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European Assessment Document for

Jointless, ecological flowing screed made of renewable and sustainable raw materials

This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) No 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

Contents

1 SCOPE OF THE EAD

1.1 Description of the construction product

The construction product is a jointless, ecological flowing screed made of renewable and sustainable raw materials (in the following referred to as “flowing screed”) and is composed of the following components:

- Primer based on acrylic aqueous dispersion,
- Flowing screed based on alkyd resin – polyurethane dispersion,
- Sealant topcoat based on polyurethane dispersion,
- Sustainable filling material cork granules, nutshell granules, corncob meal, quartz sand or recycled rubber granules.

The flowing screed is not fully covered by the following harmonised technical specification: EN 13813[1]. The harmonised standard does not cover flowing screeds containing organic filling materials in general as well as BWR 3 "Hygiene, health and the environment: release of dangerous substances into (indoor) air" in particular.

The flowing screed is a filled synthetic resin floor screed with binder made of polyurethane resin. Thus, essential characteristics for cementitious, calcium sulphate, magnesite or mastic asphalt screeds according to EN 13813 do not apply. These include "resistance of indentation", "pH value", "water vapour permeability" and "surface hardness". E.g., as the product consists of primer, screed and topcoat it is, therefore, not permeable. As in practice the product behaves similar as a resilient flooring the surface hardness does not play a role, The flowing screed does not contain or release corrosive substances. The essential characteristics "slip resistance" and "crack bridging properties" are not covered by EN 13813.

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer’s instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer’s stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

1 All undated references to standards in this EAD are to be understood as references to the dated versions listed in chapter 4.

1.2 Information on the intended uses of the construction product

1.2.1 Intended uses

This EAD covers the following intended uses as floor covering in dry indoor areas of:

- residential and commercial buildings and
- new or retrofit buildings.

The flowing screed is intended to be applied on a mineral subsurface and to be used as an open flooring system (final surface) or to be covered with an additional flooring.

The flowing screed may be combined with an underfloor heating system which is not part of this EAD.

1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the flowing screed for the intended use of 25 years when installed in the works (provided that the flowing screed is subject to appropriate installation (see 1.1)) These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product, the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works[2].

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

2 The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 2.1.1 shows how the performance of the flowing screed is assessed in relation to the essential characteristics.

Table 2.1.1 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 2: Safety in case of fire			
1	Reaction to fire	2.2.1	Class
Basic Works Requirement 3: Hygiene, health and the environment			
2	Content emission and/or release of dangerous substances	2.2.2	Description, level
Basic Works Requirement 4: Safety and accessibility in use			
3	Compressive strength	2.2.3	Class
4	Flexural strength	2.2.4	Class
5	Wear resistance	2.2.5	Class
6	Impact resistance	EN 13813, clause 5.2.13	Level
7	Dimensional stability (shrinkage and swelling)	2.2.6	Level
8	Modulus of elasticity in flexure	EN 13813, clause 5.2.11	Class
9	Water permeability	EN 13813, clause 5.3.8	Level
10	Resistance to rolling wheel for screed material intended to be covered with floor covering	EN 13813, clause 5.2.6	Class
11	Bond strength	2.2.7	Class
12	Crack bridging	2.2.8	Level
13	Anti-slip properties	2.2.9	Level
14	Chemical resistance	2.2.10	Description
Basic Works Requirement 5: Protection against noise			
15	Impact sound insulation	EN 13813, clause 5.3.9	Level
16	Sound absorption	EN 13813, clause 5.3.10	Level
Basic Works Requirement 6: Energy economy and heat retention			
17	Thermal conductivity	2.2.11	Level

2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

This chapter is intended to provide instructions for TABs. Therefore, the use of wordings such as “shall be stated in the ETA” or “it has to be given in the ETA” shall be understood only as such instructions for TABs on how results of assessments shall be presented in the ETA. Such wordings do not impose any obligations for the manufacturer and the TAB shall not carry out the assessment of the performance in relation to a given essential characteristic when the manufacturer does not wish to declare this performance in the Declaration of Performance.

2.2.1 Reaction to fire

The flowing screed shall be tested, using the method(s) relevant for the corresponding reaction to fire class according to EN 13501-1. The flowing screed shall be classified according to Commission Delegated Regulation (EU) No 2016/364 in connection with EN 13501-1.

The provisions given in Annex A shall be considered within the tests as well as for the extended application (EXAP) of test results.

The reaction to fire class and the condition for the extended application shall be given in the ETA.

