimension in the direction of the y-axis is referred to as the width of the board.

3.12

z-axis

in sandwich boards, the reference axis normal to the plane of the skins

Note 1 to entry: The board dimension in the direction of the z-axis is referred to as the thickness of the board.

3.13

structural unit

SU

entity which is repeated periodically in an inhomogeneous core material whose properties vary along the x- or y-axis of the sandwich board

Note 1 to entry: An example of a structural unit is a honeycomb cell in a honeycomb core or a single profile in a corrugated core.

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CEN/TS 16526:2013 (E)**3.14****factory made**

mass manufactured commodity product supplied on the open market for the purpose of fabrication of furniture components or furniture

Note 1 to entry: Factory made SWB-F can be subjected by the board manufacturer to additional value-adding processes (e.g. application of decorative surfaces to skins, cutting of boards to customer-specific dimensions, installation of edge-banding).

Note 2 to entry: Purpose built or custom sandwich board manufactured by a furniture producer for a specific furniture product is not considered SWB-F as covered by this European Technical Specification.

3.15**dry conditions**

conditions corresponding to service class 1 of EN 1995-1-1 which is characterized 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

3.16**humid conditions**

conditions corresponding to service class 2 of EN 1995-1-1 which is characterized by a moisture content in the material corresponding to a temperature of 20 °C and a relative humidity of the surrounding air only exceeding 85 % for a few weeks per year

3.17**furniture**

moveable or permanently installed articles for lying, sitting, working and storing of goods in areas intended for living, working, dwelling etc.

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3.18**non-structural use**

all general applications, e.g. furniture and fittings under conditions other than load-bearing conditions as part of a building or other construction or such conditions under which the board constitutes a construction product as defined by the Council Directive 89/106/EEC

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3.19**faced sandwich board**

sandwich board with overlaid, coated, printed or veneered decorative surfaces applied to skins

3.20**unfaced sandwich board**

sandwich board without overlaid, coated, printed or veneered decorative surfaces applied to skins

3.21**overlaid sandwich board**

sandwich board surfaced with one or more overlay sheets or films, for example impregnated paper, plastics, resin film, metal

3.22**coated sandwich board**

sandwich board surfaced with a coating, normally applied in liquid form, for functional or decorative purposes

3.23**veneered sandwich board**

sandwich board overlaid with a (decorative) veneer

3.24**mass per unit area**

quotient of mass and area (i.e. length multiplied by width) of a piece of sandwich board expressed in kilograms per square metres [kg/m^2]

3.25**apparent density**

mass per unit volume, expressed in kilograms per cubic metre [kg/m^3], and based on the external dimensions of the test piece to calculate the volume which is an average density of material and any hollow spaces (pores, cells, channels etc.)

3.26**peel resistance**

average force measured along the bond line, required to separate progressively the two members of a bonded test piece under specified conditions of test

4 Classification**4.1 General**

Sandwich boards can be classified according to different criteria. It is not possible to present an exhaustive classification system.

In this European Technical Specification, a combined system of criteria is presented for the classification of sandwich boards for furniture.

4.2 Classification according to board lay-up

- honeycomb sandwich board;
- solid core sandwich board;
- foam core sandwich board.

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4.3 Classification according to surface appearance

- unfaced sandwich board;
- faced sandwich board.

4.4 Classification according to conditions of use

- dry conditions;
- humid conditions.

4.5 Classification according to application purposes

- sandwich boards for vertical elements in furniture;
- sandwich boards for horizontal elements in furniture;
- sandwich boards for front elements in furniture;

NOTE Front elements in furniture most commonly act as doors; thus the ability to install hardware in front elements is often of vital importance.

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5 Symbols

5.1 General

Different symbols are used for addressing different types of sandwich boards for furniture.

5.2 Symbols related to conditions of use

Table 1 specifies the symbols which shall be used to indicate the conditions of use.

Table 1 — Symbols related to conditions of use

Conditions of use	Symbol
Dry conditions	no symbol
Humid conditions	H

5.3 Symbols related to specific applications

Table 2 specifies the symbols which shall be used to indicate the board application in furniture manufacturing.

