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Resilient, textile, laminate and modular multilayer floor coverings - Essential characteristics

National foreword

This British Standard is the UK implementation of EN 14041:2018. It supersedes BS EN 14041:2004, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/60, Resilient and Laminate Floor Coverings.

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

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Resilient, textile, laminate and modular multilayer floor coverings - Essential characteristics

Revêtements de sol résilients, textiles, stratifiés et multicouches modulaires - Caractéristiques essentielles

Elastische, textile und Laminat-Bodenbeläge - Wesentliche Merkmale

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European foreword

This document (EN 14041:2018) has been prepared by Technical Committee CEN/TC 134 “Resilient, textile and laminate floor coverings”, the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by July 2018, and conflicting national standards shall be withdrawn at the latest by October 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14041:2014.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements for construction works of Regulation (EU) No. 305/2011.

For relationship with Regulation (EU) No. 305/2011, see informative Annex ZA, which is an integral part of this document.

The major changes between this version of the standard and the superseded version can be summarized as the following:

General

The product group “modular multilayer floor coverings” has been introduced in the title, scope and has been added throughout the remaining text where applicable. (including Annex ZA).

4. Essential Characteristics

4.2 Content of dangerous substances

Following the mandate M/119 rev on Dangerous Substances and the answer prepared by CEN/TC 134 and approved by the EC, the former clause “4.2 Content of pentachlorophenol (PCP)” has been integrated into a more detailed “Clause on content of dangerous substances.

4.6 Slip resistance

The content of this clause has been updated and, according to the answer to the mandate, it is now applicable to all types of floor coverings covered by this standard.

4.7 Thermal resistance (Thermal conductivity)

The content of this clause has been updated and, according to the answer to the mandate, the option to either declare thermal resistance or thermal conductivity has been added.

5. Assessment and verification of constancy of performance (AVCP)

This clause replaces the former clause “Evaluation of conformity”; an official template for this clause is provided by CEN, which has to be implemented. Clause 5 follows this template.

Annex D (normative) Product parameters for defining product families

The former Annex D has become Clause 5. The current Annex D is an updated version of the previous Clause D.8. Separate sections per product group for the different essential characteristics have been introduced. The following clauses have been added:

D.2 Product parameters related content of dangerous substances

D.3 Product parameters related to emission of dangerous substances into indoor air

D.4 Product parameters related to slip resistance performance

D.5 Product parameters related to electrical behaviour performance

Annex E (normative) Determination of Polycyclic Aromatic Hydrocarbons (PAH)

This Annex has been added as there was no standardized test method available for determining Polycyclic Aromatic Hydrocarbons (PAH) at the moment of submitting this standard to CEN formal vote.

Annex F (normative) Determination of phthalates

This Annex has been added as there was no standardized test method available for determining phthalates at the moment of submitting this standard to CEN formal vote.

Annex G (informative) Example for a Supplier declaration on raw materials or constituent products

This Annex has been added as guidance for preparing a supplier declaration.

Annex H (normative) Azocolourants – Restricted Aromatic Amines

This Annex has been added to provide more details on the restricted aromatic amines and azo-dyes.

Annex I (normative) List of pictograms used for an alternative way of expressing the performance of certain characteristics

This Annex has been added to present the list of characteristics which also may be declared in form of (a) pictogram(s).

Annex ZA (informative) Relationship of this European Standard with Regulation (EU) No.305/2011 (Construction Products Regulation)

The revised template for the Annex ZA for construction product standards has been implemented.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies the essential characteristics for the following types of floor coverings:

- resilient floor coverings, excluding loose-laid mats;
- textile floor coverings, excluding loose-laid (barrier) mats, runners and rugs;
- laminate floor coverings;
- modular multilayer floor coverings.

These types of floor coverings may or may not be formulated to enhance the performance of one or more essential characteristics.

These types of floor coverings are intended for internal use as floor coverings within a building according to the manufacturer's specifications.

For these types of floor coverings this European standard specifies the assessment methods for determination of performances of the essential characteristics, the ways of expressing their performance, the systems for assessment and verification of constancy of performance (AVCP) their marking.

This standard does not specify requirements of floor coverings, which are not related to the essential characteristics as defined in Regulation (EU) No 305/2011.

This standard does not cover installation or maintenance of the floor coverings.

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 312:2010, *Particleboards — Specifications*

EN 651, *Resilient floor coverings — Polyvinyl chloride floor coverings with foam layer — Specification*

EN 652, *Resilient floor coverings — Polyvinyl chloride floor coverings with cork-based backing — Specification*

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

EN 687, *Resilient floor coverings — Specification for plain and decorative linoleum on a corkment backing*

EN 1081, *Resilient floor coverings — Determination of the electrical resistance*

EN 1122, *Plastics - Determination of cadmium — Wet decomposition method*

EN 1307, *Textile floor coverings — Classification*

EN 1815, *Resilient and laminate floor coverings — Assessment of static electrical propensity*

EN 1816, *Resilient floor coverings — Specification for homogeneous and heterogeneous smooth rubber floor coverings with foam backing*

- EN 1817, *Resilient floor coverings — Specification for homogeneous and heterogeneous smooth rubber floor coverings*
- EN 12199, *Resilient floor coverings — Specifications for homogeneous and heterogeneous resilient rubber floor coverings*
- EN 12466, *Resilient floor coverings — Vocabulary*
- 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 12673, *Water quality — Gas chromatographic determination of some selected chlorophenols in water*
- EN 13238:2010, *Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates*
- 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 13553:2017, *Resilient floor coverings — Polyvinyl chloride floor coverings for use in special wet areas — Specification*
- EN 13893, *Resilient, laminate and textile floor coverings — Measurement of dynamic coefficient of friction on dry floor surfaces*
- EN 13329, *Laminate floor coverings — Elements with a surface layer based on aminoplastic thermosetting resins — Specifications, requirements and test methods*
- CEN/TR 14823, *Durability of wood and wood-based products — Quantitative determination of pentachlorophenol in wood — Gas chromatographic method*
- CEN/TS 15447, *Mounting and fixing in reaction to fire tests under the Construction Products Directive*
- CEN/TS 15968, *Determination of extractable perfluorooctanesulphonate (PFOS) in coated and impregnated solid articles, liquids and fire fighting foams — Method for sampling, extraction and analysis by LC-qMS or LC-tandem/MS*
- EN 16516, *Construction products: Assessment of release of dangerous substances — Determination of emissions into indoor air*
- EN 62321-1, *Determination of certain substances in electrotechnical products — Part 1: Introduction and overview (IEC 62321-1)*
- EN ISO 139, *Textiles — Standard atmospheres for conditioning and testing (ISO 139)*
- EN ISO 9239-1:2010, *Reaction to fire tests for floorings — Part 1: Determination of the burning behaviour using a radiant heat source (ISO 9239-1:2010)*

EN ISO 10456, *Building materials and products — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values (ISO 10456)*

EN ISO 10581, *Resilient floor coverings — Homogeneous poly(vinyl chloride) floor covering — Specifications (ISO 10581)*

EN ISO 10582, *Resilient floor coverings — Heterogeneous poly(vinyl chloride) floor coverings — Specification (ISO 10582)*

EN ISO 10595, *Resilient floor coverings — Semi-flexible/vinyl composition (VCT) poly(vinyl chloride) floor tiles — Specification (ISO 10595)*

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

EN ISO 14362-1, *Textiles — Methods for determination of certain aromatic amines derived from azo colorants — Part 1: Detection of the use of certain azo colorants accessible with and without extracting the fibres (ISO 14362-1)*

CEN ISO/TS 16179, *Footwear — Critical substances potentially present in footwear and footwear components — Determination of organotin compounds in footwear materials (ISO/TS 16179)*

CEN ISO/TS 16186, *Footwear — Critical substances potentially present in footwear and footwear components — Test method to quantitatively determine dimethyl fumarate (DMFU) in footwear materials (ISO/TS 16186)*

EN ISO 18219, *Leather — Determination of chlorinated hydrocarbons in leather — Chromatographic method for short-chain chlorinated paraffins (SCCP) (ISO 18219)*

EN ISO 24011, *Resilient floor coverings — Specification for plain and decorative linoleum (ISO 24011)*

EN ISO 26986, *Resilient floor coverings — Expanded (cushioned) poly(vinyl chloride) floor covering — Specification (ISO 26986)*

ISO 390:1993, *Products in fibre-reinforced cement — Sampling and inspection*

ISO 1766, *Textile floor coverings — Determination of thickness of pile above the substrate*

ISO 1957, *Machine-made textile floor coverings — Selection and cutting of specimens for physical tests*

ISO 2424, *Textile floor coverings — Vocabulary*

ISO 6356:2012, *Textile and laminate floor coverings — Assessment of static electrical propensity — Walking test*

ISO 8302, *Thermal insulation — Determination of steady-state thermal resistance and related properties — Guarded hot plate apparatus*

ISO 10965, *Textile floor coverings — Determination of electrical resistance*

ISO 11379, *Textile floor coverings — Laboratory cleaning procedure using spray extraction*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12466, ISO 2424 and the following apply.

3.1

family of products

range of products within defined limits of variability defined by the manufacturer or by a technical specification of the product parameters and, if relevant, end-use parameters for which essential characteristics remain unchanged

4 Essential characteristics

4.1 Reaction to fire

4.1.1 General

The reaction-to-fire performance of a given type of floor coverings, as specified in the respective EN product standard (see the list in Annex A), shall be classified according to the requirements of EN 13501-1, based on one of the following options:

- a) either without the need for testing (CWT), according to 4.1.2; or
- b) based on results of the test method(s), relevant to specific reaction to fire class, as specified in 4.1.3.1.

4.1.2 Classification without the need for testing (CWT)

The reaction to fire performance of a given type of floor coverings is automatically classified E_{FL}, when meeting the requirements for that type of floor coverings, as specified in the following tables: in Table 1 for the laminate floor coverings, in Table 2 for the textile floor coverings and in Table 3 for the resilient floor coverings.

Alternatively, graphic symbol may be used for expressing the performance of this characteristic. In this case, the pictogram for the class E_{FL}, specified in Annex I, shall be used.

Table 1 — Classes of reaction to fire performance¹ of laminate floor coverings

Floor covering type ^a	Product detail	Min. density kg/m ³	Min. overall thickness mm	Class ^b Floorings
Laminate floor coverings	Laminate floor coverings manufactured in accordance with EN 13329 ¹	800	6,5	E _{FL}

^a Floor covering loose laid over any wood based substrate ≥ D-s2, d0, or any substrate of class A2-s1, d0.

^b Class as provided for in Table 2 to the Annex to Commission Delegated Regulation (EU) 2016/364.

¹ See Table 2 of Commission Decision 2005/610/EC, of 9 August 2005

Table 2 — Classes of reaction to fire performance of textile floor coverings²

Floor covering type ^a	Product standard	Class Floorings ^b
Textile floor coverings and carpet tiles ^c	EN 1307 ¹	E _{fl}
<p>^a Floor covering glued or loose laid over a class A2-s1, d0 substrate.</p> <p>^b Class as provided for in Table 2 to Commission Delegated Regulation (EU) 2016/864.</p> <p>^c Textile floor coverings having a total mass of max 4 800 g/m² and a minimum pile thickness of 1,8 mm (ISO 1766) and:</p> <ul style="list-style-type: none"> — a surface of 100 % wool, — a surface of 80 % wool or more — 20 % polyamide or less, — a surface of 80 % wool or more — 20 % polyamide/polyester or less, — a surface of 100 % polyamide — a surface of 100 % polypropylene and if with SBR³-foam backing, a total mass of > 780 g/m². All polypropylene carpets with other foam backings are excluded. 		

Table 3 — Classes of reaction to fire performance of resilient floor coverings⁴

Floor covering type ^a	EN Product standard	Min. mass (g/m ²)	Max. mass (g/m ²)	Min. overall thickness (mm)	Class ^b Floorings
Plain and decorative linoleum	EN ISO 24011 ⁵	2 300	4 900	2	E _{FL}
Homogeneous polyvinyl chloride floor coverings	EN ISO 10581 ⁶	2 300	3 900	1,5	E _{FL}
Heterogeneous polyvinyl chloride floor coverings	EN ISO 10582 ⁷	2 300	3 900	1,5	E _{FL}
Polyvinyl chloride floor coverings with foam layer	EN 651	1 700	5 400	2	E _{FL}
Polyvinyl chloride floor covering with cork-based backing	EN 652	3 400	3 700	3,2	E _{FL}
Expanded (cushioned) polyvinyl chloride floor coverings	EN ISO 26986 ⁷	1 000	2 800	1,1	E _{FL}
Semi-flexible polyvinyl chloride tiles	EN ISO 10595 ⁸	4 200	5 000	2	E _{FL}
Linoleum on corkment backing	EN 687	2 900	5 300	2,5	E _{FL}

² See Table 4 of Commission Decision 2005/610/EC, of 9 August 2005

³ Styrene Butadiene Rubber

⁴ See Table 3 of Commission Decision 2005/610/EC, of 9 August 2005

⁵ Original reference EN 548 is superseded by EN ISO 24011

⁶ Original reference EN 649 is superseded by EN ISO 10581 (homogeneous polyvinyl chloride floor coverings) and EN ISO 10582 (heterogeneous polyvinyl chloride floor coverings)

⁷ Original reference EN 653 is superseded by EN ISO 26986

⁸ Original reference EN 654 is superseded by EN ISO 10595

Floor covering type ^a	EN Product standard	Min. mass (g/m ²)	Max. mass (g/m ²)	Min. overall thickness (mm)	Class ^b Floorings
Homogeneous and heterogeneous smooth rubber floor coverings with foam backing	EN 1816	3 400	4 300		E _{FL}
Homogeneous and heterogeneous smooth rubber floor coverings	EN 1817	3 700	6 000	1,8	E _{FL}
Homogeneous and heterogeneous relief rubber floor coverings	EN 1818	4 600	6 700	2,5	E _{FL}
^a Floor covering loose laid over any wood based substrate ≥ D-s2, d0, or any substrate of class A2-s1, d0. ^b Class as provided for in Table 2 to Commission Delegated Regulation (EU) 2016/364.					