2.2.2 Content, emission and/or release of dangerous substances

The performance of the flowing screed related to the emissions and/or release and, where appropriate, the content of dangerous substances will be assessed on the basis of the information provided by the manufacturer[3] after identifying the release scenarios taking into account the intended use of the product and the Member States where the manufacturer intends his product to be made available on the market.

The identified intended release scenarios for this product and intended use with respect to dangerous substances are:

IA1: Product with direct contact to indoor air.

IA2: Product with indirect contact to indoor air (e.g., covered products) but possible impact on indoor air.

2.2.2.1 SVOC and VOC

For the intended uses covered by the release scenarios IA1 and IA2 semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) shall be determined in accordance with EN 16516. The loading factor to be used for emission testing shall be 0,4 m^2/m^3.

Sampling, transport and storage of the specimen proceeds essentially as described in EN ISO 16000-11. Specimens shall be taken as close as possible to the time of production.

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[3] The manufacturer may be asked to provide to the TAB the REACH related information which shall accompany the DoP with (cf. Article 6(5) of Regulation (EU) No 305/2011).

The manufacturer is **not** obliged:
- to provide the chemical constitution and composition of the product (or of constituents of the product) to the TAB, or
- to provide a written declaration to the TAB stating whether the product (or constituents of the product) contain(s) substances which are classified as dangerous in accordance with Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the SGDS, taking into account the installation conditions of the construction product and the release scenarios resulting from there.

Any information provided by the manufacturer regarding the chemical composition of the products may not be distributed to EOTA or to TABs.

The following product parameters shall be taken into account when testing the flowing screed:

- Each flowing screed with a different composition (not regarding inorganic filler material) shall be tested separately.
- If the amount of inorganic filler material is varied, the flowing screed containing the lowest amount of filler material shall be tested.
- The maximum allowed wet application amount and the shortest allowed drying time of the screed layers shall be considered.
- In case of doubt, the tests shall be performed separately on specimens with different specifications for each characteristic.

Once the test specimen has been produced, as described above, it shall immediately be placed in the emission test chamber. This time is considered the starting time of the emission test.

The test results shall be reported for the relevant parameters (e.g., chamber size, temperature and relative humidity, air exchange rate, loading factor, size of test specimen, conditioning, production date, arrival date, test period, specimen preparation procedure, test result) after 3 and/or 28 days testing.

The product performance shall be expressed in [µg/m³ or mg/m³] and given in the ETA.

2.2.2.2 Polycyclic aromatic hydrocarbons (PAH) content

If recycled rubber containing polycyclic aromatic hydrocarbons (PAH) from extender oils or carbon black is used, the additional assessment method for the content of specific organic compounds (PAH and B[a]P) shall be based on the raw materials according to the testing method described in Annex B (based on the method for the determination of PAH in polymers published by AfPS (Ausschuss für Produktsicherheit).

If the recycled rubber is completely and impermeably enclosed by the flowing screed and the final sealant topcoat, PAH content shall not be determined.

The concentration of single PAH and/or the sum of PAH in mg/kg shall be given in the ETA.

2.2.2.3 N-Nitrosamine content

If recycled rubber is used or nitrosamine forming agents are added to the product the additional assessment method for the content of nitrosamines shall be based on the raw materials following the method published by DIK (Deutsches Institut für Kautschuktechnologie e.V. in Hannover, Germany).

If the recycled rubber or nitrosamine forming agent is completely and impermeably enclosed by the flowing screed and the final sealant topcoat, N-Nitrosamine content may not be determined.

The content of nitrosamines shall be determined as follows:

The specimen to be tested shall be a composite, taking at least four incremental specimens collected from different areas of a batch to represent the raw material as good as possible.

Immediately before analysis, the raw material rubber specimen shall be cut into pieces of about 1 mm³ particle size. About 2 g of the sample shall be transferred to a 30 ml extraction thimble used for Soxhlet-extraction. Subsequent, extraction shall be performed for 24 hours at 65 ± 3 °C using 75 ml *N*-nitrosamine-free methanol with 0,1 wt% ascorbic acid in a 100 ml round bottom flask containing two boiling stones made of glass.

After cooling down, 2 ml of *N*-nitrosodiisopropylamine solution (NDiPA, approximately 0,2 µg/ml) shall be added as internal standard. Following, the extract shall be evaporated with approximately 3,5 ml/min to about 5 ml using a rotary evaporator with a 40 ± 2 °C water bath and 220 ± 10 mbar.

The resulting pre-concentrate shall be transferred to a test tube using a Pasteur pipette. The round bottom flask shall be rinsed twice with 1 ml *N*-nitrosamine-free methanol and the rinse solution shall be mixed with the preconcentrate.

