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BSI Standards Publication

Laminate floor coverings — Underlays — Specification, requirements and test methods

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National foreword

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

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (CEN/TS 16354:2013) has been prepared by Technical Committee CEN/TC 134 “Resilient, textile and laminate floor coverings”, the secretariat of which is held by NBN.

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1 Scope

This Technical Specification specifies test methods for the determination of the technical characteristics of underlays under laminate floor coverings. It includes minimum performance requirements for the underlay-flooring system to give satisfactory service and to encourage the consumer to make an informed choice. It also specifies requirements for marking and packaging.

Underlays pre-attached to the laminate flooring coverings are not covered by this Technical Specification.

Underlays for laminate floor coverings intended for use in electrostatically sensitive areas like computer rooms, etc., are not covered by this Technical Specification.

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 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 822, *Thermal insulating products for building applications - Determination of length and width*

EN 823, *Thermal insulating products for building applications - Determination of thickness*

EN 824, *Thermal insulating products for building applications - Determination of squareness*

EN 825, *Thermal insulating products for building applications - Determination of flatness*

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

EN 1264-3, *Water based surface embedded heating and cooling systems - Part 3: Dimensioning*

EN 1606, *Thermal insulating products for building applications - Determination of compressive creep*

EN 1815, *Resilient and textile floor coverings - Assessment of static electrical propensity*

EN 12086, *Thermal insulating products for building applications - Determination of water vapour transmission properties*

EN 12311-2, *Flexible sheets for waterproofing - Determination of tensile properties - Part 2: Plastic and rubber sheets for roof waterproofing*

EN 12664, *Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Dry and moist products of medium and low thermal resistance*

EN 12667, *Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance*

EN 13238, *Reaction to fire tests for building products - Conditioning procedures and general rules for selection of substrates*

EN 13329, *Laminate floor coverings - Elements with a surface layer based on aminoplastic thermosetting resins - Specifications, requirements and test methods*

EN 13501-1:2007+A1:2009, *Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests*

EN 13793:2003, *Thermal insulating products for building applications - Determination of behaviour under cyclic loading*

EN 14909, *Flexible sheets for waterproofing - Plastic and rubber damp proof courses - Definitions and characteristics*

EN ISO 717-1, *Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation (ISO 717-1:2013)*

EN ISO 717-2, *Acoustics - Rating of sound insulation in buildings and of building elements - Part 2: Impact sound insulation (ISO 717-2:2013)*

EN ISO 868:2003, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)*

EN ISO 1923, *Cellular plastics and rubbers - Determination of linear dimensions (ISO 1923)*

EN ISO 10140-2, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation (ISO 10140-2)*

EN ISO 10140-3, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 3: Measurement of impact sound insulation (ISO 10140-3)*

EN ISO 10140-5:2010, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment (ISO 10140-5)*

EN ISO 11925-2:2010, *Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2)*

EN ISO 16000-9, *Indoor air - Part 9: Determination of the emission of volatile organic compounds from building products and furnishing - Emission test chamber method (ISO 16000-9)*

3 Terms and definitions

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

3.1
laminate floor covering
floor covering with a surface layer consisting of one or more thin sheets of a decorative material (usually paper), impregnated with aminoplastic thermosetting resins (usually melamine) or impregnated and surfaced with an acrylate and/or methacrylate resin

3.2
underlay
layer placed between the subfloor and the floor covering to impart specific properties

Note 1 to entry: Underlays for laminate flooring can be principally divided into four main classes:

a) synthetic underlays:

   1) cellular (foam) (e.g. PE, PP, PO, EPS, polyurethane, etc., -based);

2) fibrous (e.g. non-woven polyester, polypropylene, etc., -based);

b) renewable underlays (e.g. wood fibre boards, card board, coco fibre, etc.);

c) other underlays (not falling into above groups).

Combinations of above underlays and underlay materials as well as combinations of above underlays with foils or films (e.g. vapour control layers) are also possible.

3.3
vapour control layer
underlay and/or an additional layer that offers a resistance against the passage of water vapour

3.4
floor covering system
combination of at least one underlay with a laminate floor covering

Note 1 to entry: For definition of laminate floor covering see 3.1.