4.1.3 Classification according to the test results

4.1.3.1 General

The reaction to fire performance of a given type of floor coverings shall be determined on a base of results of the test(s), performed in accordance with the relevant method(s), which is(are) specified, for the claimed reaction to fire in the standard(s), referred in EN 13501-1:2007+A1:2009, with exception of class F_{FL}, which shall be tested according to EN ISO 11925-2:2010 ⁹.

Before performing of some of these test(s), the test specimen used shall be prepared and conditioned according to 4.1.3.2 and a family of certain type of floor coverings defined, used for selection of test, according to 4.1.3.3.

Based on the test results obtained, the reaction to fire performance of a given type of floor coverings shall be classified, using the classification system according to EN 13501-1, and expressed as the class achieved. Additionally, for all classes with exception of E_{FL} and F_{FL}, the type of substrate used (4.1.3.2.2) and the method of affixation of the floor covering to the substrate (4.1.3.2.3) shall be expressed.

a) Alternatively to (4.1.3.2.2), the type of substrate may be expressed as:

- NCS, for the non-combustible type of substrate defined in 4.1.3.2.2 a);
- CS, for the combustible type of substrate defined in 4.1.3.2.2 b).

b) Alternatively to (4.1.3.2.3), the method of affixation may be expressed as

- G, for the glued method of affixation defined in 4.1.3.2.3 a);
- L, for the loose-laid method of affixation as defined in 4.1.3.2.3 b).

Alternatively, graphic symbol may be used for expressing the performance of this characteristic for a given type of substrate and given method of affixation. In this case, the pictogram for the achieved reaction to fire class, specified in Annex I, shall be used.

⁹ Commission Delegated Regulation (EU) 2016/364 on the classification of the reaction to fire performance of construction products

4.1.3.2 Specimen preparation and conditioning

4.1.3.2.1 General

The test specimens shall be prepared in accordance with the relevant test method(s), specified for claimed class in the standard(s), referred in EN 13501-1, considering also CEN/TS 15447.

The following information on the floor covering to be tested shall be provided for specimen preparation, conditioning and testing:

- density or mass per area;
- construction;
- generic composition, including the presence of any flame retardant;
- thickness.

4.1.3.2.2 Type of substrate

At least one of the two standard substrates, specified for floorings in EN 13238:2010, shall be selected according to the intended end use of the floor coverings:

- a) Non-combustible substrate, comprised of a fibre cement board (in accordance with ISO 390:1993) with thickness (8 ± 2) mm, with density $(1\ 800 \pm 200)$ kg/m³ and with class A2_{FL}-s1 (tested according to EN ISO 9239-1:2010 as flooring but without a substrate);

or

- b) Combustible substrate, comprised of a not fire retardant treated particleboard (in accordance with EN 312:2010) with thickness (20 ± 2) mm, with density (680 ± 50) kg/m³ and with class C_{FL}-s1 (tested according to EN ISO 9239-1:2010 as flooring but without a substrate).

4.1.3.2.3 Method of affixation

The method of affixation (e.g. adhesive) of the floor covering to the substrate shall be representative of end use application:

- a) glued, using a generic type¹⁰ of adhesive;

or

- b) loose laid (i.e. no adhesive is used).

4.1.3.2.4 Other

In the case of textile floor coverings, when a flame retardant has been directly applied to the exposed use surface of a floor covering by spray, foam or other technology, the specimen shall be subjected to a laboratory cleaning procedure prior to testing. The spray-extraction cleaning procedure according to ISO 11379 shall be used with the following modifications:

- a) the specimens shall be cleaned three times, with an interval of (120 ± 15) min between cycles, each cleaning cycle consisting of two strokes:
- for the first stroke: use the spray extraction machine with simultaneous spray and extraction;

¹⁰ See EN 13501-1:2007+A1:2009, Clause 15.

- for the second stroke: operate the machine only as an extraction machine;
- b) the first cleaning cycle shall be carried out using the reference cleaning solution at ambient temperature (25 ± 10) °C and the second and third cleaning cycles with water at ambient temperature without any addition of chemicals.

4.1.3.3 Application rules

When defining a family of a particular type of floor coverings with regard to their reaction to fire performance, the floor coverings parameters, influencing such performance, as given in D.1, shall be taken into account.

If the specimen is mounted to a substrate using an adhesive, the test result is valid also for other adhesives of the same generic type, in end use conditions, according to EN 13501-1.

If the specimen is tested in combination with a substrate without using an adhesive, the test result is valid for the tested floor covering with and without using adhesives in end use conditions.

If the specimen is tested on not fire retardant treated particleboard substrate the test result for the tested floor covering is also valid for end-use conditions on fibre cement board.

4.2 Content of dangerous substances

4.2.1 General

Resilient, textile, laminate and modular multilayer floor coverings shall be evaluated with respect to their content of dangerous substances. This shall be done by:

- without testing, based on a manufacturer declaration and supplier declarations (assessment without testing, 4.2.2.2);

or

- based on calculation (assessment by calculation, 4.2.2.3.2);

or

- based on testing (assessment by testing, 4.2.2.3.3).

When assessing the content of dangerous substances of a floor covering, the parameters influencing such performance, as given in D.2, shall be taken into account.

When declaring the performance based on manufacturer declaration and supplier declarations, the provisions stated in Annex G shall be used.

The term “dangerous substances” refers to either individual substances or to mixtures containing dangerous substances¹¹.

4.2.2 Content of specific dangerous substances

4.2.2.1 General

A list of specific dangerous substances, which are known to occur in resilient, textile, laminate, and modular multilayer floor coverings, or the raw materials and constituent products used for manufacturing thereof, is provided in Table 4.

¹¹ Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP).

NOTE Most of these substances are also classified as carcinogenic and mutagenic (CM) substances of category 1A and 1B ¹².

4.2.2.2 Assessment without calculation or testing

If any of the substances or groups of them listed in Table 4 are known to not be present in the product, as assessed by manufacturer declaration and based on supplier declarations for raw materials or constituent products used for the manufacturing of the floor covering product, then the performance shall be expressed as 'compliant, not actively added'.

Alternatively, graphic symbol may be used for expressing the performance of this characteristic. In this case, the respective pictogram specified in Annex I, shall be used.

4.2.2.3 Assessment based on calculation or testing

4.2.2.3.1 General

If one or more substances or groups of them, listed in Table 4, are either actively added during the production process of the floor covering or they are present in the raw materials or constituent products, or it is known they may occur in any stage of the production process, their content of such substance in the floor covering shall be determined either

— by calculation, according to 4.2.2.3.2;

or

— by testing, according to 4.2.2.3.3.

4.2.2.3.2 Assessment based on calculation

The content of each of the dangerous substances or group of them, listed in Table 4, shall be determined individually and for the final floor covering product, using a standard calculation method.

a) If any dangerous substances or group of them, listed in Table 4, is added during the manufacturing of a floor covering product, then the content of such dangerous substances or group of them in the floor covering product shall be calculated based on:

— the amount of product added to the manufacturing process (x_m);

and

— the amount of product consumed during the manufacturing process (x_c).

The net amount of this dangerous substance or group of, listed in Table 4, retained in the product after manufacturing, x_n , with

$$x_n = x_m - x_c$$

shall be calculated in mg/kg.

b) If any dangerous substances or group of them, listed in Table 4, is present in any of the raw materials or constituent products of a floor covering product, then the content of such dangerous substances or group of them in the floor covering product shall be calculated based on:

— the content of the raw material, x_r , or constituent product, x_{cp} , in the floor covering product;

— the content of the dangerous substance or group of them, listed in Table 4, in the raw material, $x_{S,R}$, or constituent product, $x_{S,CP}$.

- c) The net amount of dangerous substance or group of, listed in Table 4, in the product after manufacturing, x_N , shall be calculated for the sum of all raw materials and constituent products used for the manufacturing of the floor covering product, according to

$$x_N = \Sigma (x_{S,R} \cdot x_R) + \Sigma (x_{S,CP} \cdot x_{CP}),$$

and shall be reported in mg/kg.

Depending on the reported content of each of such substances or group of them, the performance of this characteristic shall be expressed:

- 1) as a uniform indication 'compliant, actively added', when the content of none of such substances or of group of them, exceeds the respective threshold value(s), listed in Table 4,

Alternatively, graphic symbol may be used for expressing the performance of this characteristic. The respective pictogram specified in Annex I, shall be used.

or

- 2) with the name of each individual substance and its content value (in mg/kg), when the content of such substance or of group of them, exceeds the respective threshold value(s), listed in Table 4.

4.2.2.3.3 Assessment based on testing

- a) The content of each of the substances, listed in Table 4 and presented in the floor coverings in the forms explained above, as indicated in 4.2.2.3.1, shall be determined individually by testing according to respective test method, specified in Table 4, and the resulting content reported.

- b) Depending on the reported content of each of such substances, the performance of this characteristic shall be expressed:

- 1) as a uniform indication 'compliant, actively added', when the content of none of such substances or of group of them, exceeds the respective threshold value(s), listed in Table 4,

Alternatively, graphic symbol may be used for expressing the performance of this characteristic. The respective pictogram specified in Annex I, shall be used.

or

- 2) with the name of each individual substance and its content value (in mg/kg), when the content of such substance or of group of them, exceeds the respective threshold value(s), listed in Table 4.

Table 4 — Content of dangerous substances: Test methods and requirements

Substance	CAS number	Floor covering type ^e	Test method	Threshold values
Pentachlorophenol (PCP)	87-86-5	R, T	See Annex B	≤ 5 mg/kg
		L, M	CEN/TR 14823	≤ 5 mg/kg
Phthalates:	-	R, T, L, M	See Annex A	Sum of listed phthalates ≤ 1 000 mg/kg
Benzyl butyl phthalate (BBP)	85-68-7			
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7			
Dibutylphthalate (DBP)	84-74-2			
Short chain chlorinated paraffins (C10-13, SCCP)	85535-84-8	R, T, L, M	EN ISO 18219 ^a	≤ 1 000 mg/kg ^b
Medium chain chlorinated paraffins (C14-17, MCCP)	85535-85-9	R, T, L, M	EN ISO 18219 ^a	≤ 1 000 mg/kg ^b
Pentabromodiphenylether	32534-81-9	R, T, L, M	EN 62321-1	≤ 1 000 mg/kg
Octabromodiphenylether	32536-52-0	R, T, L, M	EN 62321-1	≤ 1 000 mg/kg
Decabromodiphenylether	1163-19-5	R, T, L, M	EN 62321-1	≤ 1 000 mg/kg
Cadmium	7440-43-9	R, T, L, M	EN 1122 Total digestion of sample by hydrofluoric acid, followed by atomic absorption spectroscopy (AAS) or inductively coupled plasma (ICP)	≤ 100 mg/kg
Lead	7439-92-1	R, T, L, M	EN 1122 Total digestion of sample by hydrofluoric acid, followed by atomic absorption spectroscopy (AAS) or inductively coupled plasma (ICP).	≤ 1 000 mg/kg
PAH (polycyclic aromatic hydrocarbons)	-	R, T, L, M	See Annex E	individual PAH ≤ 1mg/kg
Benzo[a]pyrene	50-32-8			
Benzo[e]pyrene	192-97-2			
Benzo[a]anthracene	56-55-3			
Dibenzo[a,h]anthracene	53-70-3			
Benzo[b]fluoranthene	205-99-2			

Substance	CAS number	Floor covering type ^e	Test method	Threshold values
Benzo[k]fluoranthene	205-82-3			
Benzo[j]fluoranthene	207-08-9			
Chrysene	218-01-9			
Organostannic (organotin) compounds	-	R, T, L, M	CEN ISO/TS 16179	Sum of all organotin compounds listed ≤ 1 000 mg/kg
Tri-substituted organostannic compounds	-			
Dibutyltin (DBT)	1002-33-5			
Diocetyl tin (DOT)	15231-44-4			
Azo-colorants which can form the carcinogenic amines listed in Annex H	-	T, M ^c R, L, M ^d	EN ISO 14362-1 Not relevant	≤ 30 mg/kg
Perfluoro-octanoic acid (PFOA), salts and esters of PFOA	335-67-1	R, T, L, M	CEN/TS 15968	≤ 1 000 mg/kg
Dimethylfumarate	624-49-7	T, L, M R	CEN ISO/TS 16186 Not relevant	≤ 1 000 mg/kg

a Contents of SCCP and MCCP can only be determined together, as separation with the existing test method is not possible.

b In addition, also the sum of contents of SCCP and MCCP shall be ≤ 1000 mg/kg.

c Relevant for modular multilayer floor covering with a textile use surface only.

d Not applicable for modular multilayer floor covering with a non-textile use surface

e R = resilient,
T = textile,
L = laminate,
M = modular multilayer

4.3 Emission of dangerous substances into indoor air

4.3.1 General

Resilient, textile, laminate and modular multilayer floor coverings shall be evaluated concerning their emission of the following dangerous substances:

- volatile organic compounds (VOC), with exception of formaldehyde, as specified in 4.3.2; and
- formaldehyde (HCHO), as specified in 4.3.3.