By treatment with a nitrogen stream (0,05 ml/min) the solution shall be adjusted to 2 ml. Extracts with high oil content need chromatographic purification. The sample shall be analysed within 48 hours using packed columns.

The analysis of extracted *N*-nitrosamines shall be achieved by gas chromatography using a thermal energy analyzer (TEA) as detector. The conditions for gas chromatographic analysis are shown in table 2.2.2.3.1.

Table 2.2.2.3.1 Conditions for gas chromatographic analysis of *N*-nitrosamines

Nitrosamine	NDMA, NDEA, NDPA, NDBA, NPIP, NPYR, NMOR, NDiPA	NMPA, NEPA
Column	Silanzed glas column (l = 2 m, ID = 1 mm)	
Stationary phase	10 % Carbowax 20 M, 2 % KOH on Chromosorb HAW 80/100 mesh	10 % OV 101 on Chromosorb HAW 80/100 mesh
Carrier gas	Helium	
Carrier gas flow	30 ml/min	
Sample injection	On column	
Injector temperature	200 °C	
Temperature program	125 °C 2 min isothermal 125 – 175 °C (10 °C/min) 175 °C 5 min isothermal	100 °C – 200 °C (10 °C/min)
Sample volume	5 µL	

As published in Kautschuk Gummi Kunststoffe; 44, 1991, pp. 514-21, R. Liekefeld, R. H. Schuster, G. Wünsch

The N-nitrosamines to be determined are:

- N-nitrosodibutylamine (NDBA)
- N-nitrosodiethylamine (NDEA)
- N-nitrosodimethylamine (NDMA)
- N-nitrosodipropylamine (NDPA)
- N-nitrosomethylphenylamine (NMPA)
- N-nitrosoethylphenylamine (NEPA)
- N-nitrosomorpholine (NMOR)
- N-nitrosopiperidine (NPIP)
- N-nitrosopyrrolidine (NPYR)

The content of the N-nitrosamines shall be given in the ETA [µg/kg] on the basis of the specific level.

2.2.3 Compressive strength

The compressive strength shall be determined in accordance with EN 13892-2. The compressive strength shall be designated by a “C” (for Compression) followed by the compressive strength in N/mm^2. The class of the compressive strength according to EN 13813, clause 5.2.1, shall be given in the ETA.

2.2.4 Flexural strength

The flexural strength shall be determined in accordance with EN ISO 178 for screed materials intended to be applied at a thickness of 5 mm or less, or with EN 13892-2 for other screed materials. The flexural strength shall be designated with “F” (for Flexural) followed by the flexural strength in N/mm^2. The class of the flexural strength according to EN 13813, clause 5.2.2, shall be given in the ETA.

2.2.5 Wear resistance

The wear resistance for flowing screed, to be used as wearing surfaces, shall be determined in accordance with EN 13892-4 (wear resistance BCA) or with EN 13892-5 (wear resistance to rolling wheel). Both methods are considered equivalent. The wear resistance BCA is designated by an “AR” (for Abrasion Resistance) followed by the maximum wear depth in 100 µm. The wear resistance to rolling wheel is designated by “RWA” (for Rolling Wheel Abrasion) followed by the abrasion quantity in cm^3. The wear resistance shall be classified according to EN 13813, clause 5.2.3, and shall be given in the ETA.

2.2.6 Dimensional stability (shrinkage and swelling)

The dimensional stability shall be determined and designated by “DL” (for dimensional stability) followed by the change of length in µm/m. The dimensional stability shall be determined in accordance with EN 13892-9 for 3 specimens (according to EN 13892-1) and shall be given in the ETA.

2.2.7 Bond strength

The bond strength shall be determined in accordance with EN 13892-8. Bond strength shall be designated by "B" (for Bond) followed by the bond strength in N/mm² and shall be given in the ETA.

2.2.8 Crack bridging

The crack bridging shall be determined in accordance with EN 1062-7, method A. The static tension test according to EN 1062-7, Annex C.1, shall be conducted. According to EN 1062-7, clause 7.1, mortar shall be used as substrate. The flowing screed shall be applied on the substrate following manufacturer specifications according to EN 1062-7, clause 7.3. If the application is not specified by the manufacturer, the substrate shall be coated with the flowing screed until a layer thickness of 2,8 ± 0,2 mm after drying for 16 h is achieved. The crack width of the substrate at which first failure in the coating in the area of crack occurs shall be given in the ETA.