3.5
reference floor covering
monolithic seamless panel with no pre-attached underlay, having a nominal thickness of (7,0 ± 0,2) mm and a size of (2,0 ± 0,1) m x (2,4 ± 0,1) m in accordance with EN 13329, class 23/31 and produced by the DPL method with melamine backing, and with an HDF core board with a density of (850 ± 50) kg/m^3

Note 1 to entry: The reference floor covering referred to in this Technical Specification is identical with the one specified in the reflected walking sound test according to Bibliographical entries [1] and [2]. This reference floor covering can be retrieved from EPLF (http://www.eplf.com).

3.6
substrate
structural layer on which the floor covering system is installed

4 Requirements

4.1 Characteristics

The following table gives an overview of the important key characteristics and requirements for the underlay, depending on the exact application and products used. They have been determined for defined scenarios (e.g. dynamic load by walking persons, moving castor chair, structural floor unevenness) and by practical trials and measurements (e.g. 100 Pa is the approx. pressure of an unloaded laminate onto the underlay). Where needed, existing methods have been adapted.

When reference is made to this Technical Specification the characteristics declared shall be determined according to the test methods specified in Table 1.

Table 1 — Characteristics

No.	Characteristic	Requirements/Tolerances	Test method	Subclause
1	Thickness, **(d)**	Measured thickness in mm. Tolerance of declared thickness (d_d): ± 15 % or ± 0,5 mm[a]	EN 823 + A.3.1	
2	Length,**(l)**	Measured length. Tolerance of declared length (l_d): boards: - 1 % + 5 %	EN 822 + A.3.3	

		rolls: - 0 % + 5 %		
3	Width, **(w)**	Measured width. Tolerance of declared width (w_d): - 1 % + 2,5 % and of width variation $w_{max} - w_{min} \leq 10$ mm	EN 822 + A.3.2	
4	Squareness, **(q)**	$q_{max} < 5$ mm/m	EN 824 + A.3.4	
5	Flatness, **(S)**	$S_{max} < 2$ mm/m	EN 825 + A.3.5	
6	Punctual conformability **(PC)**	in mm[b]	EN ISO 868 + A.3.6	4.2.3
7	Compressive strength **(CS)**	in kPa[b]	EN 826 + A.3.7	4.2.4
8	Compressive Creep resistance **(CC)**	in kPa[b]	EN 1606 + A.3.8	4.2.5
9	Dynamic load **(DL)** resistance	in number of cycles at the defined load applied[b]	EN 13793 + A.3.9	4.2.6
10	Thermal resistance **(R)**	in m^2K/W	EN 12667 or EN 12664 at 24 °C mean temperature	4.2.7
11	Water vapour diffusion resistance **(SD)**	in m	EN 12086, method A, at 23 °C and 0 %–50 % rel. humidity	4.2.8
12	Impact sound **(IS)**	Weighted reduction of impact sound pressure level ΔLw in dB	EN ISO 10140-3 and EN ISO 717-2	4.2.12.2
13	Reflected walking sound **(RWS)**	RWS (in sone) [b]	See Bibliography [1] and [2]	4.2.12.3
14	Air borne sound **(AS)**	Weighted apparent sound reduction index Rw' in dB	EN ISO 10140-2 and EN ISO 717-1	4.2.12.4
14.1	Reaction-to-fire **(RTF)**	Material (underlay only)	EN ISO 11925-2 Classification according to EN 13501–1:2007+A1:2009 - Table 2	4.2.11.1 1)
14.2		Product (underlay plus laminate in end-use conditions)	EN 13501–1:2007+A1:2009 – Table 2	4.2.11.1 2)
15	Resistance to impact by large diameter ball **(RLB)**	Product (underlay plus laminate in end-use conditions)	EN 13329	4.2.11.2
16	Electrostatic behaviour **(EB)**	Product (underlay plus laminate in end-use conditions)	EN 1815, method A	4.2.11.3
17	Alkaline resistance **(AR)**		EN 14909	4.2.9
18	Emission of formaldehyde		EN 717–1 or EN ISO 16000-9	4.2.11.4
19	Emission of VOCs		EN ISO 16000-9	4.2.11.5
20	Area weight **(AW)**		A.3.10	4.2.10

[a]	Whichever gives the smallest numerical tolerances.
[b]	See Annex B (informative).

4.2 Testing

4.2.1 General

The tests specified in this clause are based on existing standards used for other building applications and adapted to the specific application conditions of laminate flooring underlays where needed.