When assessing the emission of these dangerous substances, the parameters influencing such performance, as given in D.3, shall be taken into account.

4.3.2 Emissions of volatile organic compounds (VOC) with exception of formaldehyde

Emission of volatile organic compounds (VOC) from a floor covering product shall be determined in accordance with EN 16516:2017. The performance of this characteristic shall be expressed with value, in mg/m^3 , and name of the respective characteristic.

4.3.3 Emissions of formaldehyde (HCHO)

4.3.3.1 Assessment without testing

If formaldehyde is neither used in the manufacturing process of the floor covering nor existing in any of its raw materials and is known not to occur in any stage of the production process, then performance of this characteristic shall be based on a manufacturer declaration and supplier declarations and expressed, without testing, as the emission of formaldehyde class E1, as specified in Table 5.

Alternatively, graphic symbol may be used for expressing the performance of this characteristic. In this case, the respective pictogram specified in Annex I, shall be used.

4.3.3.2 Assessment based on testing

If formaldehyde is used in the manufacturing process of the floor covering or exists in any of its raw materials or is known that it may occur in any stage of the production process, the emission of formaldehyde in the floor covering shall be determined by testing in accordance with either:

- a) EN 717-1;
- b) EN 16516.

Depending on the test results the performance of this characteristic shall be expressed as formaldehyde emissions class E1 or E2, considering the respective threshold requirements, specified in Table 5.

Alternatively, graphic symbol may be used for expressing the performance of this characteristic. In this case, the respective pictogram specified in Annex I, shall be used.

Table 5 — Classes for formaldehyde emissions (E-classes)

Class	Requirements EN 717-1	Requirements EN 16516
E1	Equilibrium concentration in the air of the test chamber $\leq 0,12 \text{ mg}/\text{m}^3$	$\leq 0,12 \text{ mg}/\text{m}^3$
E2	Equilibrium concentration in the air of the test chamber $> 0,12 \text{ mg}/\text{m}^3$	$> 0,12 \text{ mg}/\text{m}^3$

4.4 Water-tightness

The water-tightness performance of the resilient floor coverings shall be determined by test according to EN 13553:2017, Annex A.

If at the bottom surface of the test specimen after the test is finished, there is no sign of penetrating water, the resilient floor coverings may be considered water-tight and the related performance expressed as “compliant”.

Alternatively, graphic symbol may be used for expressing the performance of this characteristic. In this case, the respective pictogram specified in Annex I, shall be used.

NOTE Applicable to resilient floor coverings only.

4.5 Slip resistance

The slip resistance performance of a floor covering, shall be determined by test as dynamic coefficient of friction, μ , in accordance with EN 13893 under dry and non-contaminated conditions.

NOTE The slip resistance performance of an installed floor covering can be affected by its installation, the surface treatment that is given to it, when installed, dirt accumulation and its cleaning and maintenance. For this reason, it is only possible to determine the slip resistance performance of a floor covering, before its installation (ex-factory) and under dry and non-contaminated conditions. Guidance on the reduction of slip hazards is given in Annex C.

When determining the slip resistance performance of the textile floor coverings, the floor covering parameters, influencing such performance, as given in D.4, shall be taken into account.

The coefficient of friction, μ , shall be declared, depending on the obtained result, as:

a) $\mu < 0,30$;

or

b) $\mu \geq 0,30$.

Alternatively, graphic symbol may be used for expressing the performance of this characteristic. In this case, the respective pictogram specified in Annex I, shall be used.

4.6 Electrical behaviour

4.6.1 General

Electrical behaviour of the floor coverings, determined as antistatic, static dissipative or conductive performances, shall be individually determined by test results and in accordance with the test methods, as specified in the standards, listed in Table 6, column (3), under test conditions, specified in Table 6, column (4). The individual results shall be evaluated according to the relevant assessment requirements, listed in Table 6, column (5), and the respective performance shall be expressed as one of the indications, given also in Table 6, column (6).

Alternatively, graphic symbol may be used for expressing the performance of this characteristic. In the case of the referenced expression, specified in Table 6, the respective pictogram specified in Annex I, shall be used.

When determining the performances related to the electrical behaviour of the textile floor coverings, the parameters influencing such performance, as given in D.5, shall be taken into account.

Table 6 — Requirements for floor covering for antistatic, dissipative or conductive performance

Electrical behaviour	Floor coverings types ^a	Specification with test methods	Test conditions	Assessment requirements	Ways of expression of the performance ⁽⁶⁾
(1)	(2)	(3)	(4)	(5)	(6)
Antistatic	R	EN 1815	Directly on metal base plate and at 25 % RH	$BV^b \leq 2,0 \text{ kV}$	“Body Voltage $\leq 2,0 \text{ kV}$ ” or “Antistatic” or graphic symbol (Annex I)
	L, M	EN 1815 or ISO 6356:2012, Method A	PE foil/foam on metal base plate at 25 % RH		
	T	ISO 6356:2012, Method A	Rubber mat on metal base plate and at 25 % RH		
Static dissipative	R, L, M	EN 1081	$\leq 50 \text{ % RH}$	$VR^c \leq 1,0 \times 10^9 \Omega$	“Vertical resistance $\leq 1,0 \times 10^9 \Omega$ ” or “Static dissipative” or graphic symbol (Annex I)
	T	ISO 10965	25 % RH		
Conductive	R, L, M	EN 1081	$\leq 50 \text{ % RH}$	$VR^c \leq 1,0 \times 10^6 \Omega$	“Vertical resistance $\leq 1,0 \times 10^6 \Omega$ ” or “Conductive” or graphic symbol (Annex I)
	T	ISO 10965	25 % RH		

^a Floor coverings types: R – resilient; L – laminate; T – textile; M – modular multilayer.

^b BV = Body voltage (in kV), for antistatic performance.

^c VR = Vertical resistance (in Ω), for static dissipative and conductive performances.

4.6.2 Specimen preparation and conditioning

The test specimen of the floor coverings shall be prepared and conditioned in accordance with the respective test method(s), as specified in the standards, listed in Table 6, column (3).

In the case of textile floor coverings, when an antistatic or static dissipative additive has been directly applied to the exposed use surface of a floor covering by spray, foam or other technology, the test specimen shall be subjected to a laboratory cleaning procedure prior to testing. The spray-extraction cleaning procedure according to ISO 11379 shall be used with the following modifications:

- a) the specimens shall be cleaned three times, with an interval of (120 ± 15) min between cycles, each cleaning cycle consisting of two strokes:

- for the first stroke: use the spray extraction machine with simultaneous spray and extraction;
 - for the second stroke: operate the machine only as an extraction machine.
- b) the first cleaning cycle shall be carried out using the reference cleaning solution at ambient temperature (25 ± 10) °C and the second and third cleaning cycle with water at ambient temperature without any addition of chemicals.

4.7 Thermal resistance (thermal conductivity)

4.7.1 The performance of thermal resistance, R , of the floor coverings shall be determined either:

- a) by calculation, using the thermal conductivity design value(s), λ_i , of the material(s), which the floor coverings is(are) made of, taken from EN ISO 10456; or

NOTE The conversion quotations for the thermal values in EN ISO 10456 may be used to extrapolate the data to 23°C.

- b) by testing in accordance with the following standards:
- ISO 8302 or EN 12667, for the floor coverings, which are made of medium to high thermal resistance materials;
 - ISO 8302 or EN 12664, for the floor coverings, which are made of low to medium thermal resistance materials.

For the resilient, laminate and modular multilayer floor coverings the test samples shall be conditioned at 23 °C and 50 % RH before testing. For the textile floor coverings test samples shall be conditioned according to EN ISO 139, at 20 °C 65 % RH.

4.7.2 The performance of this characteristic shall be expressed as the 23 °C value of, either:

- a) thermal resistance, R_{23} , in $\text{m}^2 \cdot \text{K}/\text{W}$, or alternatively;
- b) thermal conductivity, λ_{23} , in $\text{W}/\text{m} \cdot \text{K}$.

5 Assessment and verification of constancy of performance (AVCP)

5.1 General

The compliance of the product (i.e. resilient, textile, laminate or modular multilayer floor coverings) with the requirements of this standard and with the performances declared by the manufacturer in the Declaration of Performance (DoP) shall be demonstrated by:

- product type determination (PTD);
- factory production control (FPC) by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

5.2 Type Testing

5.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests.

Assessments previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristic for all products within that same family. Products may be grouped in different families for different characteristics (see also Annex D).

Reference to the assessment method standards shall be made to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

- at the beginning of the production of a new or modified resilient, textile, laminate and modular multilayer floor covering (unless a product of the same product range);

or

- at the beginning of a new or modified method of production where this affects the stated properties.

Therefore, the determination of the product type shall be repeated for the appropriate characteristic(s), whenever a change occurs in the resilient, textile, laminate and modular multilayer floor coverings design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing marking in accordance with appropriate harmonized European specifications may be presumed to meet the performances declared in the DoP, although this does not replace the responsibility of the manufacturer to ensure that the floor coverings as defined in the scope of this standard as a whole are correctly manufactured and their final products have the declared performance values.

5.2.2 Test samples, testing and compliance criteria

The number of samples of resilient, textile, laminate and modular multilayer floor coverings to be tested/ assessed shall be in accordance with Table 7.

Table 7 — Number of samples to be tested and compliance criteria

Characteristic	Requirement	Assessment method	No. of samples ^a	Compliance criteria
Reaction to fire, assessed				
— without testing (R, T, L) ^b	4.1.2	4.1.2	-	4.1.2
— by testing	4.1.3.1	4.1.3.2	1	4.1.3.1
Content of specific dangerous substances, assessed				
— without testing/ calculation	4.2.2.2	4.2.2	-	4.2.2.2
— by calculation	4.2.2.3.2	4.2.2.3.2	-	4.2.2.3.2
— by testing	4.2.2.3.3	4.2.2.3.3, Table 4	1	Table 4
Emissions of volatile organic compounds (VOC) with exception of formaldehyde, assessed				
— by testing	4.3.2	4.3.2	1	4.3.2
Emissions of formaldehyde (HCHO), assessed				
— without testing	4.3.3.1	4.3.3.1	-	4.3.3.1
— by testing	4.3.3.2, Table 5	4.3.3.2, Table 5	1	4.3.3.2
Water tightness (R)	4.4	4.4	1	4.4
Slip resistance	4.5	4.5	1	4.5
Electrical behaviour, assessed as				
— antistatic	4.6.1, Table 6	4.6.1, Table 6	1	4.6.1
— static dissipative	4.6.1, Table 6	4.6.1, Table 6	1	4.6.1
— conductive	4.6.1, Table 6	4.6.1, Table 6	1	4.6.1
Thermal resistance (thermal conductivity), assessed				
— by calculation	4.7	4.7	-	4.7
— by testing	4.7	4.7	1	4.7
^a Sample dimensions and number of test specimen as specified in the assessment method.				
^b Floor coverings types: R – resilient; L – laminate; T – textile; M – modular multilayer.				

5.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the resilient, textile, laminate and modular multilayer floor coverings to which they relate.

5.2.4 Shared other party results

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

- the results are known to be valid for products with the same essential characteristics relevant for the product performance;
 - in addition to any information essential for confirming that the product has the same performance related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted¹² to transmit to the manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;
 - the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:
 - a) ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type;
- and
- b) keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

5.2.5 Cascading determination of the product type results

For some construction products, there are companies (often called “system houses”) which supply or ensure the supply of, on the basis of an agreement¹³, some or all of the components (e.g. in case of windows: profiles, gaskets, weather strips)¹⁴ to an assembler who then manufactures the finished product (referred to below as the “assembler”) in his factory.

Provided that the activities for which such a system house is legally established include manufacturing/assembling of products as the assembled one, the system house may take the responsibility for the determination of the product type regarding one or several essential characteristics of an end product which is subsequently manufactured and/or assembled by other firms in their own factory. When doing so, the system house shall submit an “assembled product” using components manufactured by it or by others, to the determination of the product type and then make the determination of the product type report available to the assemblers, i.e. the actual manufacturer of the product placed on the market.

To take into account such a situation, the concept of cascading determination of the product type might be taken into consideration in the technical specification, provided that this concerns characteristics for which either a notified product certification body or a notified test laboratory intervene, as presented below.

¹² The formulation of such an agreement can be done by licence, contract, or any other type of written consent.

¹³ This can be, for instance, a contract, license or whatever kind of written agreement, which should also contain clear provisions with regard to responsibility and liability of the component producer (system house), on the one hand, and the assembler of the finished product, on the other hand.

¹⁴ These companies may produce components but they are not required to do so.

The determination of the product type report that the system house has obtained with regard to tests carried out by a notified body, and which is supplied to the assemblers, may be used for the regulatory marking purposes without the assembler having to involve again a notified body to undertake the determination of the product type of the essential characteristic(s) that were already tested, provided that:

- the assembler manufactures a product which uses the same combination of components (components with the same characteristics), and in the same way as that for which the system house has obtained the determination of the product type report. If this report is based on a combination of components not representing the final product as to be placed on the market, and/or is not assembled in accordance with the system house's instruction for assembling the components, the assembler needs to submit his finished product to the determination of the product type;
- the system house has notified to the manufacturer the instructions for manufacturing/assembling the product and installation guidance;
- the assembler (manufacturer) assumes the responsibility for the correct assembly of the product in accordance with the instructions for manufacturing/assembling the product and installation guidance notified to him by the system house;
- the instructions for manufacturing/assembling the product and installation guidance notified to the assembler (manufacturer) by the system house are an integral part of the assembler's Factory Production Control system and are referred to in the determination of the product type report;
- the assembler is able to provide documented evidence that the combination of components he is using, and his way of manufacturing, correspond to the one for which the system house has obtained the determination of the product type report (he needs to keep a copy of the system house's determination of the product type report);
- regardless the possibility of referring, on the basis of the agreement signed with the system house, to the latter's responsibility and liability under private law, the assembler remains responsible for the product being in compliance with the declared performances, including both the design and the manufacture of the product, which is given when he affixes the regulatory marking on his product

5.3 Factory production control (FPC)

5.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This FPC system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared or cascading product type results, the FPC shall also include the appropriate documentation as foreseen in 5.2.4.