2.2.9 Anti-slip properties

The anti-slip properties of the flowing screed shall be determined according to the testing method described in Annex B of EN 16165. The ramp test value, α_{shod} rounded to the nearest 1° indicates the slip resistance. The slip resistance shall be given in the ETA.

2.2.10 Chemical resistance

The determination of the chemical resistance shall be performed according to EN 13529. The degree of degradation shall be determined according to clause 6.4, changes in appearance shall be given in the ETA indicating the test liquids (see Annex A of EN 13529) and the thickness of the flowing screed in µm.

2.2.11 Thermal conductivity

The thermal conductivity of the flowing screed at a reference mean temperature of 10 °C after storing the specimen in a climate of (23 ± 2) °C and (50 ± 5) % relative humidity until constant mass is achieved, is determined with a guarded hot plate in accordance with EN 12664. Concerning the influence of moisture, clause 7.2.3.3.3 of EN 12664 shall be taken into account.

At least 3 measurements with test specimens of at least 200 mm x 200 mm shall be performed.

The thermal conductivity of the flowing screed shall be given in the ETA in levels with steps of 0,01 W/(m·K).

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 System(s) of assessment and verification of constancy of performance to be applied

For the products covered by this EAD the applicable European legal act is Commission Decision 97/808/EC, as amended by Commission Decisions 1999/453/EC, 2001/596/EC and 2006/190/EC.

For all uses as described in clause 1.2.1 of this EAD the applicable AVCP systems are 1, 3 or 4 depending on the conditions defined in the said Decision related to the reaction to fire classes.

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 3.2.1.

Table 3.2.1 Control plan for the manufacturer; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
Basic Works Requirement 2: Safety in case of fire					
1	Reaction to fire *	2.2.1	According to control plan	At least 1 (depending on applied test method)	With production start and: • EN ISO 11925-2 every three months • EN ISO 9239-1, EN ISO 1182 and EN ISO 1716 once a year*
2	Constancy of the composition of the screed *	According to control plan	According to control plan	-	Continuously during the production process
Basic Works Requirement 3: Hygiene, health and the environment					
2	Content emission and/or release of dangerous substances	2.2.2	According to control plan	At least 1 (depending on applied test method)	With production start and yearly
Basic Works Requirement 4: Safety and accessibility in use					
3	Compressive strength	2.2.3	According to control plan	6	One test for every 1000 t, minimum once per year, maximum once per month
4	Flexural strength	2.2.4	According to control plan	3	One test for every 1000 t, minimum once per year, maximum once per month
5	Wear resistance	2.2.5	According to control plan	3	Regular intervals
6	Impact resistance	EN 13813, clause 5.2.13	According to control plan	3	Once per year for production under 2500 t per year, twice per year for production greater than 2500 t per year
7	Dimensional stability (shrinkage and swelling)	2.2.6	According to control plan	1	Once per year for production under 2500 t per year, twice per year for production greater than 2500 t per year
8	Modulus of elasticity in flexure	EN 13813, clause 5.2.11	According to control plan	3	Once per year for production under 2500 t per year, twice per year for production greater than 2500 t per year
9	Water permeability	EN 13813, clause 5.3.8	According to control plan	3	Once per year for production under 2500 t per year, twice per year for production greater than 2500 t per year

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
10	Resistance to rolling wheel for screed material intended to be covered with floor covering	EN 13813, clause 5. 2.6	According to control plan	3	Once per year for production under 2500 t per year, twice per year for production greater than 2500 t per year
11	Bond strength	2.2.7	According to control plan	3	Once per year for production under 2500 t per year, twice per year for production greater than 2500 t per year
12	Crack bridging	2.2.8	According to control plan	1	Once per year for production under 2500 t per year, twice per year for production greater than 2500 t per year
13	Anti-slip properties	2.2.9	According to control plan	1	Once per year for production under 2500 t per year, twice per year for production greater than 2500 t per year
14	Chemical resistance	2.2.10	According to control plan	1	Once per year for production under 2500 t per year, twice per year for production greater than 2500 t per year
Basic Works Requirement 5: Protection against noise					
15	Impact sound insulation	EN 13813, clause 5.3.9	According to control plan	1	Every 5 years
16	Sound absorption	EN 13813, clause 5.3.10	According to control plan	1	Every 5 years
Basic Works Requirement 6: Energy economy and heat retention					
17	Thermal conductivity	2.2.11	According to control plan	3	Every 5 years

* If the manufacturer voluntarily provides information on the composition of his product / product variants as basis for controlling the constancy of the composition of the flowing screed and the corresponding provisions in the control plan, the minimum frequency of direct tests within the framework of the factory production control with respect to reaction to fire can be reduced to every six months for tests according to EN ISO 11925-2 and once per two years for tests according to EN ISO 1182, EN ISO 1716 and EN ISO 9239-1.