4.2.2 Thickness (d)

Thickness is the main property of an underlay to ensure functionality such as acoustic performance or conformability.

The thickness d shall be determined according to EN 823 plus the details given in A.3.1 under a measurement load of 100 Pa (= typical load of a laminate).

4.2.3 Punctual conformability (PC)

Punctual conformability is the ability of the underlay to smoothen small local defects of the subfloor (e.g. small protruding particles) and/or small particles laying on the subfloor when installed under a laminate floor covering.

The punctual conformability of the underlay shall be determined by measuring the Shore-A-hardness (SH) according to EN ISO 868 plus the details defined in A.3.6. The punctual conformability shall be declared as PC-value (mm).

The higher the PC-value the better the underlay will smoothen the punctual unevenness or defects of a subfloor.

4.2.4 Compressive strength (CS)

To ensure the integrity of the joints of a laminate floor covering element, the compressive strength at 0,5 mm deformation shall be determined according to EN 826 plus the details defined in A.3.7 and with a pre-load of 100 Pa. The compressive strength shall be declared as CS-value (in kPa).

4.2.5 Compressive Creep (CC) resistance

To ensure sufficient resistance of the underlay against static load applied by e.g. furniture feet, the resistance to compressive load shall be determined according to EN 1606 plus the details defined in A.3.8 and with a pre-load of 100 Pa.

Compressive creep resistance shall be determined as the maximum applicable load in kPa resulting in a thickness loss $X_t = X_0 + X_{ct}$ of ≤ 0,5 mm after extrapolation to 10 years. The compressive creep resistance shall be declared as CC-value in kPa.

When CC is determined at temperatures other than the standard conditions as defined under A.2, the conditions shall be reported (e.g. CC (35 °C)).

4.2.6 Dynamic load (DL) resistance

To ensure sufficient resistance of the underlay against long-term dynamic loads applied by e.g. people walking or sitting on a castor chair the resistance to dynamic load shall be determined according to EN 13793 plus the details defined in A.3.9.

The dynamic load resistance shall be declared as DL-value (number of cycles). The value is determined as the maximum number of load cycles which can be applied to the underlay that results in a maximum loss in thickness of ≤ 0,5 mm.

4.2.7 Thermal resistance (R)

If the laminate floor coverings is going to be installed over underfloor heating according to EN 1264-3 the thermal resistance R of the floor covering system shall not exceed 0,15 m^2K/W when tested according to EN 12667 or EN 12664 at 24 °C mean temperature.

The heat resistance R of the materials laid onto the heated floor such as underlay and floor covering, etc., shall be summed up. Because of the weight of the floor covering itself and the weight of furniture, air gaps may not be expected and can be neglected in this respect.

NOTE For more information, see [3].

4.2.8 Water vapour resistance (SD)

In situations where slight rising dampness or occasional condensation can be expected because of differences in temperature, wet conditions in underneath rooms or in case of an underfloor heating, a vapour control layer shall be installed to protect the floor covering system from swelling or other negative effects. The minimum SD value of the vapour control layer in these situations should be SD ≥ 75 m measured using EN 12086, method A, with the test conditions 23 °C, 0/50 % relative humidity.

The vapour control properties may be provided by the underlay itself (e.g. multilayer) or by a separate layer. For underlays known to be sensitive to humidity suitable precautions shall be taken to prevent water vapour from the structural floor to penetrate into the underlay (e.g. by installing a water vapour control layer between structural floor and underlay).

4.2.9 Alkaline resistance (AR)

To ensure the long-term performance of a floor covering system laid on concrete floors, a sufficient alkaline resistance of underlays and vapour control layers is important in case they are in direct contact to the alkaline substrate.

The alkaline resistance is determined in accordance with EN 14909. The upper concrete block is replaced by a 7 mm DPL board (130 mm x 110 mm) as described under 3.5.

The alkaline resistance is assessed by measuring the tensile elongation according to EN 12311-2 before and after alkaline exposure.

4.2.10 Area weight (AW)

The area weight may be important for logistical/transport reasons and shall be determined for the underlay as such (including e.g. foils, films) and as described in A.3.10.

4.2.11 Specific requirements for health/safety aspects

4.2.11.1 Reaction to fire (RTF)

The reaction to fire of an underlay can be determined and classified according to EN 13501-1 for two cases:

1) Material (underlay only):

The test shall be carried out according to the test procedure described in EN ISO 11925-2:2010, Clause 7.