5.3.2 Requirements

5.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies, non occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

- identify procedures to demonstrate constancy of performance of the product at appropriate stages;
- identify and record any instance of non-constancy;
- identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

- the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;
- the effective implementation of these procedures and instructions;
- the recording of these operations and their results;
- the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

NOTE Manufacturers operating an FPC system, which complies with EN ISO 9001, are considered to be able to satisfy the provisions of the present European Standard.

5.3.2.2 Equipment

5.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

5.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

5.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the constancy of performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

5.3.2.4 Traceability and marking

Individual product batches or packages shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

5.3.2.5 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

5.3.2.6 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The characteristics, and the means of control, are stated in Table 8.

FPC can be done either by direct testing according to the reference test methods specified in this standard or by other test methods, for which a proven correlation with the reference test can be demonstrated by the manufacturer.

Table 8 — Minimum frequency of testing for declared performances if product composition and production method remain unchanged (essential characteristics)

Requirement	Relevant clause of this standard	Frequency of testing
Reaction to fire, assessed		
— without further testing (R, T, L) ^a	4.1.2	-
— by testing	4.1.3.1	once per 5 years
Content of specific dangerous substances, assessed		
— without calculation/ testing	4.2.2.1	-
— by calculation	4.2.2.3.2	-
— by testing	4.2.2.3.3, Table 4	once per 5 years
Emission of volatile organic compounds (VOC) with exception of formaldehyde, assessed		
— by testing	4.3.2	once per 5 years
Emission of formaldehyde (HCHO), assessed		
— without testing	4.3.3.1	-
— by testing	4.3.3.2, Table 5	once per 5 years
Water tightness (R)	4.4	once per 5 years
Slip resistance	4.5	once per 5 years
Electrical behaviour, assessed as		
— antistatic	4.6.1, Table 6	once per 5 years
— static dissipative	4.6.1, Table 6	once per 5 years
— conductive	4.6.1, Table 6	once per 5 years
Thermal resistance (thermal conductivity), assessed		
— by calculation	4.7	-
— by testing	4.7	-
^a Floor coverings types: R - resilient; L - laminate; T - textile; M - modular multilayer.		

5.3.2.7 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

5.3.2.8 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

5.3.2.9 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

5.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

- a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan;

and/or

- b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

5.3.4 Initial inspection of factory and of FPC

Initial inspection of factory and of FPC (for products covered by AVCP 1) shall be carried out when the production process has been finalized and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 5.3.2 and 5.3.3 are fulfilled.

During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European standard are in place and correctly implemented;

and

b) that the FPC-procedures in accordance with the FPC documentation are followed in practice;

and

c) that the product complies with the product type samples for which compliance of the product performance to the DoP has been verified.

All locations where final assembly or at least final testing of the relevant product is performed shall be assessed to verify that the above conditions a) to c) are in place and implemented. If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

5.3.5 Continuous surveillance of FPC (for products covered by AVCP 1)

Surveillance of the FPC shall be undertaken once per year. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the correct actions have been taken for non-compliant products.

5.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 5.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

5.3.7 One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity

The resilient, textile, laminate and modular multilayer floor coverings, produced as a one-off, prototypes assessed before full production is established, and products produced in very low quantities (less than 500 m² per year) shall be assessed as follows.

For type assessment, the provisions of 5.2.1, 3rd paragraph apply, together with the following additional provisions:

- in case of prototypes, the test samples shall be representative of the intended future production and shall be selected by the manufacturer;
- on request of the manufacturer, the results of the assessment of prototype samples may be included in a certificate or in test reports issued by the involved third party.

The FPC system of one-off products and products produced in very low quantities shall ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate. The manufacturer shall maintain records allowing traceability of the product.

For prototypes, where the intention is to move to series production, the initial inspection of the factory and FPC shall be carried out before the production is already running and/or before the FPC is already in practice. The following shall be assessed:

- the FPC-documentation; and
- the initial inspection of the factory.

In the initial assessment of the factory and FPC it shall be verified:

- a) that all resources necessary for the achievement of the product characteristics included in this European standard will be available; and
- b) that the FPC-procedures in accordance with the FPC-documentation will be implemented and followed in practice; and
- c) that procedures are in place to demonstrate that the factory production processes can produce a product complying with the requirements of this European standard and that the product will be the same as the samples used for the determination of the product type, for which compliance with this European standard has been verified.

Once series production is fully established, the provisions of 5.3 shall apply.

6 Marking and labelling

Floor coverings shall be clearly and indelibly marked either on their package or on a label accompanying the package with the following information:

- name and registered address of the manufacturer;
- reference to this European Standard, i.e. EN 14041:2018;
- the product name and batch number (possibly in code form).

Where regulatory marking provisions require information on some or all items listed in this clause, the requirements of this clause concerning those common items are deemed to be met for the purpose of this clause and the information needs not be repeated.

NOTE A guidance document can be found under <http://ec.europa.eu/DocsRoom/documents?tags=ce-guide>.

Annex A
(informative)

Product standards for resilient, textile, laminate and modular multilayer floor coverings

The following standards specify general requirements and classification scheme requirements for resilient, textile, laminate and modular multilayer floor coverings. They address other properties than those related to health, safety and energy conservation.

EN 650, *Resilient floor coverings — Polyvinyl chloride floor coverings on jute backing or on polyester felt backing or on polyester felt with polyvinyl chloride backing — Specification*

EN 651, *Resilient floor coverings — Polyvinyl chloride floor coverings with foam layer — Specification*

EN 652, *Resilient floor coverings — Polyvinyl chloride floor coverings with cork-based backing — Specification*

EN 655, *Resilient floor coverings — Tiles of agglomerated composition cork with polyvinyl chloride wear layer — Specification*

EN 686, *Resilient floor coverings — Specification for plain and decorative linoleum on a foam backing*

EN 687, *Resilient floor coverings — Specification for plain and decorative linoleum on a corkment backing*

EN 688, *Resilient floor coverings — Specification for corklinoleum*

EN 1307, *Textile floor coverings — classification*

EN 1816, *Resilient floor coverings — Specification for homogeneous and heterogeneous smooth rubber floor coverings with foam backing*

EN 1817, *Resilient floor coverings — Specification for homogeneous and heterogeneous smooth rubber floor coverings*

EN 12103, *Resilient floor coverings — Agglomerated cork underlays — Specification*

EN 12104, *Resilient floor coverings — Cork floor tiles — Specification*

EN 12199, *Resilient floor coverings — Specifications for homogeneous and heterogeneous relief rubber floor coverings*

EN 12455, *Resilient floor coverings — Specification for corkment underlay*

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

EN 13413, *Resilient floor coverings — Polyvinyl chloride floor coverings on a filled fibrous backing — Specification*

EN 13553, *Resilient floor coverings — Polyvinyl chloride floor coverings for use in special wet areas — Specification*

EN 13845, *Resilient floor coverings — Polyvinyl chloride floor coverings with particle based enhanced slip resistance — Specification*

EN 14085, *Resilient floor coverings — Specification for floor panels for loose laying*

EN 14215, *Textile floor coverings — Classification of machine-made pile rugs and runners*

EN 14499, *Textile floor coverings — Minimum requirements for carpet underlays*

- EN 14521, *Resilient floor coverings — Specification for smooth rubber floor coverings with or without foam backing with a decorative layer*
- EN 14565, *Resilient floor coverings — Floor coverings based upon synthetic thermoplastic polymers — Specification*
- EN 14978, *Laminate floor coverings — Elements with acrylic based surface layer, also known as beam cured — Specifications, requirements and test methods*
- EN 15468, *Laminate floor coverings — Elements with directly applied printing and resin surface layer — Specifications, requirements and test methods*
- EN 15772, *Textile floor coverings — Minimum requirements for needed floor coverings for single usage in events of limited duration*
- EN 16511, *Loose-laid panels — Semi-rigid multilayer modular floor covering (MMF) panels with wear resistant top layer*
- EN 16776, *Resilient floor coverings — Heterogeneous polyurethane floor coverings — Specification*
- EN ISO 10581, *Resilient floor coverings — Homogeneous poly(vinyl chloride) floor coverings — Specification*
- EN ISO 10582, *Resilient floor coverings — Heterogeneous poly(vinyl chloride) floor coverings — Specification*
- EN ISO 10595, *Resilient floor coverings — Semi-flexible/vinyl composition (VCT) poly(vinyl chloride) floor tiles — Specification*
- EN ISO 10874, *Resilient, textile and laminate floor coverings — Classification*
- EN ISO 24011, *Resilient floor coverings — Specification for plain and decorative linoleum*
- EN ISO 26986:2012, *Resilient floor coverings — Expanded (cushioned) poly(vinyl chloride) floor covering — Specification*

Annex B
(normative)

Determination of content of pentachlorophenol (PCP) in resilient and textile floor coverings

B.1 Principle of test

Pentachlorophenol (PCP) is extracted from a resilient or textile floor covering into a potassium carbonate solution and analysed quantitatively according to EN 12673.

B.2 Apparatus and materials

B.2.1 Laboratory equipment

Standard laboratory glassware with vacuum filtration equipment shall be used.

B.2.2 Ultrasonic bath

A standard ultrasonic bath shall be used.

B.2.3 Potassium carbonate aqueous solution

A potassium carbonate 1,5 % aqueous solution shall be used.

B.2.4 Other apparatus and materials

Other apparatus and materials, as specified in EN 12673, shall be used.

B.3 Sampling and specimen preparation

Sampling and specimen preparation shall be made in accordance with ISO 1957.

B.4 Sample extraction and analysis

- Cut the floor covering sample into small pieces.
- Weigh a 5 g specimen from the sample and insert it into a 250 ml Erlenmeyer flask with 50 ml of the potassium carbonate solution (see B.2.3).
- Place the flask and contents into an ultrasonic bath for one hour to allow the PCP to be extracted as potassium salt. After extraction, filter the extract through a suction flask and extract the resulting residue a second time with a further 50 ml of potassium carbonate solution.
- After extraction, combine the aqueous extracts and analyse for PCP content in accordance with EN 12673.

WARNING: Avoid ingress of carbon dioxide.

B.5 Expression of results

Express the result as content of PCP, in mg of PCP per kg dry weight of the floor covering.

Annex C (informative)

Guidance on the reduction of slip hazards

C.1 Scope

The information given in this annex is aimed at raising the awareness of the problem of slips and falls and resultant injuries. However, in giving advice on how to help reduce some of the major contributors to such accidents, it can only provide guidance rather than an absolute guarantee.

C.2 General

The interaction of feet, shod or bare, with flooring materials governs slipping. The slip resistance of a floor in service depends on the nature of its surface, and this may change over the lifetime of the floor. Slip resistance is adversely affected by the presence of contamination; the most common contaminant is water but others including oil, grease, soap, dust, lint and sand are also possible.

It is important to remember that coefficient of friction is only one indicator of slip resistance and the two terms should not be interchanged. Slip resistance is neither a constant nor an intrinsic property of any floor or floor covering material. Surface roughness is another property that may be usefully considered.

Resilient, textile, laminate and modular multilayer floor coverings and other flooring surfaces in common use usually have acceptable slip resistance provided they are clean, dry, free from oil, fat and other slippery substances and have received appropriate treatment after installation, and continue to receive appropriate maintenance in service.

Many slip incidents do not result in serious injury. A thorough investigation to uncover the root causes of such incidents and comprehensive records of these events will help identify problem areas and allow action to be taken before a serious accident does occur. Records may also allow patterns to be identified, giving further clues to the action required to reduce the hazard.

C.3 Design

The measures that can be taken by designers, in consultation with their clients, to promote safe conditions in service include:

- a) considering the likely contaminants that will be present in service and specifying the floor surface and measures required for draining it accordingly;
- b) anticipating the cleaning and maintenance regime necessary and making the necessary provisions for it;
- c) providing adequate entrance flooring systems at foyers and entrances to intercept water and dirt brought in by traffic. The effective length of the entrance flooring system should allow for a minimum of two footfalls for each foot;
- d) entrance flooring systems will only remain effective if properly cleaned and maintained and replaced when necessary. Matting should be securely fixed so that it does not present a tripping hazard;
- e) the use of canopies over entrances;

- f) positioning entrances to reduce the effects of prevailing weather;
- g) the use of appropriate ventilation systems to help reduce the ingress of wet weather.

Poor lighting, inside or outside, can significantly increase the risk faced by pedestrians. Limited lighting may also skew individuals' perceptions or expectations of the degree of slipperiness of walking surface. Steps, stairs and ramps also present an increased risk and should be clearly identified and well lit.

Accidents will generally occur when unexpected differences in floor conditions are encountered. It is often the difference between the dry and wet (contaminated) coefficient of friction that is important. Specifiers should remember this and not simply choose a floor covering material with a high dry coefficient of friction value. It is also good practice to avoid significantly different flooring materials (in terms of their slip resistance) in adjacent areas. It is also important to recognize that many flooring materials will change merely on installation for example by the application of polishes; after all, it is the installed floor that will be walked on.