Table 2 — Symbols related to board application in furniture manufacturing

Board application in furniture manufacturing	Symbol
general purpose	no symbol
vertical elements	VE
horizontal elements	HE
front elements	FE

5.4 Combination of symbols for identification of sandwich boards

The symbols indicating conditions of use and application purposes are added to the symbol "SWB-F" for sandwich board for furniture after a full stop, in this sequence:

"SWB-F" condition of use application purpose

EXAMPLE 1 SWB-F.H.FE

sandwich board for furniture to be used in humid conditions as front elements (e.g. for doors in bathroom furniture)

EXAMPLE 2 SWB-F

sandwich board for furniture to be used in dry conditions for general purposes

6 Conditioning and test conditions

Unless otherwise stated in this European Technical Specification 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.

Unless otherwise stated in this European Technical Specification tests should be carried out at ambient room temperature and no requirements pertaining to the relative humidity during testing apply. However, if the ambient conditions of testing are not the same as those in the conditioning chamber, tests shall be undertaken immediately after the test pieces have been removed from the conditioning chamber.

7 Sampling, preparation and handling of test pieces and expression of test results

7.1 General requirements

Sampling, cutting of test pieces (also referred to as test pieces) and expression of test results shall be carried out according to EN 326-1.

Unless otherwise stated in this European Technical Specification the minimum number of test pieces m to be tested for determination of the respective property shall be taken from Table 3.

Table 3 — Minimum number of test pieces m which have to be tested to determine properties of sandwich boards

Property	Reference to test method	Minimum number of test pieces m
Moisture content	8.2.2	4
Apparent density and mass per unit area	8.2.3	6
Linear expansion due to changes in relative humidity	8.2.4	4
Behaviour under humidity variations in successive uniform climates	8.2.5	2
Moisture resistance	8.2.6	see respective test method
Bending test	8.3.1.2	6
Bending properties of sandwich board for shelving and similar applications	8.3.1.3	5
Surface soundness	8.3.2	8
Flatwise compressive behaviour	8.3.3.1	10
Resistance to a concentrated static point load	8.3.3.2	10
Resistance to a concentrated static load applied in close proximity to the board edge	8.3.3.3	10
Impact resistance	8.3.4	see respective test method
Shear strength	8.3.5	6
Resistance of the board edge with edgebanding against a static concentrated load	8.4.3.2	6
Peel resistance of edge-banding	8.4.3.3	6
Determination of axial withdrawal resistance of fastener	8.4.4.2	10
Pull through resistance of fasteners	8.4.4.3	10
Load bearing capacity of shelf supports	8.4.4.4	10
Shear resistance of a grooved board	8.4.5	10

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In order to determine properties, which differ with respect to the x-axis and the y-axis of the board, two groups of m test pieces shall be tested. For the purpose of ensuring and demonstrating compliance with specific requirements in factory production control, testing can be limited to test pieces with the known weakest orientation in the plane of the board.

7.2 Testing of SWB-F in combination with auxiliary material(s) or after execution of additional processing steps

For certain purposes (e.g. evaluation of properties of SWB-F for a very specific application or furniture design) it may be desirable to evaluate properties of SWB-F in combination with auxiliary materials or after the execution of further processing steps which are to be applied to the respective SWB-F in the manufacturing of furniture or furniture components.

Examples of such auxiliary materials and/or processing steps are the installation of edge reinforcements and/or edge banding, the application of decorative surface finishes etc. The respective auxiliary materials and/or processing steps etc. have to be specified and described in the test report. Test results are only applicable to the tested SWB-F in combination with the specified auxiliary material and/or processing steps.

7.3 Test piece size

Unless other specifications are provided in this European Technical Specification for the respective test method the test piece size shall be as follows:

The test piece shall be square. The side length of the test piece shall measure 100 mm. The thickness of the test pieces shall be equal to the thickness of the sandwich board. For a sandwich board with an inhomogeneous core the side length may have to be increased in order to meet the following criteria:

For inhomogeneous core materials with a longitudinal orientation of the structural units (e.g. channels in a corrugated core) a minimum of three structural units shall be contained in the test piece cross section. For inhomogeneous core materials with cellular structural units at least nine structural units shall be contained in the test piece cross section.