Where an underlay is fixed to a substrate, the test specimen shall represent the end-use conditions.

2) System (underlay plus laminate assembly in end-use conditions):

The test shall be carried out on the floor covering system under end-use conditions and the test specimen shall represent the end-use conditions.

Substrates for 1) and 2) shall be selected in accordance with EN 13238.

In absence of a defined floor covering the reaction to fire can be alternatively determined and declared using a standardised assembly simulating end-use conditions. This is composed of the reference floor covering as defined in 3.5 plus a fibre cement board as end use substrate defined in EN 13238.

The result shall be accompanied by the exact description of the tested system (e.g. floor covering, underlay, substrate…).

4.2.11.2 Resistance to impact by large diameter ball (RLB)

The test shall be carried out on the floor covering system (underlay plus laminate).

In absence of a defined floor covering the resistance to impact by a large diameter ball can be alternatively determined and declared using the reference floor covering as defined in 3.5.

4.2.11.3 Electrostatic behaviour (EB)

The electrostatic behaviour of the laminate floor covering in end-use can be tested according to EN 1815, Method A.

4.2.11.4 Emission of formaldehyde

The emission of formaldehyde of an underlay shall be determined according to EN 717-1 or EN ISO 16000-9. For wood based underlays EN 717-1 or EN 717-2 shall be used.

4.2.11.5 Emission of VOCs

The emission of VOCs of an underlay shall be determined according to EN ISO 16000-9.

4.2.12 Specific requirements for acoustical characteristics

4.2.12.1 General

One of the major functions of an underlay is to provide acoustic performance.

To compare the generic acoustic characteristics of different underlays the measurements shall be done under comparable conditions as each type and thickness of floor covering on the same underlay will give different acoustical results.

4.2.12.2 Impact sound (IS)

The impact sound insulation shall be measured according to EN ISO 10140-3 and calculated according to EN ISO 717-2 using a 140 mm concrete floor as defined in EN ISO 10140-5:2010, C.2. 'Heavyweight reference floor'.

The assembled floor covering (EN ISO 10140-3, category II or reference floor covering as per Definition 3.5) shall always be tested with load.

The impact sound depends on the type and thickness of the underlay as well of the floor covering and should be measured in end-use conditions. The declared value shall be accompanied by the exact description of the floor covering system as tested.

NOTE Practical impact sound values (*in situ*) of a floor covering can significantly deviate from the values determined under above laboratory conditions on a standardised concrete subfloor.

In absence of a defined floor covering (end-use condition) and/or for relative comparison of different underlays the impact sound can be alternatively determined and declared using the reference floor covering as defined in 3.5.

4.2.12.3 Reflected walking sound (RWS)

The reflected walking sound depends on the type and thickness of the underlay as well of the floor covering and should be measured in end use conditions.

In absence of a defined floor covering (end-use condition) and/or for relative comparison of different underlays the reflected walking sound can be alternatively determined and declared using the monolithic reference floor covering as defined in Definition 3.5.

The reflected walking sound shall be declared as RWS-value (sone). The declared value shall be accompanied by the exact description of the tested floor (floor covering thickness, etc.).

At present no standardized test method exists to measure RWS. The EPLF Reflected Walking Sound method may be used (see Bibliography, [1] and [2]).

NOTE Practical reflected walking sound values (*in situ*) of a floor covering can significantly deviate from the values determined under laboratory conditions on a standardized concrete subfloor.

4.2.12.4 Airborne sound (AS)

The airborne sound insulation shall be measured according to EN ISO 10140-2 and calculated according to EN ISO 717-1.

NOTE Practical airborne sound values (*in situ*) of a floor covering can significantly deviate from the values determined under above laboratory conditions on a standardized concrete subfloor.

In absence of a defined floor covering (end-use condition) and/or for relative comparison of different underlays the airborne sound transmission can be alternatively determined and declared using the reference floor covering as defined in 3.5.

5 Marking and labelling

Underlays referring to this Technical Specification shall be marked clearly, either on the product or on the label or on the packaging, with at least the following information:

— product name or other identifying characteristic (e.g. type of facing if any);

— declared thickness (d_d), width, length and, if applicable, squareness and flatness;

— number of pieces and area in the package, as appropriate;

— compressive strength (CS).

Other applications specific characteristic(s) as listed in Table 1 may be added to the product, label or packaging if needed.