If contamination is likely to be present, then flooring with enhanced slip resistance should be used. The use of such floorings is particularly important on steps and sloping areas and in areas where falls in gradient are used to drain water from foreseeable wet areas (expert advice should be sought).

C.4 Service

The measures that can be taken by the owner or occupier of the building to promote safe conditions in service include identifying potentially wet areas and using an appropriate surface there, establishing an effective cleaning/maintenance procedure that uses appropriate cleaning materials/dressings and includes entrance flooring systems, confirming that these procedures are conducted at the appropriate frequency and using normal measures of good housekeeping.

Various European Directives require the employer to make an assessment of the risks of slipping caused by conditions in his workplace and to take the necessary measures to minimize them.

Areas of class DS floor coverings wet as a result of cleaning should be clearly identified and small areas of local contamination should be cordoned off. Freshly cleaned surfaces should be completely dry before pedestrian traffic is allowed to return. Signs used during cleaning should be removed once the floor has dried; failure to do this will result in their effectiveness being significantly reduced.

The frequency of cleaning and maintenance regimes should be determined by the numbers (normal and peak levels) and type (children, elderly, disabled etc.) of pedestrians who will use the floor.

Good housekeeping practices are the first defence against slip and fall accidents. Good housekeeping is therefore a state to be maintained rather than merely achieved. One way to facilitate this, especially in situations where spills etc. are common, is to leave absorbent materials at conspicuous accessible points throughout the facility. The resources required to clean up spills etc. are far less than those involved if an accident were to occur.

In occupational settings it is often possible to control the footwear to be worn. An informed choice of footwear may offer some protection against the incidence of slipping accidents. Footwear should also be properly cleaned and maintained to remain effective. In situations where no control over footwear is possible the condition of the floor will be even more crucial in reducing the likelihood of slipping accidents. People pulling or pushing loads will generally require a surface with a higher slip resistance to operate safely.

C.5 User responsibility

Water and other liquids are arguably the substances that most often make floors slippery. Spills of tea, coffee, cleaning solution, rinse water and other liquids are too hazardous to leave until the cleaners

arrive. Water or other spilt liquids on the floor are primarily the responsibility of the person who spilt them and that person should remove them immediately and alert others to the hazard while he does so.

Slip resistance can only be maintained by frequent effective cleaning with appropriate detergent and cleaning tools. The flooring product manufacturer may provide details of cleaning methods. When a wet cleaning process is used a thorough final rinse with clean water is particularly important.

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Annex D
 (normative)

Product parameters for defining product families

D.1 Product parameters related to reaction to fire performance

The product parameters shown in Table D.1 may influence the reaction to fire performance of floor coverings. The parameters of Table D.1 shall be applied when testing a family of products.

Table D.1 — Product parameters which influence reaction to fire performance

Parameter	Comments
Composition	Each floor covering with different composition, build-up or surface layer shall be tested separately.
Thickness	If a floor covering is produced with a range of different nominal thickness this needs to be considered when testing. At least the minimum and maximum thickness shall be tested (one test each) and a complete set of tests shall be conducted for the worst case. The worst case determines the classification.
Mass per unit area or density	If a floor covering is produced with a range of different nominal mass per unit area or density this needs to be considered when testing. At least the minimum and maximum mass per unit area or density shall be tested (one test each) and a complete set of tests shall be conducted for the worst case. The worst case determines the classification.
Surface structure	If a floor covering is produced with several different surface structures and it is assumed that this will influence the reaction to fire performance this needs to be considered when testing. Each surface structure shall be tested (one test each) and the complete set of tests shall be conducted for the worst case. The worst case determines the classification.
Colour and design	Colour and design of a floor covering have no effect on the reaction to fire behaviour unless different colour and design change the composition or other parameters as mentioned above.

The parameters shown in Table D.2 shall be incorporated in the test methods.

Table D.2 — Parameters considered in reaction to fire testing and classification

Parameter	Provisions in test and classification standards
Orientation	EN ISO 11925-2 EN ISO 9239-1 CEN/TS 15447
Adhesives	EN 13501-1 CEN/TS 15447
Substrates	EN 13501-1 (and EN 13238) CEN/TS 15447
Working/Cleaning	EN 13501-1
Size	EN ISO 9239-1 EN ISO 11925-2

D.2 Product parameters related content of dangerous substances

D.2.1 General

The product parameters, shown in Tables D.3, D.4, D.5 and D.6, may influence the test results of the content of dangerous substances of resilient, laminate, modular multilayer and textile floor coverings, respectively. The parameters of Tables D.3, D.4, D.5 and D.6 shall be applied when testing the respective family of products.

D.2.2 Resilient floor coverings

Table D.3 — Product parameters which influence the content of dangerous substances for resilient floor coverings

Parameters	Comments
Composition	For products of the same product group according to EN product specification standards, the product with the highest percentage of organic material shall be tested. NOTE Percentage of organic material = 100 % - x % (x = inorganic fillers + inorganic flame retardants)
Thickness	If the amount of organic compounds is equal, the product with the maximum nominal overall thickness shall be tested.
Mass per unit area or density	When the product is produced with a range of different nominal mass per unit area or density this needs to be considered when testing. The product with the maximum mass per unit area or density shall be tested.
Surface structure and coatings	If a coated and an uncoated version of a product of the same composition exist, both versions shall be tested. All different types of coatings shall be tested. The surface structure (embossing) is not relevant.
Colour and design	The colour and design of a floor covering can have an influence and therefore at least two different colours shall be tested. In case inks are used with different solvents each combination shall be tested.

D.2.3 Laminate floor coverings

Table D.4 — Product parameters which influence the content of dangerous substances for laminate floor coverings

Parameters	Comments
Composition	Surface layer type, core board type, backing layer type, and integrated underlay if present.
Thickness	The highest overall thickness per composition shall be tested.
Mass per unit area or density	The highest density of each composition layer type shall be tested.
Surface structure	The surface structure has no influence.
Colour and design	The colour of laminate floor covering has no influence. If a bevelled edge (V-groove) is present, the deepest V-groove of the composition with highest thickness shall be tested.

NOTE The “worst case” scenario for a given composition is the thickest panel and the thickest surface layer and with an integrated sound absorbing material (if present) and also with a V-groove.

D.2.4 Modular multilayer floor coverings

Table D.5 — Product parameters which influence the content of dangerous substances for modular multilayer floor coverings

Parameters	Comments
Composition	Surface layer type, glue type, topcoat if present, core board type, backing layer type, and integrated underlay (if present).
Thickness	The highest thickness of each of the composition layers shall be tested.
Mass per unit area or density	The highest density of each composition layer type shall be tested.
Surface structure and coating	The surface structure has no influence. Every coating type shall be tested with the highest thickness.
Colour and design	The colour and design of a floor covering can have an influence and therefore at least two different colours shall be tested. In case inks are used with different solvents each combination shall be tested. If a bevelled edge (V-groove) is present, the deepest V-groove of the composition with highest thickness shall be tested.

NOTE The “worst case” scenario for a given composition is the panel with the highest thickness of each individual layer, the highest coating thickness, with an integrated sound absorbing material (if present) and also with a V-groove.

D.2.5 Textile floor coverings

Table D.6 — Product parameters which influence the content of dangerous substances for textile floor coverings

Parameters	Comments
Composition	One test shall be performed on a generic product prototype. The prototype shall reflect a generic family of products composed of the same specific materials as e.g. pile material, substrates and compounds. Examples of these materials and constructions as defined in EN 1307 and ISO 2424.
Mass per unit area	The prototype to be tested shall reflect the highest total mass of each component as pile material above the primary and, where applicable, the substrate, the binder, and additional backing materials
Surface structure	The surface structure has no influence
Colour and design	The colour and design have no influence.

D.3 Product parameters related to emission of dangerous substances into indoor air

D.3.1 General

The product parameters shown in Tables D.7, D.8, D.9 and D.10 may influence the indoor air emissions of resilient, laminate, modular multilayer and textile floor coverings, respectively. The parameters of Tables D.7, D.8, D.9 and D.10 shall be applied when testing the respective family of products.

D.3.2 Resilient floor coverings

Table D.7 — Product parameters which influence indoor air emissions for resilient floor coverings

Parameters	Comments
Composition	For products of the same product group according to EN product specification standards, the product with the highest percentage of organic material shall be tested. NOTE Percentage of organic material = 100 % - x % (x = inorganic fillers + inorganic flame retardants)
Thickness	If the amount of organic compounds is equal, the product with the maximum nominal overall thickness shall be tested.
Mass per unit area or density	Not relevant
Surface structure and coatings	If a coated and an uncoated version of a product of the same composition exist, both versions shall be tested. All different types of coatings shall be tested. The surface structure (embossing) is not relevant.
Colour and design	The colour and design of a floor covering have no influence on emissions. In case inks are used with different solvents each combination shall be tested.

D.3.3 Laminate floor coverings

Table D.8 — Product parameters which influence indoor air emissions for laminate floor coverings

Parameters	Comments
Composition	One test per composition (surface layer type, core board type and backing layer type and integrated underlay (if present)) shall be performed.
Thickness	The highest overall thickness per composition shall be tested.
Mass per unit area or density	The highest overall density shall be tested.
Surface structure	The surface structure has no influence. Every surface layer type shall be tested with the highest thickness.
Colour and design	The surface colour has no influence. If a lacquered bevelled edge (V-groove) is present, the deepest V-groove of the composition with highest thickness shall be tested.

NOTE The “worst case” scenario for a given composition is the thickest panel and the thickest surface layer, together with an integrated sound absorbing material (if present) and a lacquered V-groove.

D.3.4 Modular multilayer floor coverings

Table D.9 — Product parameters which influence indoor air emissions for modular multilayer floor coverings

Parameters	Comments
Composition	One test per composition (surface layer type, glue type, topcoat if present, core board type, backing layer type and integrated underlay if present) shall be performed.
Thickness	The highest thickness of each of the composition layers shall be tested.
Mass per unit area or density	The highest density of each of the composition layers shall be tested.
Surface structure and coatings	The surface structure has no influence. Every coating type shall be tested with the highest thickness.
Colour and design	The surface colour has no influence. If a bevelled edge (V-groove) is present, the deepest V-groove of the composition with highest thickness shall be tested.

NOTE The “worst case” scenario for a given composition is the panel with the highest thickness of each individual layer, the highest coating thickness, with an integrated sound absorbing material (if present) and also with a V-groove.

D.3.5 Textile floor coverings

Table D.10— Product parameters which influence indoor air emissions for textile floor coverings

Parameters	Comments
Composition	One test shall be performed on a generic product prototype. The prototype shall reflect a generic family of products composed of the same specific materials as, e.g. pile material, substrates and compounds. Examples of these materials and constructions as defined in EN 1307 and ISO 2424.
Mass per unit area	The prototype to be tested shall reflect the highest total mass of each component as pile material above the primary and, where applicable, the substrate, the binder, and additional backing materials
Surface structure	The surface structure has no influence
Colour and design	The colour and design has no influence

D.4 Product parameters related to slip resistance performance

The product parameters shown in Table D.11 may influence the slip resistance performance of textile floor coverings. The parameters of Table D.11 shall be applied when testing a family of products.

Table D.11 — Product parameters which influence slip resistance performance of textile floor coverings

Parameter	Comments
Composition	One test shall be performed on a generic product prototype. The prototype shall reflect a generic family of products composed of the same specific materials as the use surface material. When considering the use surface material the fibre fineness and the presence of softeners or other auxiliary products shall be considered.
Surface structure	The surface structure shall be taken into account and the least structured (smoothest) shall be tested.
Thickness	The product with the lowest total thickness shall be tested.
Colour and design	The colour and design have no direct influence.

D.5 Product parameters related to electrical behaviour performance

The product parameters shown in Table D.12 may influence the electrical behaviour performances of textile floor coverings. The parameters of Table D.12 shall be applied when testing a family of products.

Table D.12 — Product parameters which influence electrical behaviour performance of textile floor coverings

Parameter	Comments
Composition	Each floor covering with different composition, build-up or surface treatment shall be tested separately.
Thickness	The thickness shall be considered when testing for electrical behaviour. Only the highest thickness shall be tested.
Mass per unit area or density	The mass per unit area shall be considered when testing for electrical behaviour. Only the product with the highest mass per unit area or density shall be tested.
Surface structure	The surface structure shall be taken into account and one test shall be performed for each surface structure.
Colour and design	The colour and design have no influence

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Annex E (normative)

Determination of content of Polycyclic Aromatic Hydrocarbons (PAH)

E.1 Principle of test

This annex describes a test method to analyse the PAH (polycyclic aromatic hydrocarbon) content in resilient, textile, laminate and modular multilayer floor coverings using toluene. The extract is then filtered and analysed by GC-MS in order to determine the concentration of the following 8 restricted PAHs (see Table E.1).

