EUROPEAN ASSESSMENT DOCUMENT

EAD 040461-00-1201

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THERMAL INSULATION PRODUCT MADE OF LOOSE FILL EXPANDED PERLITE (EP)

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 thermal insulation product made of loose-fill expanded perlite (EP), hereinafter referred to as insulation product, which is not fully covered by the harmonized technical specification EN 14316-1.

The product is not fully covered by the following harmonised technical specification: EN 14316-1:2004.

The following essential characteristics of the thermal insulation product are covered for the assessment of the construction product in addition to EN 14316-1 (see also clause 2):

- other classes acc. to EN 13501-1 (deviating from class A1 acc. to EN 14316-1)

- settlement (no assessment method is provided in EN 14316-1)

- compressive stress/strength

The thermal insulation product consists of granular, inorganic bulk goods of thermally expanded perlite.

The solids of the thermal insulation product can be covered with pure bitumina, paraffins, mixtures of paraffin and resins, or other organic coatings, or hydrophobic agents, which are to be stated in the ETA.

The organic content of the thermal insulation product can be greater than 1,0 % deviating from EN 14316-1.

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.

1.2 Information on the intended use(s) of the construction product

1.2.1 Intended use(s)

The thermal insulation product is used for the thermal insulation of buildings as follows, without contact to soil, ground- and surface water:

- Intended use 1: core insulation of double wall masonry

- Intended use 2: insulation of cavity walls (e.g. timber frame work)

- Intended use 3: insulation of roofs and insulation between the rafters

- Intended use 4: internal insulation of floors

The thermal insulation product can also be used in a compressed bonded state below an additional load-distributing top layer (e.g. cement screed, mastic asphalt screed or dry screed elements).

The thermal insulation product can be executed on site with the use of additional compacting agents (e.g. mineral oil).

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 thermal insulation product for the intended use of 50 years when installed in the works, provided that thermal insulation product is subject to appropriate installation (see clause 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[1].

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.

1 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 1 shows how the performance of the thermal insulation product is assessed in relation to the essential characteristics.

Table 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	See clause 2.2.1	Class
Basic Works Requirement 3: Hygiene, health and the environment			
2	Content, emission and/or release of dangerous substances	See clause 2.2.2	Description
Basic Works Requirement 6: Energy economy and heat retention			
3	Thermal conductivity	See clause 2.2.3	Level
4	Loose bulk density	See clause 2.2.4	Level
5	Particle size distribution	See clause 2.2.5	Level
6	Water repellency	See clause 2.2.6	Level
7	Crushing resistance	See clause 2.2.7	Level
8	Water vapour transmission (water vapour diffusion resistance factor)	See clause 2.2.8	Level
9	Settlement	See clause 2.2.9	Level
10	Compressive stress at 10 % deformation or compressive strength	See clause 2.2.10	Level

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

For sampling, conditioning and testing (dimensions of the test specimens, minimum number of measurements, specific conditions), EN 14316-1 shall apply, unless specified otherwise in the following. The test specimens shall be chosen to cover the intended product parameter (thickness and density range) in built-in state.

2.2.1 Reaction to fire

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

2.2.1.1 Class A1 product – without testing (only for products with an organic content < 1,0 %)

If the organic content of the product is less than 1,0 % (see 2.2.1.3) the thermal insulation product is classified without testing as class A1 product in accordance with Decision 1996/603/EC as amended by Decision 2000/605/EC (see EN 14316-1).

The class A1 is given in the ETA.

2.2.1.2 Other classes – with testing (for products with an organic content > 1,0 %)

If the organic content of the product is greater than 1,0 % (see 2.2.1.3) the thermal insulation product is tested, using the test method(s) relevant for the corresponding reaction to fire class, in order to be classified according to EN 13501-1 (and Commission Delegated Regulation (EU) 2016/364).

If relevant the instructions of Annex A are used for reaction to fire testing.

The test result is given in the ETA (e.g. class C according to EN 13501-1).