Annex A
(normative)

Determination of thickness, length, width, squareness, flatness, punctual conformability, compressive strength, compressive creep resistance, dynamic load resistance and area weight

A.1 Sampling

A sample is generally a packaging unit (such as a roll, a pack) or a pack of boards. The test specimen(s) shall be taken from the sample according to the respective test standards.

A.2 Conditions

No special conditioning of the test specimens is required unless otherwise specified in the test standard.

In case of dispute, the test specimens shall be stored at (23 ± 2) °C and (50 ± 5) % relative humidity for at least 6 h prior to testing.

If not mentioned otherwise all laboratory tests mentioned in Table 1 shall be carried out under normal laboratory conditions (23 ± 2)°C and (50 ± 5)% relative humidity.

Other conditions may be agreed between parties.

A.3 Procedure

A.3.1 Determination of thickness (d)

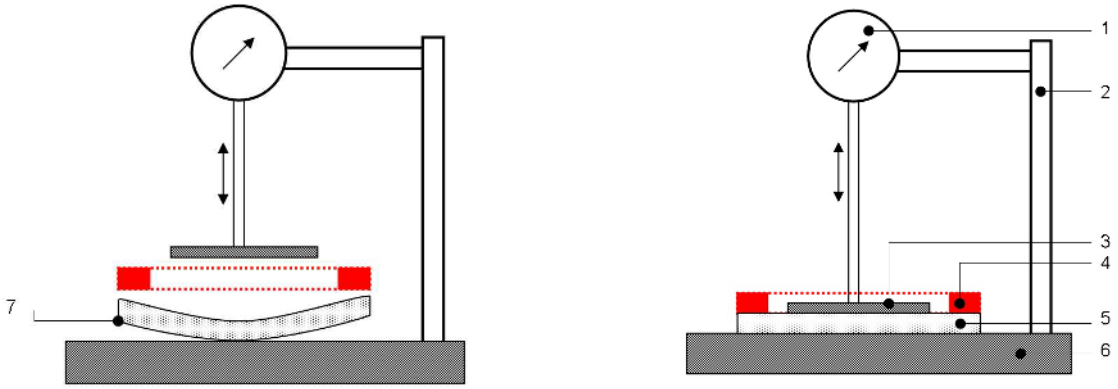
The characteristic shall be determined according to EN 823. Number and location of the specimens for measurements depends on the size and shape of the sample, but shall be at least five.

The specimen size shall be (200 × 200) mm. The size of the pressure foot shall be (100 × 100) mm (or circular with a diameter of 113 mm). Apply a measurement load of (100 ± 5) Pa, including the load of the measurement gauge and take the reading after (30 ± 5) s.

The thickness shall be expressed in millimetres and rounded to the nearest 0,1 mm.

Specimen not lying flat shall be laid down onto the stiff base plate with the concave side up as shown in Figure A.1 a) and loaded using a stable circular pressure frame (200 mm outside diameter, 123 mm inside diameter) or a square pressure frame ((200 × 200) mm outside, (110 × 110) mm inside) as shown in Figure A.1 b).

The pressure applied by the frame shall be (0,5 ± 0,2) kPa.



a) **b)**

Key

1 thickness dial
2 stable frame
3 pressure plate
4 pressure frame
5 flattened specimen
6 stiff base plate
7 specimen with concave side up

Figure A.1 — Thickness device with pressure frame

A.3.2 Determination of width (w)

The characteristic shall be determined according to EN 822. Number and location of the specimens for measurements depend on the size and shape of the sample, but shall be at least five. For roll material the distance between measurements (see EN 822:2013, Figure 2) should be x ≥ 0,5 m and y ≥ 1 m to determine the average width and the variation in width $w_{max} - w_{min}$.

A.3.3 Determination of length (l)

The characteristic shall be determined according to EN 822. Number and location of the specimens for measurements depend on the size and shape of the sample, but shall be at least five. For rolls only one measurement shall be made per specimen.

A.3.4 Determination of squareness (q)

The characteristic shall be determined according to EN 824 and is only applicable for boards. Number and location of the specimens for measurements depend on the size and shape of the sample, but shall be at least five.

A.3.5 Determination of flatness (S)

The characteristic shall be determined according to EN 825. Number and location of the specimens for measurements depends on the size and shape of the sample, but shall be at least five. Apply a pre-load of (100 ± 5) Pa, including the load of the measurement gauge.