Table E.1 — List of PAHs in resilient, textile, laminate and modular multilayer floor coverings

PAH		CAS Number
1	Benzo[a]pyrene	50-32-8
2	Benzo[e]pyrene	192-97-2
3	Benzo[a]anthracene	56-55-3
4	Dibenzo[a,h]anthracene	53-70-3
5	Benzo[b]fluoranthene	205-99-2
6	Benzo[j]fluoranthene	207-08-9
7	Benzo[k]fluoranthene	205-82-3
8	Chrysene	218-01-9

E.2 Terms and definitions

E.2.1

sample

resilient, textile, laminate or modular multilayer floor covering to be extracted for analysis

E.2.2

extraction sample

extract from the resilient, textile, laminate or modular multilayer floor covering to be analysed

E.3 Abbreviations

GC-MS gas chromatograph with mass selective detector

SIM secondary ion mass, a type of mass selective detector

PAH polycyclic aromatic hydrocarbons

E.4 Equipment

- 1) Adjustable pipettes with suitable tips, volumes 20 µl – 5 ml;
- 2) Volumetric flasks, Grade A, various volumes;

- 3) Glass extraction vessels, with PTFE-lined lids;
- 4) Balance, capable of measuring to a minimum accuracy of 0,1 mg;
- 5) Ultrasonic water bath, with in-built timer and temperature control;
- 6) Glass pipette, volume 10 ml;
- 7) Syringes, 2-part polypropylene, minimum volume 5 ml;
- 8) Membrane filters, pore size 0,45 µm;
- 9) GC-MS, equipped with auto-sampler;
- 10) (Optional) Prepacked cleaning tube, with silica gel and sodium sulphate (for purification);
- 11) (Optional) Rotational evaporator (for purification).

E.5 Chemicals and solutions

E.5.1 Reagents

E.5.1.1 Toluene

Analytical grade Toluene shall be used.

E.5.1.2 Extraction solution, 100 µg/l of internal standards in toluene

Using suitable pipettes and volumetric flasks, dilute ISTD working solution (E.5.2.2) in toluene (E.5.1.1) at a ratio of 2,5 ml per litre.

The extraction solution shall be stored at room temperature for a maximum of one month. Shake thoroughly before use.

E.5.1.3 Petroleum ether (Optional)

Petroleum ether shall be used when the optional purification step is implemented.

E.5.2 Internal standards

E.5.2.1 Stock solution

Solution containing: Phenanthrene-d10 and Perylene-d12 at 4 000 µg/ml.

E.5.2.2 Working solution (40 µg/ml)

Using pipettes, transfer 1 ml of stock (E.5.2.1) to a 100 ml volumetric flask.

Bring to volume with toluene (E.5.1.1).

The working solution shall be stored at (3 ± 3) °C for a maximum of one year.

E.5.3 External standards

E.5.3.1 8 PAH calibration mixture (10 µg/ml solution)

(Solution contains: *Benzo[a]pyrene*, *Benzo[e]pyrene*, *Benzo[a]anthracene*, *Dibenzo[a,h]anthracene*, *Benzo[b]fluoranthene*, *Benzo[k]fluoranthene*, *Benzo[j]fluoranthene*, *Chrysene*, at 10 µg/ml in acetonitrile.)

E.5.3.2 Benzo[e]pyrene

100 µg/ml solution.

E.5.3.3 Benzo[j]fluoranthene

2 000 µg/ml solution.

E.5.3.4 Benzo[e]pyrene and Benzo[j]fluoranthene working solution

Prepare the 10 µg/ml solution as follows.

Using pipettes, transfer 1 ml of benzo[e]pyrene solution (E.5.3.2) and 50 µl of benzo[j]fluoranthene solution (E.5.3.3) to a 10 ml volumetric flask.

Bring to volume with toluene (E.5.1.1).

Benzo[e]pyrene and Benzo[j]fluoranthene working solution shall be stored at $(3 \pm 3) ^\circ\text{C}$ for a maximum of one year.

E.6 Procedure

E.6.1 Extraction

Per floor covering sample one extraction sample shall be prepared for GC-MS analysis.

- 1) To extraction vessels, weigh $(1 \pm 0,01)$ g of each sample using a balance. Record the mass in grams to 4 decimal places on the controlled worksheet.
- 2) To each vessel, add 10 ml of extraction solution (E.5.1.2) using a pipette. Seal the vessels and place in the ultrasonic bath to extract for a total of (60 ± 5) min at $(60 \pm 5) ^\circ\text{C}$.

If the temperature cannot be maintained within the required range, the water in the bath shall be changed.

- 3) Remove the vessels and cool to room temperature before filtering the extracts into suitable vials using syringes and membrane filters.

E.6.2 Calibration standards

- 1) External and internal standard working solutions shall be added, using pipettes, to volumetric flasks in accordance with Table E.2. Solutions shall be brought to volume with toluene as described in E.5.1.1.

Table E.2 — Preparation of calibration standards

Volume of 8 PAH mixture (E.5.3.1) μl	Volume of B[j]F and B[e]P solution (E.5.3.2 and E.5.3.3) μl	Volume of ISTD working solution (E.5.2.2) μl	Final volume ml	PAH concentration μg/l	ISTDs concentration μg/l
20	20	50	20	10	100
50	50	50	20	25	
100	100	50	20	50	
200	200	50	20	100	
500	500	50	20	250	

2) These standards shall be stored for a maximum of 3 months in the dark at $(3 \pm 3) ^\circ\text{C}$.

3) Each solution shall be transferred to a suitable vial for each run.

E.6.3 Purification (optional)

NOTE E.6.3 is optional.

- 1) Remove the solvent toluene from the extract in a rotary evaporator, reducing it to about 1 ml.
- 2) Condition the purification by adding 10 ml petrol ether.
- 3) Bring the 1 ml toluene extract onto the column.
- 4) Rinse the flask used for concentrating the extract with 20 ml petrol ether and bring onto the column.
- 5) Rinse the column with another 50 ml petrol ether, collecting the eluate from steps 3 through 5.
- 6) Remove the solvent from the eluate in a rotary evaporator.
- 7) Re-dissolve the residue in a predefined volume (volumetric flask, for example 5 ml) with toluene.
- 8) The purified extraction sample is then ready for GC-MS analysis.

E.7 GC-MS Analysis

Extraction samples shall be analysed by GC-MS. Run in sequence the calibration standards followed by the samples. Alternate with toluene blanks.

Use the GC-MS software to construct calibration curves for the target compounds, plotting the response ratio against the concentration ratio of each PAH against its relevant internal standard (see Table E.3). All calibration curves shall have a correlation coefficient (R^2) greater than 0,99.

Table E.3 — Internal standard quantification

ISTD	Quantifies	ISTD	Quantifies
Phenanthrene-d10	Benzo[a]anthracene Chrysene	Perylene-d12	Benzo[b]fluoranthene Benzo[k]fluoranthene Benzo[e]fluoranthene Benzo[e]pyrene Benzo[a]pyrene Dibenzo[a,h]anthracene

The GC-MS software shall then be used to calculate the concentration of each PAH in each sample.

Where the concentration of any PAH exceeds 250 µg/l, solutions shall be re-analysed after suitable dilutions. Dilutions shall be performed using pipettes and volumetric flasks. Solutions shall be brought to volume with extraction solution (E.5.1.2) so that the internal standard concentration remains constant.

E.8 Calculations

Results obtained from the GC-MS shall be converted to mg/kg using the following formula:

$$\text{PAH amount (mg / kg)} = \frac{\text{Concentration (}\mu\text{g / l)} \times \text{Extraction volume (ml)} \times \text{Dilution factor}}{1000 \times \text{Sample weight (g)}}$$

The reporting limit for each PAH shall be 0,2 mg/kg. If a result for an individual PAH is below this, it is excluded from the sum total of the 8 PAHs. The reporting limit for total PAHs shall be also 0,2 mg/kg.

E.9 Test Report

The test report shall include the following information:

- a) reference to this procedure, i.e. EN 14041:2018, Annex E, along with any relevant regulation/directive;
- b) identification of the test lab;
- c) date of testing;
- d) type, manufacturer and specifications of the equipment used;
- e) sample references and material types tested;
- f) a list of the 8 target PAHs, along with the amount of each detected (in mg/kg);
- g) the total amount of each of the 8 PAHs (in mg/kg);
- h) purification step, if used;
- i) any deviations from this standard;
- j) other remarks and observations.

Annex F
(normative)

Determination of content of phthalates

F.1 Principle of test

A sample is completely dissolved in tetrahydrofuran. Any PVC polymer is precipitated with hexane and filtered.

Then the solution is diluted with cyclohexane, and analysed by Gas Chromatography-Mass Spectrometry (GC-MS).

Any other extraction method resulting in the same degree of extraction of phthalates can be used.

F.2 Terms and definitions

F.2.1

sample

individual product or a group of identical products from a batch to be tested

F.2.2

component part

individual sub-unit within a product

F.2.3

laboratory reagent blank

LRB

aliquot of solvents that is treated exactly as a sample including exposure to glassware, apparatus and conditions used for a particular test, but with no added sample

Note 1 to entry: LRB data are used to assess contamination from the laboratory environment.

F.2.4

stock standard

phthalate of the highest available purity, used to prepare calibration standards, to be replaced before expiration date

F.2.5

calibration standard

solution containing the phthalate(s) of interest in cyclohexane;

F.2.6

quality control sample

QCS

solution containing known amounts of phthalates that are used to evaluate the performance of the analytical instrument system

Note 1 to entry: QCSs are obtained from a source external to the laboratory and are not made from the stock standard solutions. For example, certified reference materials (CRMs) are, e.g. available from the US. National Institute of Standards and Technology (NIST), such as those listed in the Equipment and Supplies section below.

F.3 Equipment and Supplies

F.3.1 General

The equipment and supplies, used for sampling and analyses, shall be as specified in following subclauses:

F.3.2 Equipment

- Sealable glass vials with PTFE or silicone liner, size 20 ml or larger.
- Cryogenic-mill (or suitable alternative to grind samples to powder).
- PTFE filters, 0,45 μm .
- Gas Chromatograph-Mass Spectrometer (GC-MS) with an auto-sampler, split/splitless inlet, programmable GC oven, and capable of selective ion monitoring.

F.3.3 Chemicals

- Tetrahydrofuran ($\text{C}_4\text{H}_8\text{O}$, THF), GC grade or higher.
- Hexane (C_6H_{12}), GC grade or higher.
- Cyclohexane (C_6H_{12}), GC grade or higher.
- Benzyl Benzoate ($\text{C}_{14}\text{H}_{12}\text{O}_2$, BB), analytical grade or higher.
- Dibutyl Phthalate ($\text{C}_{16}\text{H}_{22}\text{O}_4$, DBP), CAS No. 84-74-2, analytical grade or higher.
- Di-(2-ethylhexyl) phthalate ($\text{C}_{24}\text{H}_{38}\text{O}_4$, DEHP), CAS No. 117-81-7, analytical grade or higher.
- Benzyl Butyl Phthalate ($\text{C}_{19}\text{H}_{20}\text{O}_4$, BBP), CAS No. 85-68-7, analytical grade or higher.
- Di-n-octyl phthalate ($\text{C}_{24}\text{H}_{38}\text{O}_4$, DnOP), CAS No. 117-84-0, analytical grade or higher.
- Diisononyl phthalate ($\text{C}_{26}\text{H}_{42}\text{O}_4$, DINP), CAS No. 28553-12-0/68515-48-0, analytical grade or higher.
- Diisodecyl phthalate ($\text{C}_{28}\text{H}_{46}\text{O}_4$, DIDP), CAS No. 26761-40-0/68515-49-1, analytical grade or higher.
- CRMs containing phthalates (such as NIST SRM 3074).

F.3.4 Calibration standards

Calibration standards shall be prepared each of the phthalate(s) to be analysed, using cyclohexane as solvent.

A minimum of four calibration standards shall be prepared as needed from the stock solution and shall be stored at room temperature. The weight of solutions shall be recorded before and after use to monitor for solvent evaporation. Calibration standards shall be replaced when experimental data demonstrates a decrease in quality or significant loss in solvent weight.

Calibration standard shall also contain an internal standard. The amount should be

— 20 µg/ml, for a 20:1 split injection;

or

— 1 µg/ml, for a splitless injection.

F.4 Measurement of Phthalate Concentration

F.4.1 General

The procedure to be used consists of three steps: sample preparation, extraction, and analysis.

WARNING — These methods require the use of hazardous materials. It is paramount to handle all hazardous materials using the appropriate safety measures, which include a ventilated fume hood and adequate personal protective equipment.

Phthalates are a common contaminant. Even low levels of contamination can impact quantitative results. Avoid plastic materials and use only scrupulously cleaned glassware and equipment. All solvents shall be tested for any phthalate content. Solvent blanks should be run through the GC-MS periodically to monitor for potential contamination. Disposable glassware is recommended, where practical.

F.4.2 Sample Pre-Screening by Infrared (IR) Spectroscopy (optional)

A broad estimate of phthalate concentration shall be obtained by scanning the sample to be tested with an IR spectrometer. This information shall be used when deciding the dilution factor and analysis method later in the procedure.

Usually A doublet peak at $1\ 600\ \text{cm}^{-1}$ and $1\ 580\ \text{cm}^{-1}$ indicates that the concentration of phthalate(s) is higher than 10 % (see Figure F.1). If the doublet is present, the sample shall be treated as concentrated, and a higher dilution factor may be used. If this doublet is not observed, the sample shall be treated as containing a low concentration of phthalates.

The absence of the doublet peak does not indicate that phthalates are not present in the sample. Conversely, the presence of the double peak does not indicate that regulated phthalates are present in restricted amounts.