3.3 Tasks of the notified body

The intervention of the notified body under AVCP system 1 is only necessary for 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 fire retardants or a limiting of organic material).

The cornerstones of the actions to be undertaken by the notified body of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 3.3.1.

Table 3.3.1 Control plan for the notified body; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control				
1	- Presence of suitable test equipment - Presence of trained personal - Presence of an appropriate quality assurance system and necessary stipulations taking especially account of a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification	Verification of the complete FPC as described in the control plan agreed between the TAB and the manufacturer	control plan	When starting the production process, after its modification and when starting a new production line
Continuous surveillance, assessment and evaluation of factory production control				
1	- Inspection of the factory, of the production of the product and the facilities for factory production control - Evaluation of the documents concerning the factory production control including the test results - Issuing a surveillance report taking especially account of a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification.	Verification of the controls carried out by the manufacturer as described in the control plan agreed between the TAB and the manufacturer with reference to the process and to the product as indicated in Table 3.2.1	control plan	Once a year

4 REFERENCE DOCUMENTS

EN 1062-7:2004	Paints and varnishes – Coating materials and coating systems for exterior masonry and concrete – Part 7: Determination of crack bridging properties
EN 12664:2001	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 with medium and low thermal resistance
EN 13238: 2010	Reaction to fire tests for building products – Conditioning procedures and general rules for selection of substrates
EN 13501-1:2018	Fire classification of construction products and building elements - Part 1: Classification using test data from fire reaction to fire tests
EN 13529:2003	Products and systems for the protection and repair of concrete structures – Test methods – Resistance to severe chemical attack
EN 13813:2002	Screed material and floor screeds - Screed material - Properties and requirements
EN 13892-1:2002	Methods of test for screed materials – Part 1: Sampling, making and curing specimens for testing
EN 13892-2:2002	Methods of test for screed materials – Part 2: Determination of flexural and compressive strength
EN 13892-4:2002	Methods of test for screed materials – Part 4: Determination of wear resistance-BCA
EN 13892-5:2003	Methods of test for screed materials – Part 5: Determination of wear resistance to rolling wheel of screed materials for wearing layer
EN 13892-8:2002	Methods of test for screed materials – Part 8: Determination of bond strength
EN 13892-9:2018	Methods of test for screed materials – Part 9: Dimensional stability
EN 16165:2021	Determination of slip resistance of pedestrian surfaces – Methods of evaluation
EN 16516:2017+A1:2020	Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air
EN ISO 178:2019	Plastics – Determination of flexural properties
EN ISO 1182:2020	Reaction to fire tests for products – Non-combustibility test
EN ISO 1716:2018	Reaction to fire tests for products – Determination of the gross heat of combustion (calorific value)
EN ISO 9239-1:2010	Reaction to fire tests for floorings – Part 1: Determination of the burning behaviour using a radiant heat source
EN ISO 11925-2:2020	Reaction to fire tests for building products - Part 2: Ignitability when subjected to direct impingement of flame
EN ISO 16000-11:2006	Indoor air - Part 11: Determination of the emission of volatile organic compounds from building products and furnishing - Sampling, storage of samples and preparation of test specimens
KGK, 1991 (see DIK)	Kautschuk Gummi Kunststoffe; 44, 1991, pp. 514-21, R. Liekefeld, R. H. Schuster, G. Wünsch
AfPS GS 2019:1	PAK – Testing and assessment of polycyclic aromatic hydrocarbons (PAH) in the course of awarding the GS mark (see https://www.baua.de/DE/Aufgaben/Geschaeftsfuehrung-von-Ausschuessen/AfPS/pdf/AfPS-GS-2019-01-PAK-EN.pdf?__blob=publicationFile&v=5/1000)

ANNEX A: MOUNTING AND FIXING PROVISIONS AS WELL AS EXTENDED APPLICATION RULES FOR THE TEST RESULTS OF THE RELEVANT REACTION TO FIRE TESTS

A.1 General

In addition to the provisions given in EN 13813 the following conditions and parameters shall be considered within testing due to the properties of the flowing screed.

A.2 Conditioning

All specimens shall be conditioned according to the provisions given in EN 13238, clause 4.3, before testing.