2.2.1.3 Determination of organic content

In accordance with EN 14316-1 the determination of the organic content is performed according to EN 13820. Annex D of EN 14316-1 is considered.

2.2.2 Content, emission and/or release of dangerous substances

The performance of the product 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[2] after identifying the release scenarios (in accordance with EOTA TR 034) 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 scenario for this product and intended use with respect to dangerous substances is:

IA 2: Product with indirect contact to indoor air (e.g. covered products) but possible impact on indoor air.

[2] The manufacturer may be asked to provide to the TAB the REACH related information which he must 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 according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the SGDS.

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

If bitumen is used the assessment method following clause are to be performed to determine the content of specific organic compounds (polycyclic aromatic hydrocarbons (PAH), Benzo(a)pyrene (B[a]P)) based on the raw materials.

Specific organic compounds PAH and B[a]P

The assessment method for the content of specific organic compounds (PAH and B[a]P) is based on the raw material according to the testing method described in the document AfPS GS 2014:01 PAK (Annex: Testing instructions, ´Harmonised method for the determination of polycyclic aromatic hydrocarbons (PAH) in polymers´).

The product performances to be stated in the ETA take into account the concentration of single PAH and/or the sum of PAH in mg/kg, as applied by the client.

2.2.3 Thermal conductivity

The thermal conductivity at a temperature of 10 °C is determined according to EN 12667 in accordance with EN 14316-1.

If the product shall be used in a compressed state, the tests are performed in a corresponding compressed state with a sample height of 100 mm and a frame size corresponding to the external dimensions of the protective ring.

The thermal conductivity λ_D , based on $\lambda_{90/90}$ (representing at least 90 % of the production with a confidence level of 90 %), is given in the ETA - in levels with steps of 0,001 W/(m·K).

2.2.4 Loose bulk density

The loose bulk density (not in a compressed state) shall be determined according to EN 1097-3 in accordance with EN 14316-1.

The container (with a volume of at least 10 liter) should be filled using a flat bottomed scoop held centrally over the container without touching it, and be no more than 50 mm above the rim.

The test result is given in the ETA and expressed in kg/m³ (in steps of 1 kg/m³). The value of the loose bulk density is in the range of ± 15 % of the given value.

2.2.5 Particle size distribution

The particle size distribution is determined according to EN 933-1 (without washing) in accordance with EN 14316-1.

The test result is given in the ETA, expressed as a percentage by mass.

2.2.6 Water repellency

If relevant the water repellence of hydrophobic perlite (EPH) is determined in accordance with EN 14316-1 (Annex E).

The test result is given in the ETA.

2.2.7 Crushing resistance

If relevant (e.g. in load bearing applications) the crushing resistance is determined according to EN 13055-1 in accordance with EN 14316-1 (using the relevant test method depending on the bulk density).

The test result is given in the ETA and expressed in N/mm².

Note: Crushing resistance is a measure of the strength of the material but it does not necessarily relate directly to load bearing capacity (see EN 14316-1).

2.2.8 Water vapour transmission

The water vapour diffusion resistance factor μ can be assumed to be 3 (see EN 14316-1).

2.2.9 Settlement

The settlement depends on the density of the product, the thickness or height of the in-situ formed insulation and the application. Therefore the settlement should be assessed for different densities, at different thicknesses or heights covering the intended use conditions.

2.2.9.1 Determining the settlement due to impact excitation or vibration (horizontal and slightly sloped elements)

For each test cycle insert the insulation material into a container with a clear space of 0,55 m x 0,55 m x 0,33 m (volume: 0,10 m³). Fit the insulation material surface flush with the upper edge of the container by means of a ruler.

Then mount the container to the settlement determination device. This device consists of a mounting plate which is excited by an eccentric. The eccentric is set to lift the container smoothly by 50 mm and then let it fall freely on hard plastic bearings.

Repeat this procedure 20 times to complete one test cycle. The thickness of the insulation layer shall be determined at the center of the container by means of a needle inserted centrically through a test board (see footnote 2) before and after 3 test cycles.

Note: Apparatus see EN 15101-1, Annex B.3.2.