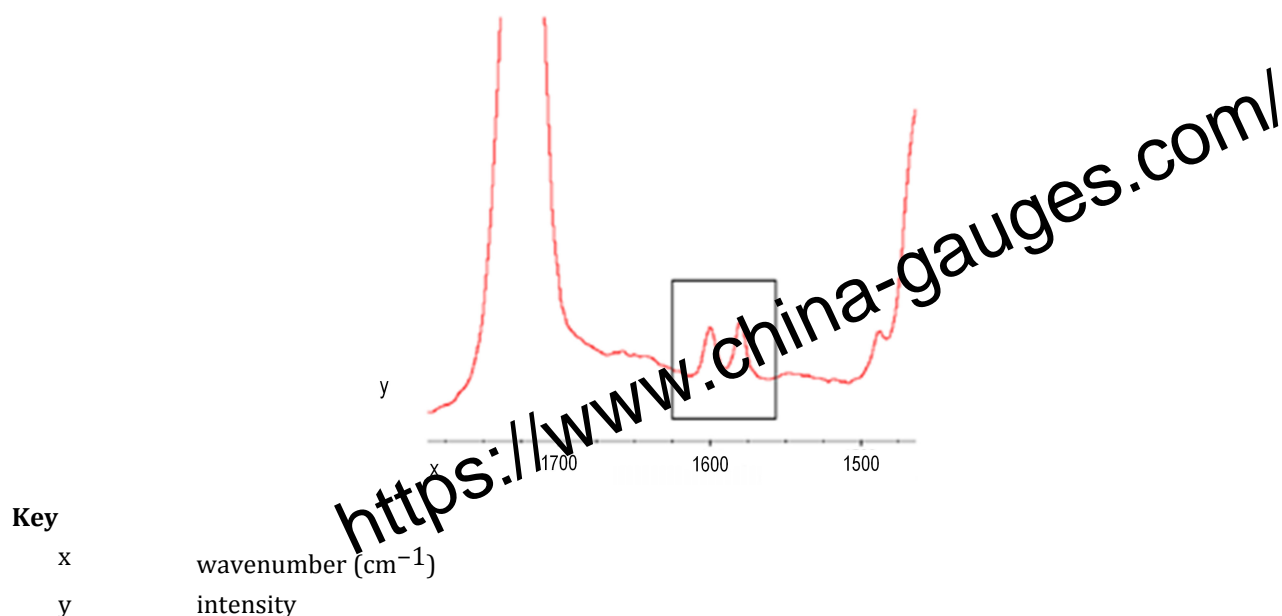


Figure F.1 — Example - IR spectrum of PVC plastic containing approximately 30 % phthalates

F.4.3 Sample Preparation

Prior to analysis, each plasticized component part shall be cut into small pieces (no dimension larger than 2 mm), or milled/ground into a representative powder. Each cut/milled plasticized component part shall be considered a sample for testing as described below. At minimum, prepare the amount required to constitute a sufficient sample size.

F.4.4 Phthalate Extraction Method

The testing lab shall determine how many replicate samples are necessary to meet their quality assurance requirements.

Any other extraction method giving an equivalent result can be used.

Prepare LRB concurrently with samples.

Weigh out a minimum of (0,05 ± 0,005) g of sample into a sealable glass vial (weighed to an accuracy of ± 0,5 % relative). If the sample is not uniform, collect more to reduce sample variance.

Add 5 ml of tetrahydrofuran (THF) to the sample. For samples larger than 0,05 g, add 10 ml of THF for every 0,1 g of sample (or a reasonable amount to dissolve sample). Shake, stir, or otherwise mix the sample for at least 30 min to allow dissolution. Ultra-sound and/or gently heating may be used to expedite the dissolution.

In the case that the material does not dissolve completely an additional 2h mixing time shall be used.

Precipitate any PVC polymer with 10 ml of hexane for every 5 ml of THF used in the dissolution step. Shake and allow at least 5 min for polymer to settle (longer times may be necessary to minimize clogging of filters in subsequent step).

It is recommended to filter the THF/hexane solution through a 0,45 µm PTFE filter and collect a few ml of the filtered solution in a separate vial.

Combine 0,3 ml of the THF/hexane solution with 0,2 ml of internal standard (BB, 150 µg/ml) in a GC vial, and dilute to 1,5 ml with cyclohexane.

Depending on the phthalate concentration, a different dilution ratio shall be used as to produce results in the calibration range. (e.g. if the sample is known to contain approximately 5 % phthalate, increase the amount of filtered THF/hexane solution from 0,3 ml to 1,0 ml). For very low concentrations (0,1 %), use 1,3 ml of filtered solution. A pre-screen of the sample by IR spectroscopy shall be used to determine a broad estimate of phthalate concentration.

F.4.5 GC-MS Operating Procedures and Quality Control Measures

A GC-MS system with an auto-sampler or equipment yielding results of the same quality shall be used for the sample analysis.

An example for the GC conditions is given in Table F.1.

Table F.1 — Example for GC Conditions

Column:	DB-5MS; 30 m x 0,25 mm ID x 0,25 µm
Flow Mode:	1 ml/min, constant flow (He gas)
Inlet Mode:	20:1 Split or Splitless
Injection Amount:	1 µl
Inlet Temperature:	290 °C
Solvent Delay:	5 min
Initial Oven Temp, Hold Time:	50 °C, 1 min
Ramp 1:	30 °C/min, 280 °C
Ramp 2:	15 °C/min, 310 °C
Final Hold Time:	4 min or longer

The 20:1 split mode injection shall be used when the phthalate concentration is expected to be ≥ 5 %. All other samples shall be run in splitless mode. A pre-screen of the sample by IR spectroscopy can provide a broad estimate of phthalate concentration.

Samples shall be analysed using both full scan mode and the Selective Ion Monitoring (SIM) program listed in Table F.2. Monitor for corresponding ions of each compound listed in a time segment (e.g. set Group 3 to monitor for 149, 167, 261, 279, 293, and 307 m/z). The retention times listed are estimated and shall be confirmed by analysing stock standards. The last column indicates the identification (ID) ion, and the relative abundance of this ion to 149 m/z.

If the instrument to be used has limited SIM abilities, monitor for only those ions in bold.

Table F.2 — SIM Settings

	Estimated Retention Time (min)	Corresponding Ions (m/z)	Published Relative Abundance of Ions to 149 m/z
SIM Group 1	5 to 9,5		
BB (Internal Standard)	7,9	91,1, 105 , 194, 223	
DBP	8,5	149, 167, 206 , 223	223 : 4
SIM Group 2:	9,5 to 10,8		
BBP	9,8	91,1, 149, 206	206 : 27
DEHP	10,4	149, 167, 279	279 : 10
SIM Group 3:	10,9 to End		
DnOP	11,2	149, 167, 261, 279	279 : 12
DINP	11,6	149, 167, 293	293 : 26
DIDP	12,1	149, 167, 307	307 : 27

F.4.6 Analysis

Prepare at least four calibration standards for each of the six phthalates of interest along with one calibration blank (cyclohexane). Each calibration standard shall have an internal standard concentration of 20 µg/ml (for 20:1 split mode samples) or 1 µg/ml (for splitless mode samples).

Analyse standards and blank with the GC-MS in both full-scan mode and SIM. Qualitatively analyse the results to ensure proper retention times and no contamination.

Integrate the peak area from valley to valley (approximate retention times are listed in Table F.2 for each standard. Compounds monitored in SIM Groups 1 and 2 shall be quantified by extracted ion chromatograph (EIC) or the ion chromatograph (suggested quantitative ions are in bold). The phthalates monitored in SIM Group 3 overlap and shall be quantified using their quantitative ions (again, in bold).

Construct a calibration curve using normalized phthalate responses. The normalized phthalate response (Pht_n) shall be calculated by:

$$Pht_n = \frac{Pht}{ISTD} \quad (F.1)$$

where

Pht is the phthalate response;

Pht_n is the normalized phthalate response;

$ISTD$ is the internal standard response.

Analyse a CRM to ensure a proper calibration. The analysed value shall be within ± 15 % of the expected value. If not, prepare new standards and re-run calibration.

Analyse the LRB and all samples.

Qualitatively evaluate full-scan results. Phthalates of interest shall be identified by matching with retention times and mass spectra of standards. Potential non-regulated chemicals, which may have mass ions of interest, and/or similar retention times and shall be qualitatively eliminated from

consideration based on their spectra and chromatograms include, but are not limited to, linear C9 and C10 phthalates, and terephthalates.

Quantitatively evaluate the SIM results. If the results are out of the calibration range, perform another dilution to get results in calibration range). If the signal is near or below the limit of detection, change the inlet mode to splitless injection (when using splitless injection, samples and calibration curves should contain an internal standard concentration of 1 µg/ml). If the signal is still below quantitation limits when using a splitless injection, the injection amount shall be doubled from 1 µl to 2 µl (calculations shall be adjusted accordingly).

F.4.7 Calculations and results

Results shall be reported as percentage phthalate:

$$\%Phthalate(w/w) = \frac{C \times V \times D}{1000 \times W} \times 100 \% \tag{F.2}$$

where

- C* is the concentration of phthalate in GC-MS sample (in µg/ml);
- V* is the total volume of THF and hexanes added during phthalate extraction method (F4.4);
- D* is the dilution factor of phthalate extraction method (F4.4);
- W* is the weight of sample collected (in mg).

Repeat the calculation for each phthalate present in sample.

EXAMPLE: A small, homogeneous PVC sample was cut into small pieces and ground to a powder. 50 mg of sample powder was dissolved in 5 ml THF; next 10 ml of hexane were added (total of 15 ml of solvent). Of the filtered solution, 0,3 ml was combined with 0,2 ml of internal standard and diluted with cyclohexane to 1,5 ml for GC-MS analysis (5 times dilution factor). The GC-MS results found 200 µg/ml of DEHP and 50 µg/ml of DINP. Therefore, the sample contained 30 % DEHP and 7,5 % DINP by weight. A summary of the calculation can be found in Table F.3 below.

Table F.3 — Example Calculations

<i>W</i>	<i>C</i>	<i>V</i>	<i>D</i>	$[(C \times V \times D) / (W \times 1\ 000)] \times 100 \%$
Sample Weight	Measured DEHP Concentration by GC-MS	Original Volume	Dilution Factor	% DEHP (w/w)
50 mg	200 µg/ml	15 ml	1,5 ml / 0,3 ml = 5	$[(200 \mu\text{g/ml} \times 15 \text{ ml} \times 5) / (50 \text{ mg} \times 1\ 000 \mu\text{g/mg})] \times 100 \% = 30 \%$
	Measured DINP Concentration by GC-MS			% DINP (w/w)
	50 µg/ml			$[(50 \mu\text{g/ml} \times 15 \text{ ml} \times 5) / (50 \text{ mg} \times 1\ 000 \mu\text{g/mg})] \times 100 \% = 7,5 \%$

Annex G (normative)

Information to be provided in the Supplier declaration on raw materials or constituent products

G.1 Information to be provided with the supplier declaration on dangerous substances in raw materials or constituent products

The purpose of the supplier declaration is to provide information on the content of dangerous substances and groups of them, as listed in Table 4 of Clause 4.2, in any raw materials or constituent product implemented in the manufacturing of floor covering products. This supplier declaration shall, therefore, provide all information necessary for the provisions stated in Clause 4.2.

The declaration of the supplier of any raw material or constituent product concerning the content of dangerous substances listed in Table 4 of Clause 4.2 shall contain the following information:

- the raw material or constituent product name for which this supplier declaration is drafted;
- the type of raw material/ constituent product (e.g. adhesive, paint) and its area of use;
- the name of the supplier;
- the list of substances, including their names and CAS numbers, as provided in Table 4. For each substance listed in Table 4 it shall be declared whether or not it is known to be present in the raw material or constituent product;
- for each substance listed in Table 4, which is known to be present in the raw material or constituent product, the concentration in mg/kg shall be declared;
- the name of the person authorized to sign the document;
- the date of signing the document;
- the signature of the contact person or person authorized to sign the document;

NOTE G.2 provides an example of how the supplier declaration can be structured.

For all dangerous substances listed in Table G.2 the supplier shall:

- 1) declare that the substance is not known to be present in the raw material or constituent product, by indicating 'No' in column 3 of Table G.2;

or;

- 2) if the substance is known to be present in the raw material or constituent product, declare in mg/kg the concentration of the substance in the raw material or constituent product supplied, by indicating 'Yes' in column 4 and provide the concentration of the substance into column 5 of Table G.2.

G.2 Supplier declaration on the content of dangerous substances in raw materials or constituent products

This document shall be completed and signed by an authorized person representing the supplier of the raw material or constituent products based to the best of his/her knowledge at the time of delivery, and also based on tests and/or declarations from their raw material suppliers, with reservations for new developments and new knowledge.

Table G.1 — General information about the supplier and the raw material or constituent product

Supplier name:
Raw material or constituent product name:
Type of raw material/ constituent product (e.g. adhesive, paint) and its area of use:

Table G.2 — List of dangerous substances

Substance	CAS number	Known to be present in product		Concentration in mg/kg ^a
		NO	YES ^a	
Pentachlorophenol (PCP)	87-86-5			
Phthalates:				
Benzyl butyl phthalate (BBP)	85-68-7			
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7			
Dibutylphthalate (DBP)	84-74-2			
Short chain chlorinated paraffins (C10-13, SCCP)	85535-84-8			
Medium chain chlorinated paraffins (C14-17, MCCP)	85535-85-9			
Pentabromodiphenylether	32534-81-9			
Octabromodiphenylether	32536-52-0			
Decabromodiphenylether	1163-19-5			
Cadmium	7440-43-9			
Lead	7439-92-1			
PAH (polycyclic aromatic hydrocarbons):				
Benzo[a]pyrene	50-32-8			
Benzo[e]pyrene	192-97-2			
Dibenzo[a,h]anthracene	53-70-3			
Benzo[b]fluoranthene	205-99-2			

Substance	CAS number	Known to be present in product		Concentration in mg/kg ^a
		NO	YES ^a	
Benzo[k]fluoranthene	205-82-3			
Benzo[j]fluoranthene	207-08-9			
Chrysene	218-01-9			
Dibenzo[a,h]anthracene	53-70-3			
Organostannic (organotin) compounds:				
Tri-substituted organostannic compounds	-			
Dibutyltin (DBT)	1002-53-5			
Diocetyl tin (DOT)	15231-44-4			
Azo-colorants which can form the carcinogenic amines listed in Annex H	-			
Perfluoro-octanoic acid (PFOA), salts and esters of PFOA	335-67-1			
Dimethylfumarate	624-49-7			

^a In the case the substance is known to be present, its concentration (in mg/kg) has to be provided

Table G.3 — Example of signature of raw material or constituent product supplier:

Date	Name of supplier
Signature by authorized representative of the supplier	
Name of authorized representative of the supplier	Contact information

Annex H
(normative)

Content of Azocolourants – Restricted Aromatic Amines

Azo-colorants (also referred to as Azodyes) may release one or more of the restricted aromatic amines, listed in Table H.1, by reductive cleavage of one or more azogroups.