A.3.6 Determination of punctual conformability (PC)

The characteristic shall be determined according to EN ISO 868:2003 using type ‘A’ shore durometer mounted on a durometer stand (as defined in EN ISO 868:2003, 8.1, NOTE) with a mass of 1 kg.

The PC-value shall be calculated according to Formula (A.1) using the thickness d (in mm) as determined under A.3.1.

$$\left(\frac{100 - shoreA}{100}\right) \times d \qquad \text{(A.1)}$$

Number and location of the specimens for measurements depend on the size and shape of the sample, but shall be at least five. The test specimen shall be tested as one-piece test specimens at its original thickness. The shore durometer shall be applied from the side which is in contact with the structural floor as described in the laying instructions of the manufacturer. The readings shall be taken after (60 ± 5) s.

A.3.7 Determination of compressive strength (CS)

The characteristic shall be determined according to EN 826.

The compression plates of the test machine should not be fixed by use of ball joints. The measurement range of the load cell should be chosen depending on the underlay to allow for sufficient resolution over the full measurement range (including the pre-load).

Number and location of the specimens for measurements depends on the size and shape of the sample, but shall be at least five.

The specimen size shall be square ((200 × 200) mm) or circular (diameter 200 mm). The size of the pressure foot shall be square ((100 × 100) mm) or circular (diameter 113 mm). Apply a pre-load of (100 ± 5) Pa. Determine the compressive strength at 0,5 mm deformation.

Specimen not lying flat shall be laid down onto the stiff base plate with the concave side up as shown in Figure A.1 a) and loaded using a stable circular pressure frame (200 mm outside diameter, 123 mm inside diameter) or a square pressure frame ((200 × 200) mm outside, (110 × 110) mm inside) as shown in Figure A.1 b).

The applied pressure by the frame shall be (0,5 ± 0,2) kPa.

A.3.8 Determination of compressive creep (CC) resistance

The characteristic shall be determined according to EN 1606 at normal test conditions as defined under A.2.

Underlays used in heated floor constructions shall be tested at the maximum temperature expected at the point of contact between underlay and heated screed (typically 35 °C). Other test conditions may be agreed but shall be reported.

Number and sampling location of the specimens depend on the size and shape of the sample, but shall be at least three.

The specimen size shall be square ((200 × 200) mm) or circular (diameter 200 mm). The size of the pressure foot shall be square ((100 × 100) mm) or circular (diameter 113 mm).

Specimen not lying flat shall be laid down onto the stiff base plate with the concave side up as shown in Figure A.1 a) and loaded using a stable circular pressure frame (200 mm outside diameter, 123 mm inside diameter) or a square pressure frame ((200 × 200) mm outside, (110 × 110) mm inside) as shown in Figure A.1 b).

Apply a pre-load of (100 ± 5) Pa followed by a load which is expected to be the maximum applicable load (in kPa) resulting in a total thickness loss $X_t = (X_0 + X_{ct}) \leq 0{,}5$ mm after extrapolation to 10 years.

Loads should be chosen in such a way that an extrapolation by the Findley equation is mathematically possible. This is normally the case when the regression coefficient of the logarithmic approximation of the values between day 1 and day 10 is $r^2 \geq 90$ %. Due to the higher variation of measurements in the initial test phase, it is recommended to use only values for the Findley calculation taken after more than 100 h.

For calculation details see A.3.1 of EN 1606:2013.

Several tests with several different loads may be necessary to approach and find the maximum applicable load for an underlay.

X_t shall be determined after 122 d of testing at the imposed load and extrapolated 30 times, which corresponds to 10 years. If it can be proven by the manufacturer that the duration of the test can be shortened for his specific underlay the extrapolation to 10 years can be based on shorter test durations. However, in any case the minimum duration should be always ≥ 10 d.

Specimen not lying flat shall be laid down onto the stiff base plate with the concave side up as shown in Figure A.1 a).

The pre-load plate shall be rigid and stable enough not to get deformed under the given test loads. The flexural E-modulus of such plates shall be minimum 20 GPa (e.g. GFR epoxy composites).

NOTE The minimum load of 2 kPa is based on the requirements defined in EN 1991–1-1:2002, category A. Due to the limited capabilities of laminate floor coverings to distribute punctual loads, the high contact pressure caused by e.g. furniture feet etc. leads to compressive creep loads onto the underlay much higher than 2 kPa. For more information, see [4].