A.3 EN ISO 1182 and EN ISO 1716

These test methods are relevant for reaction to fire classes $A1_{fl}$ and/or $A2_{fl}$ according to EN 13501-1.

Dimensions of the test specimens

The dimension of the test specimens shall be as prescribed in the test standard.

Test specimens

The following parameters shall be considered when preparing the test specimens:

- Product variations of a product family (as defined by a certain combination of raw materials and other additives and produced in a certain production process)[4] and assembly – each product variation and assembly (e.g., number, type and dimensions of the various layers of the flowing screed) shall be considered within the tests.
- Flame retardants – each type with the lowest amount shall be considered within the tests.
- Density – the highest as well as the lowest density shall be tested.

The results of tests taking into consideration completely the aforementioned parameters are valid for:

- the same defined product-family and assembly as tested,
- any thickness,
- the tested density (if only one density was tested) or any density between those evaluated,
- the same type of flame retardants with equal or higher amount than tested.

A.4 EN ISO 9239-1 (Radiant panel test)

This test method is relevant for reaction to fire classes $A2_{fl}$ to D_{fl} according to EN 13501-1.

Dimensions of the test specimens

The dimension of the test specimens shall be as prescribed in the test standard.

Substrate

The test specimens shall be mounted onto an appropriate standard substrate according to EN 13238 representing a range of substrates in end use applications.
Other substrate (deviating from EN 13238) may also be used for testing purposes. However, in this case the test results will only valid for the practical use of the flowing screed on this specific substrate.

Test specimens

The following parameters shall be considered when preparing the test specimens:

4 To permit the TAB to apply EXAP-rules, sufficient information (e.g., on the basis of the composition of the products in questions) are to be made available to a TAB to determine which products or product variants shall be submitted to testing. Otherwise, test results apply for tested configuration(s) only.

- Product-variations of a product family (as defined by a certain combination of raw materials and other additives and produced in a certain production process)[4] and assembly – each product variation and assembly (e.g., number, type and dimensions of the various layers of the flowing screed) shall be considered within the tests.
- Colour – if there is a range of different colours but no difference in the chemical composition itself, tests with a light, a dark and a medium colour (e.g., White, Black and Red) shall be performed.
- Flame retardants – each type with the lowest amount shall be considered within the tests.
- Thickness – the highest as well as the lowest thickness of the flowing screed shall be tested.
- Density – the highest as well as the lowest density shall be tested.

The results of tests taking into consideration completely the aforementioned parameters are valid for:
- the same defined product-family and assembly as tested,
- the complete range of colours,
- the tested thickness (if only one thickness was tested) or any thickness between those evaluated,
- the tested density (if only one density was tested) or any density between those evaluated, and
- the same type of flame retardants with equal or higher amount than tested.

At least one test with any of the identified specimen configurations (based on the aforementioned parameters) shall be performed and two further tests with the most onerous specimen configuration as basis for the classification.

A.5 EN ISO 11925-2 (Small ignition source test)

This test method is relevant for reaction to fire classes B_{fl} to $E_{fl,}$ according to EN 13501-1.

Dimensions of the test specimens and preparation

The dimension of the test specimens shall be as prescribed in the test standard.

Substrate

The test specimens shall be mounted onto an appropriate standard substrate according to EN 13238 representing a range of substrates in end use applications.
Other substrate (deviating from EN 13238) may also be used for testing purposes. However, in this case the test results will only be valid for the practical use of the flowing screed on this specific substrate.

Test specimens

The following parameters shall be considered when preparing the test specimens:
- Product-variations of a product family (as defined by a certain combination of raw materials and other additives and produced in a certain production process)[4] and assembly – each product-variation and assembly (e.g., number, type and dimensions of the various layers of the flowing screed) shall be considered within the tests.
- Colour – if there is a range of different colours but no difference in the chemical composition itself, tests with a light, a dark and a medium colour (e.g., White, Black and Red) shall be performed.
- Thickness – the highest as well as the lowest thickness of the flooring shall be tested.
- Density – the highest as well as the lowest density shall be tested.
- Flame retardants – each type with the lowest amount shall be considered within the tests.

The results of tests taking into consideration completely the aforementioned parameters are valid for:
- the same defined product-family and assembly as tested,
- the complete range of colours,
- the tested thickness (if only one thickness was tested) or any thickness between those evaluated,
- the tested density (if only one density was tested) or any density between those evaluated, and
- the same type of flame retardants with equal or higher amount than tested.

The test specimens shall be tested with surface exposure. Additionally, for multilayer products greater than 10 mm thick, a set of tests shall be carried out with specimens turned 90 degrees on their vertical axis with edge exposure on each different layer.