Generally the person or entity applying this European Technical Specification is responsible for ensuring that representative and reproducible test results can be obtained by considering characteristics of and local variations within the respective sandwich board and its core material when choosing a sampling strategy, a test piece cutting plan and a test piece size.

Test piece dimensions shall be stated in the test report.

If larger test pieces have to be employed to determine certain properties suitable modifications of the test equipment may have to be implemented and described in the test report (e.g. larger loading plates for determination of the flatwise compressive behaviour as described in 8.3.3.1).

7.4 Determination of dimensions of test pieces

Unless otherwise stated in this European Technical Specification dimension of test pieces shall be determined following conditioning of test pieces according to the provisions stated in Clause 6. Dimensions of test pieces with a maximum nominal length and/or width of 300 mm shall be determined according to EN 325. Dimensions of test pieces which are larger in size shall be determined according to the provision of the respective test method or in case that no provisions are given in the respective test method by applying the procedures specified in 8.2.1.

The thickness of a test piece shall be measured at four points located 25 mm from the nearest edges. The average thickness is recorded.

The length and width of a square test piece with a nominal size of 10 000 mm² shall be measured at two points located 2 mm from the nearest edge, respectively. The average length and width shall be recorded.

The length and width of a rectangular test piece or of a square test piece with a nominal size of $\geq 40\,000\text{ mm}^2$ shall be measured at two points located 25 mm from the nearest edge and at the point midway along the edge(s) measuring $\geq 200\text{ mm}$ in length. The average length and width shall be recorded.

7.5 Expression of test results

Unless otherwise stated in this European Technical Specification test results shall be expressed as 5 percentile values (95 percentile values in case of properties for which an upper limit is imposed) based on the mean values for individual boards and calculated in accordance with EN 326-1. Mean values and standard deviations shall also be reported.

Evaluation and statistical analysis procedures of results shall be carried out in accordance with EN 326-2 if test procedures provided in this European Technical Specification are employed by a manufacturer as part of initial type testing or of factory production control.

Evaluation and statistical analysis procedures of results shall be carried out in accordance with EN 326-3 for the inspection of an isolated lot of boards.

8 Test methods

8.1 General guideline on the description and use of test methods

Methods provided for determination of various properties are either described in full in this European Technical Specification or they are based partially or fully on existing standards. Whenever test methods are based on existing standards it shall be observed that unless otherwise stated in this European Technical Specification the provisions of Clause 6 (“Conditioning and test conditions”) and Clause 7 (“Sampling, preparation and handling of test pieces and expression of test results”) of this European Technical Specification replace the respective provision of the referenced standards. Other modifications which apply to specific, referenced test methods are provided in the description of the test method within this European Technical Specification.

8.2 Physical properties

8.2.1 Determination of board dimensions

Thickness, width and length of a sandwich board shall be determined in accordance with EN 324-1. Squareness and edge straightness of a sandwich board shall be determined in accordance with EN 324-2.

Warping of a sandwich board shall be determined and expressed according to EN 14323:2004, 5.2.

The edges of a sandwich board have to be trimmed in a precise manner such that any deviations in size of the two skins are negligible. Width, length, squareness and edge straightness of a sandwich board are equal to the width, length, squareness and edge straightness of its skins.

8.2.2 Moisture content

The moisture content of a sandwich board shall be determined according to EN 322 using 4 test pieces with a minimum weight of at least 100 g each.

The method for determination of moisture content according to EN 322 is based on differential weighing of board material prior to and after drying of material at a temperature of $(103 \pm 2)\text{ }^\circ\text{C}$. If the sandwich board to be tested contains particularly temperature sensitive (i.e. volatile) substances the method according to EN 322 may lead to an incorrect and non-reproducible result. In order to obtain accurate results SWB-F containing volatile, heat-sensitive or readily flammable materials shall be dried over a desiccant under vacuum conditions (pressure: $< 100\text{ Pa}$) at low temperatures (temperature: max. $50\text{ }^\circ\text{C}$) in a desiccator.