A.3.9 Determination of dynamic load (DL) resistance

The characteristic shall be determined according to EN 13793.

Specimen not lying flat shall be laid down onto the stiff base plate with the concave side up as shown in Figure A.1 a) and loaded using a stable square pressure frame ((200 x 200) mm outside, (110 x 110) mm inside), or a circular frame (diameter 200 mm outside, diameter 123 mm inside) as shown in Figure A.1 b).

The applied pressure by the frame shall be (0,5 ± 0,2) kPa.

Pre-conditioning and testing conditions: see 6.4 and 7.1 of EN 13793:2003. Underlays known to be sensitive to humidity should be pre-conditioned for at least 16 h and tested at (23 ± 2) °C, (50 ± 5) % relative humidity.

The applied sinusoidal load shall vary between σ_{min} = 100 Pa and σ_{max} = 25 kPa at a frequency of approximately 1 Hz.

The maximum number of load cycles shall be determined as shown in Figure A.2 (dotted lines) by finding the point of intersection between the strain curve at σ_{max} and the (−0,5 mm)-limit curve.

The number of cycles shall be rounded to the nearest left digit (e.g. 7 450 = 7 000, 287 500 = 300 000).

The load σ_{max} = 25 kPa is the measured approximate peak load to an underlay (3 mm PE-foam, 25 kg/m^3 density) when a person is sitting (castor chair) or walking (shoe heel) over a 7 mm laminate floor covering. Peak loads measured in combinations with other types of underlays and/or laminates may be higher than 25 kPa and may be agreed upon.