Table H.1 — Restricted Aromatic Amines

Restricted Aromatic Amine	CAS-number
2-naphthylamine	91-59-8
Benzidine	92-87-5
4-aminobiphenyl	92-67-1
4-chloro-o-toluidine	95-69-2
o-aminoazotoluene	97-56-3
5-nitro-o-toluidine	99-55-8
4-chloroaniline	106-47-8
4-methoxy-m-phenylenediamine	615-05-4
4,4'-diaminodiphenylmethane	101-77-9
3,3'-dichlorobenzidine	91-94-1
3,3'-dimethoxybenzidine	119-90-4
3,3'-dimethylbenzidine	119-93-7
4,4'-methylenedi-o-toluidine	838-88-0
p-cresidine	120-71-8
4,4'-methylene-bis-(2-chloro-aniline)	101-14-4
4,4'-oxydianiline	101-80-4
4,4'-thiodianiline	139-65-1
o-toluidine	95-53-4
4-methyl-m-phenylenediamine	95-80-7
2,4,5-trimethylaniline	137-17-7
4-aminoazobenzene	60-09-3
o-anisidine	90-04-0
2,4-xylidine	95-68-1
2,6-xylidine	87-62-7
Restricted Azodyes	
Navy Blue 018112: Component 1 Component 2	118685-33-9






Annex I
(normative)

List of pictograms used for an alternative way of expressing the performance of certain characteristics

When decided to express the performance of certain characteristics of the floor coverings on an alternative, simplified way, using graphic symbols but yet given in clear and explicit manner, the pictogram(s), as listed in Table I.1, for the respective characteristic of the floor coverings, shall be used.

NOTE The referenced way of expressing the performance of characteristics, is given in the corresponding subclause in Clause 4.

Table I.1 — Pictograms for alternative way of expressing performance of certain characteristics


Characteristic	Corresponding subclauses	The way of expressing the performance	
		Referenced	Pictogram
Reaction to fire, class E _{FL}	4.1.2	E _{FL}	
Reaction to fire, class F _{FL}	4.1.3.1	F _{FL}	
Reaction to fire, for all classes with exception of E _{FL} and F _{FL} , with testing	4.1.3.1	The class, as referenced in EN 13501-1, abbreviated here as 'abc'	Generic pictogram ^a 
	4.1.3.2.2, 4.1.3.1 a) 4.1.3.2.3, 4.1.3.1. b)	The type of substrate, abbreviated here with 'y', with the options for 'y' being — NCS — CS The method of affixation, abbreviated here with 'x', with the options for 'x' being — G — L	
Content of specific dangerous substances	4.2.2.2	Compliant, not actively added	
Content of specific dangerous substances	4.2.2.3.2 or 4.2.2.3.3	Compliant, actively added	

Characteristic	Corresponding subclauses	The way of expressing the performance	
		Referenced	Pictogram
Emission of formaldehyde (HCHO)	4.3.3.1 and 4.3.3.2 a) or b)	E1	
Emission of formaldehyde (HCHO)	4.3.3.1 and 4.3.3.2 a) or b)	E2	
Watertightness	4.4	Compliant	
Slip resistance $\mu < 0,30$	4.5 a)	$\mu < 0,30$	
Slip resistance $\mu \geq 0,30$	4.5 b)	$\mu \geq 0,30$	
Electrical behaviour - Antistatic	4.6.1 Table 6	Body voltage $\leq 2,0 \text{ kV} $, or Antistatic	
Electrical behaviour - Static dissipative	4.6.1 Table 6	Vertical resistance $\leq 1,0 \times 10^9 \Omega$, or Static dissipative	
Electrical behaviour - Conductive	4.6.1 Table 6	Vertical resistance $\leq 1,0 \times 10^6 \Omega$, or Conductive	

^a Please find in Table I.2 below two examples on how to prepare the specific pictograms.

Table I.2 — Examples reaction to fire, for all classes with exception of E_{FL} and F_{FL}

Characteristic	Corresponding subclauses	The way of expressing the performance	
Reaction to fire, for all classes with exception of E _{FL} and F _{FL} , with testing	4.1.3.2.2, 4.1.3.1 a) 4.1.3.2.3, 4.1.3.1. b)	Example 1: Fire class: 'abc' = C _{FL} -S1 Type of substrate 'y' = NCS Method of affixation 'x' = L	Example 1:

Characteristic	Corresponding subclauses	The way of expressing the performance	
Reaction to fire, for all classes with exception of E _{FL} and F _{FL} , with testing	4.1.3.2.2, 4.1.3.1 a) 4.1.3.2.3, 4.1.3.1. b)	Example 2: Fire class: 'abc' = C _{FL} -S1 Type of substrate 'y' = CS Method of fixation 'x' = F	Example 2 

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Annex ZA
(informative)

Relationship of this European Standard with Regulation (EU) No.305/2011

(When applying this standard as a harmonized standard under Regulation (EU) No. 305/2011, manufacturers and Member States are obliged by this regulation to use this Annex)

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under standardization request M/119, as amended, given to CEN and CENELEC by the European Commission (EC) and the European Free Trade Association (EFTA).

When this European Standard is cited in the Official Journal of the European Union (OJEU), under Regulation (EU) No 305/2011, it shall be possible to use it as a basis for the establishment of the Declaration of Performance (DoP) and the CE marking, from the date of the beginning of the co-existence period as specified in the OJEU.

Regulation (EU) No 305/2011, as amended, contains provisions for the DoP and the CE marking.

Table ZA.1 — Relevant clauses for resilient, textile, laminate and modular multilayer floor coverings

Product:	a. Resilient floor coverings, excluding loose-laid mats (R);		
	b. Textile floor coverings, excluding loose-laid (barrier) mats, runners and rugs; (T)		
Intended use	c. Laminate floor coverings (L); and		
	d. Modular multilayer floor coverings (M).		
Essential Characteristics	Clauses of this European Standard related to essential characteristics	Classes and/or threshold levels	Notes
Reaction to fire, assessed			
— without testing	4.1.2	E _{FL}	Expressed as specified in 4.1.2
— by testing	4.1.3.1	A _{FL} to F _{FL}	Expressed as specified in 4.1.3.1
Content of specific dangerous substances, assessed			
— without calculation/testing, not actively added	4.2.2.2	-	Expressed as specified in 4.2.2.2
— by calculation, actively added	4.2.2.3.2	≤ (threshold level) ^a	Expressed as specified in 4.2.2.3.2, c)1)
		> (threshold level) ^a	Expressed as specified in 4.2.2.3.2, c)2)
— by testing, actively added	4.2.2.3.3	≤ (threshold level) ^a	Expressed as specified in 4.2.2.3.3, 1)

Product:	a. Resilient floor coverings, excluding loose-laid mats (R);		
	b. Textile floor coverings, excluding loose-laid (barrier) mats, runners and rugs; (T)		
Intended use	c. Laminate floor coverings (L); and		
	d. Modular multilayer floor coverings (M).		
Internal use			
Essential Characteristics	Clauses of this European Standard related to essential characteristics	Classes and threshold levels	Notes
		> (threshold level) ^a	Expressed as specified in 4.2.2.3.3, 2)
Emission of volatile organic compounds (VOC) with exception of formaldehyde, assessed			
— by testing	4.3.2	-	Expressed as specified in 4.3.2
Emissions of formaldehyde (HCHO), assessed			
— without testing	4.3.3.1	E1	Expressed as specified in 4.3.3.1
— by testing	4.3.3.2	E1, E2	Expressed as specified in 4.3.3.2
Water tightness	4.4	no sign of penetrating water	Expressed as specified in 4.4
Slip resistance, as:	4.5	< 0,30 and ≥ 0,30	Expressed as specified in 4.5
— dynamic coefficient of friction, μ			
Electrical behaviour, assesses as			
— antistatic	4.6.1, Table 6	$\leq 2,0 $ kV	Expressed as specified in 4.6.1, Table 6
— static dissipative	4.6.1, Table 6	$\leq 1,0 \times 10^9 \Omega$	Expressed as specified in 4.6.1, Table 6
— conductive	4.6.1, Table 6	$\leq 1,0 \times 10^6 \Omega$	Expressed as specified in 4.6.1, Table 6
Thermal resistance (thermal conductivity), assessed			
— by calculation	4.7.1, a)		Expressed as specified in 4.7.2, a)
— by testing	4.7.1, b)		Expressed as specified in 4.7.2, b)
^a Threshold level for the respective dangerous substance, listed in Table 4.			

ZA.2 System of Assessment and Verification of Constancy of Performance (AVCP)

The AVCP systems of resilient textile, laminate and modular multilayer floor coverings indicated in Table ZA.1, can be found in the EC legal act(s) adopted by the EC: EC Decision 97/808/EC of 20 November 1997 (OJ L 331 of 3.12.1997), as amended by decisions 1999/453/EC of 18 June 1999 (OJ L 178 of 14.7.1999), 2001/596/EC of 8 January 2001 (OJ L 209 of 2.8.2001) and 2006/194/EC of 1 March 2006 (OJ L 66 of 8.3.2006)

Micro-enterprises are allowed to treat products under AVCP system 5 covered by this standard in accordance with AVCP system 4, applying this simplified procedure with its conditions, as foreseen in Article 37 of Regulation (EU) No.305/2011.

ZA.3 Assignment of AVCP tasks

The AVCP systems of resilient, textile, laminate and modular multilayer floor coverings, as provided in Table ZA.1 is defined in Tables ZA.3.1 to ZA.3.3 resulting from application of the clauses of this European Standard. The content of the tasks assigned to the notified body shall be limited to those essential characteristics, if any, as provided for in Annex III of the relevant standardization request and to those that the manufacturer intends to declare.

Taking into account the AVCP systems defined for the products and the intended uses the following tasks are to be undertaken by the manufacturer and the notified body respectively for the assessment and verification of the constancy of performance of the product.

Table ZA.3.1 — Assignment of AVCP tasks for resilient, textile, laminate and modular multilayer floor coverings under system 1

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	5.3
	Further testing of samples taken at the manufacturing plant by the manufacturer in accordance with the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	5.3
Tasks for the notified product certification body	An assessment of the performance of the construction product carried out on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Table ZA.1 relevant for the intended use which are declared, namely: <ul style="list-style-type: none"> - Reaction to fire, for classes (A1_{FL}, A2_{FL}, B_{FL}, C_{FL})* - Emission of formaldehyde 	5.2
	Initial inspection of manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely: <ul style="list-style-type: none"> - Reaction to fire, for classes (A1_{FL}, A2_{FL}, B_{FL}, C_{FL})*. Documentation of the FPC.	5.3.4
	Continuing surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely: <ul style="list-style-type: none"> - Reaction to fire, for classes (A1_{FL}, A2_{FL}, B_{FL}, C_{FL})*. Documentation of FPC.	5.3.5
NOTE System 1: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.2.			
* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of flame retardants or a limiting of organic material).			

Table ZA.3.2 — Assignment of AVCP tasks for resilient, textile, laminate and modular multilayer floor coverings under system 3

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	5.3
Tasks for a notified laboratory	The notified laboratory shall assess the performance on the basis of testing (based on sampling carried out by the manufacturer), calculation, tabulated values or descriptive documentation of the construction product.	Essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely: - Reaction to fire, for classes (A _{1FL} , A _{2FL} , B _{FL} and C _{FL})** and (D _{FL} , E _{FL} and F _{FL}) - Emission of formaldehyde.	5.2
NOTE System 3: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.4. ** Products/materials not covered by footnote (*) in Table ZA.3.1 or footnote (***) in Table ZA.3.3.			

Table ZA.3.3 — Assignment of AVCP tasks for resilient, textile, laminate and modular multilayer floor coverings under system 4

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	An assessment of the performance of the construction product on the basis of testing, calculation, tabulated values or descriptive documentation of that product	Essential characteristics of Table ZA.1 relevant for the intended use which are declared, including: - Reaction to fire, for classes (A _{1FL} to F _{FL})***	5.2
	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use	5.3
NOTE System 4: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.5. *** Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of Classes A1/A _{1FL} according to Commission Decision 96/603/EC (OJ L 267, 19.10.1996)).			

Bibliography

- [1] https://ec.europa.eu/growth/tools-databases/cp-ds_en
- [2] Commission Delegated Regulation (EU) 2016/364 on the classification of the reaction to fire performance of construction products
- [3] REGULATION (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP)
- [4] REGULATION (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
- [5] COMMISSION DECISION of 5 June 2014 establishing the ecological criteria for the award of the EU Ecolabel for textile products (notified under document C(2014) 3677) (2014/350/EU)
- [6] EN ISO 9001, *Quality management systems — Requirements (ISO 9001)*

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