At least two tests with any of the identified specimen configurations (based on the aforementioned parameters) shall be performed and four further tests with the most onerous specimen configuration as basis for the classification.

A.6 Further advices

Since there is a wide field of possible assemblies of the flowing screed and various parameters which may influence the reaction to fire performance, it is recommended to agree the necessary test programme between applicant, Technical Assessment Body in charge and involved test laboratory, where relevant, before commencing the reaction to fire tests.

ANNEX B: TESTING INSTRUCTIONS FOR THE DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) IN POLYMERS

B.1 Method

B.1.1 Brief description

B.1.1.1 Standard method

A representative partial specimen shall be taken of the recycled rubber granulate and mixed to represent a homogeneous mixture. Then, 500 mg of the sample shall be weighed into a container and extracted with 20 ml of toluene (to which an internal standard shall be added) for 1 h at 60 ± 2 °C in an ultrasonic bath. An aliquot shall be taken from the extract once it has cooled down to 23 ± 2 °C. In the case of polymers (e.g., plastics or rubber products) for which matrix problems arise throughout the analysis, an additional purification step shall be carried out using column chromatography. Quantification shall be performed on a gas chromatograph with a mass-selective detector (GC/MSD) using the SIM (selected ion monitoring) method.

B.1.1.2 Method for insufficient quantities

If the total mass of material to be analysed is less than 500 mg, the procedure shall be as follows: Identical materials from the product shall be combined and considered as one specimen. Additional product specimens must not be used.
If less than 50 mg of material is available for individual specimens, these shall not be tested.
If the available mass of chopped-up material is between 50 mg and 500 mg, the sample shall be tested according to B.1.1.1 and the quantity of toluene converted or adapted in proportion. The actual mass of the specimen shall be recorded in the test report accordingly.

B.1.2 Utensils

• Ultrasonic bath with a minimum power of 200 W and a bath area of 706 cm^2, corresponding to 0,28 W/cm^2, without a basket and with an internal or external thermostat
• Gas chromatograph with a mass-selective detector.

B.1.3 Chemicals and solutions

B.1.3.1 Chemicals

• Toluene

• Internal standards
  - Standard 1: Naphthalene-d8
  - Standard 2: Pyrene-d10 or anthracene-d10 or phenanthrene-d10
  - Standard 3: Benzo[a]pyrene-d12 or perylene-d12 or triphenylbenzene

At least three internal standards shall be used; these shall be added to the extraction solvent (toluene).
• External standard: 18 PAH substances according to the list under no. 2.3, as a mix or individually
• Petroleum ether
• Silica gel
• Sodium sulfate

B.1.3.2 Calibration solutions

The concentrations of the calibration solutions shall be chosen as follows: A three-point calibration covers a working range of 0,1 to 10 mg/kg in the specimens. This corresponds to a concentration range of 2,5 to 250 ng/ml in the calibration solutions.

B.2 Specimen preparation and execution

B.2.1 Extraction

500 mg of the specimen shall be placed in a vial. 20 ml of toluene, previously amended with internal standards, shall be added. The sample extraction shall take place for 1 h in the ultrasonic bath at a temperature of 60 ± 2 °C. For this purpose, the vials shall be placed or suspended in the ultrasonic bath without using a basket. The vials shall then be removed, the extract shall be left to cool to 23 ± 2 °C and shaken briefly, and an aliquot shall be taken from the extract and measured either directly or following dilution with toluene.

B.2.2 Column chromatography extraction step

For some polymers (e.g., plastic or rubber products), especially those that dissolve well in toluene under the described extraction conditions, it is necessary to clean the extract using adsorption chromatography on silica gel.
For this purpose, a clean-up column with “Hahnschliff” (“stopcock”) (approximately 220 mm x 15 mm) shall be filled with glass wool, 4 g of silica gel and 1 cm of sodium sulfate.
The silica gel shall be deactivated previously by adding 10% water (the corresponding volume of water shall be added to the silica gel in a glass flask, and the mixture shall be homogenised on the rotary evaporator for 1 h at standard pressure and room temperature. The silica gel shall then be stored in the sealed glass flask at room temperature).
The packed column shall be conditioned with 10 ml of petroleum ether.
The aliquot of toluene extract shall then be evaporated to a volume of approximately 1 ml on the rotary evaporator and poured into the column. The pointed flask shall be rinsed out with approximately 20 ml of eluent, which shall then also be transferred to the clean-up column. Elution shall be performed with 50 ml of petroleum ether. The collected petroleum ether eluate shall be amended with 1 ml of toluene and evaporated to a volume of approximately 1 ml under a nitrogen stream (e.g., on the TurboVap). This shall then be made up to a defined volume with toluene, and the extract shall be analysed by GC-MS.