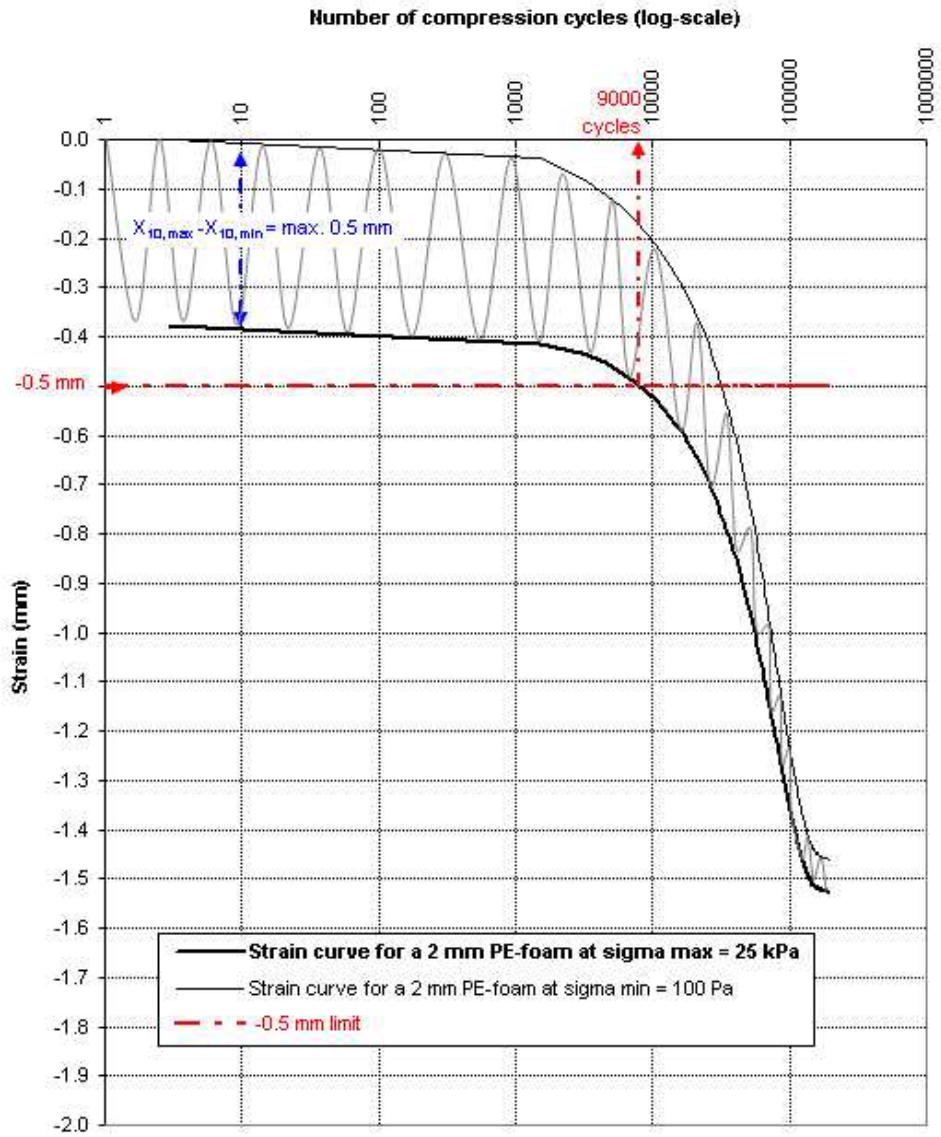


Figure A.2 — Example of strain curves ($X_{i,\,max}$ and $X_{i,\,min}$) as function of the number of loading cycles between σ_{min} = 100 Pa and σ_{max} = 25 kPa

A.3.10 Determination of area weight (AW)

Each specimen shall be cut to a specimen size of (200 x 200) mm without deforming the original structure of the material. A minimum of five specimens shall be tested.

Specimens shall be cut from product samples at least 72 h after manufacture. If required, this period may be reduced to 48 h or 16 h if experience shows that the difference compared with the AW 72 h after manufacture is less than 10 %.

Underlays known to be sensitive to humidity should be pre-conditioned for at least 16 h and tested at (23 ± 2) °C and (50 ± 5) % relative humidity.

Measure the dimensions, in millimetres, of the specimen in accordance with EN ISO 1923. Make a minimum of three separate measurements of each dimension. Calculate the mean values for each dimension.

Weigh each specimen and record its mass in grams. Use a balance, capable of determining the mass of a test specimen to an accuracy of 0,1 %.

The area weight m' (apparent overall area weight) of a test specimen, in grams per square metre is given by the formula:

$$m' = m/A$$

where

m is the mass, in grams, of the test specimen;

A is the area, in square meters, of the test specimen

Calculate the mean value of the area weight from the result for all test specimens and round it to the nearest 0,1 g/m^2.

Annex B
(informative)

Proposed performance classes

B.1 General

It is foreseen to define performance classes in a later stage of this specification for properties which are most relevant for the proper use of underlays under laminate floorings.

Due to the fact that only a limited amount of product data is available now a definition of classes is difficult and more data needs to be collected by the test laboratories for the different products. Table B.1 however give a first non-binding overview of the proposed performance classes for underlays.

B.2 Proposed classes

Table B.1 — Proposed classes

No	Characteristic	Class	Requirement	Test method	Clause
1	Punctual conformability **(PC)**	PC0 PC1 PC2 PC3	PC < 1 mm 1 mm ≤ PC < 2 mm 2 mm ≤ PC < 3 mm 3 mm ≤ PC	EN ISO 868 + A.3.6	4.2.3
2	Compressive strength **(CS)**	CS0 CS1 CS2 CS3	CS < 10 kPa 10 kPa ≤ CS ≤ 50 kPa 50 kPa < CS ≤ 200 kPa CS > 200 kPa	EN 826 + A.3.7	4.2.4
3	Compressive Creep resistance **(CC)**	CC0 CC1 CC2 CC3	CC < 2 kPa 2 kPa ≤ CC ≤ 25 kPa 25 kPa < CC ≤ 50 kPa CC > 50 kPa	EN 1606 + A.3.8	4.2.5
4	Dynamic load **(DL)** resistance	DL0 DL1 DL2	DL < 10 000 cycles 10 000 ≤ DL ≤ 100 000 cycles DL > 100’000 cycles	EN 13793 + A.3.9	4.2.6
5	Impact Sound **(IS)**	ISO IS1 IS2	< 15 dB 15 dB ≤ ∆Lw < 17 dB ∆Lw ≥ 17 dB	EN ISO 10140-3 and EN ISO 717-2	4.2.12.2
6	Reflected walking sound **(RWS)**	RWS0 RWS1 RWS2 RWS3	RWS > 30 sone 25 sone < RWS ≤ 30 sone 20 sone ≤ RWS ≤ 25 sone RWS < 20 sone	Bibliography [1] and [2]	4.2.12.3

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