B.2.3 Measuring procedure

The method of determination to be applied shall be gas chromatography with a mass-selective detector in the SIM mode.

The following 18 PAHs are to be determined:
• Naphthalene
• Acenaphthylene
• Acenaphthene
• Fluorene
• Phenanthrene
• Anthracene
• Fluoranthene
• Pyrene
• Chrysene
• Benzo[a]anthracene
• Benzo[b]fluoranthene
• Benzo[k]fluoranthene
• Benzo[j]fluoranthene
• Benzo[a]pyrene
• Benzo[e]pyrene
• Indeno[1,2,3-cd]pyrene
• Dibenzo[a,h]anthracene
• Benzo[g,h,i]perylene

B.2.3.1 Measuring conditions for gas chromatography

The equipment parameters (temperatures, columns, mass traces) may be chosen by the individual laboratory or are determined by the analytes.

B.2.3.2 Analysis

At least three internal standards shall be used. For these three standards, the internal standards and the correction ranges are defined as follows:

Parameter	**Internal standards with recommended reference**
• Naphthalene	Naphthalene-d8
• Acenaphthylene	Pyrene-d10 or anthracene-d10 or phenanthrene-d10
• Acenaphthene	Pyrene-d10 or anthracene-d10 or phenanthrene-d10
• Fluorene	Pyrene-d10 or anthracene-d10 or phenanthrene-d10
• Phenanthrene	Pyrene-d10 or anthracene-d10 or phenanthrene-d10
• Anthracene	Pyrene-d10 or anthracene-d10 or phenanthrene-d10
• Fluoranthene	Pyrene-d10 or anthracene-d10 or phenanthrene-d10
• Pyrene	Pyrene-d10 or anthracene-d10 or phenanthrene-d10
• Benzo[a]anthracene	Pyrene-d10 or anthracene-d10 or phenanthrene-d10
• Chrysene	Pyrene-d10 or anthracene-d10 or phenanthrene-d10
• Benzo[b]fluoranthene	Benzo[a]pyrene-d12 or perylene-d12 or triphenylbenzene
• Benzo[k]fluoranthene	Benzo[a]pyrene-d12 or perylene-d12 or triphenylbenzene
• Benzo[j]fluoranthene	Benzo[a]pyrene-d12 or perylene-d12 or triphenylbenzene
• Benzo[a]pyrene	Benzo[a]pyrene-d12 or perylene-d12 or triphenylbenzene
• Benzo[e]pyrene	Benzo[a]pyrene-d12 or perylene-d12 or triphenylbenzene
• Indeno[1,2,3-cd]pyrene	Benzo[a]pyrene-d12 or perylene-d12 or triphenylbenzene
• Dibenzo[a,h]anthracene	Benzo[a]pyrene-d12 or perylene-d12 or triphenylbenzene
• Benzo[g,h,i]perylene	Benzo[a]pyrene-d12 or perylene-d12 or triphenylbenzene

External calibration: for each individual PAH, at least a three-point calibration shall be carried out with reference to the internal standardisation set out above. A working range of 0,1 to 10 mg/kg is recommended.
Concentrations above the calibration range can be determined by diluting the extract.

Concentrations of the individual PAH shall be given in mg/kg. The sum of quantified PAH, P, shall be calculated by addition of the individual PAH concentrations, p_i, following equation A.I:

$$\sum p_i = P \qquad (B.2.3.2.1)$$

B.2.3.3 Limit of quantification

The limit of quantification for material samples shall be 0,2 mg/kg per parameter.

B.2.4 Special characteristics

Naphthalene is a parameter hard to assess in products that come into contact with the skin. Experience indicates that it is possible to identify instances of both naphthalene depletion in materials and secondary contamination. The result obtained for naphthalene therefore only ever reflects the test specimen's current situation at the time of measurement.

B.2.5 Measuring conditions for gas chromatography

Injected volume: 1 µl pulsed splitless
Column: Rxi-PAH, 40 m, ID0.18 mm, film thickness 0,07 µm
Injector temperature: 290 °C
Transfer-line temperature: 340 °C
Initial temperature: 90 °C
Initial time: 0,7 min
Heating rate: 15 °C/min. → 120 °C
40 °C/min. → 170 °C
20 °C/min. → 340 °C