The relative settlement shall be determined as follows:

$S_v = (S_i – S_a)/S_i \cdot 100\ \%$

S_v Relative settlement

S_i Thickness in m before the tests

S_a Thickness in m after the tests

The settlement S_v is given in conjunction with the minimum installation density followed from the tests.

The ETA will include a provision that a reduced insulation layer thickness for calculating the thermal resistance is to be determined from the installation thickness taking account the settlement[3].

For this purpose the reduction value in %, determined from the value of settlement rounded upwards to the nearest one percent, is given in the ETA based on the test results.

2.2.9.2 Determining the settlement in wall cavities

For determination of the settlement, a wood stud wall shall be used as a test wall. The studs shall be 40 mm thick. The wood sheathing shall be at least 20 mm thick. For visual inspection, one of the two sheathings may be made of safety glass with a thickness of 6 mm.

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3 The installation thickness of uncovered insulation layers (not exposed to loads) installed in a plane, horizontal position should be tested with a plane test board (dimensions: 200 mm x 200 mm, weight 200 ± 5 g, test pressure: 50 N/m²). Put the test board gently on top of the insulation layer. Determine the height of the layer by means of a needle inserted centrically through the test board. The thickness should be the average value of at least 10 individual values taken from different points distributed over the whole surface.

The test wall's cavity dimensions shall be at least: 2,0 m x 1,0 m x 0,10 m (height x width x thickness). Where necessary several test walls are used with different thicknesses depending on the intended use conditions so that the maximum thickness in built-in state is considered.

Mount the test wall on elastic supports and install a pendulum vibrator underneath. Set the unbalance weight of the pendulum vibrator in a way to ensure that the peak acceleration in direction of the wall is at least 15 m/s². The rotational speed of the engine shall be 2,800 rpm approximately in order to generate an excitation frequency of 45 - 50 Hz.

Insert the insulation material through a hole at the front of the test wall.

Then rock the test wall by means of the pendulum vibrator for 30 minutes. After rocking the wall, determine the settlement and the bulk density (in relation to the original thickness and the thickness after settlement).

A single test cycle is carried out.

The settlement is given in the ETA in conjunction with the dimensions of the test wall and the minimum installation density followed from the tests.

Note: For the factory production control (fpc see clause 3.2) a test wall with cavity dimensions of at least: 1,0 m x 0,625 m x 0,16 m (height x width x thickness) is sufficient.

2.2.10 Compressive stress

Compressive stress at 10 % deformation is determined in line with EN 826.

The test samples are compressed before testing considering the intended compression in built-in state. If necessary the compressed sample height can be limited. The frame size for testing shall be approx. 200 mm x 200 mm.

The compressive stress at 10 % deformation is given in the ETA.

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: Decision 1999/91/EC.

The system to be applied is: 3 for any use except for uses subject to regulations on reaction to fire.

For uses subject to regulations on reaction to fire the applicable AVCP systems are 1, or 3, or 4 depending on the conditions defined in the said Decision.

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 2.

Table 2 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**]					
1	Reaction to fire (where relevant, products with an organic content > 1,0 %)	See clause 2.2.1.2	Control plan	1	twice per year
2	Determination of organic content	See clause 2.2.1.3	Control plan	1	See EN 14316-1
3	Thermal conductivity	See clause 2.2.3	Control plan	1	See EN 14316-1
4	Loose bulk density	See clause 2.2.4	Control plan	3	See EN 14316-1
5	Particle size distribution	See clause 2.2.5	Control plan	1	See EN 14316-1
6	Water repellency (where relevant)	See clause 2.2.6	Control plan	1	See EN 14316-1
7	Settlement	See clause 2.2.9	Control plan	1	twice per year
8	Compressive stress at 10 % deformation (where relevant)	See clause 2.2.10	Control plan	1	once per month

3.3 Tasks of the notified body

The intervention of the notified body is only necessary in so far as the conditions for the applicability of system 1 as defined in Decision 1999/91/EC are fulfilled.

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance are laid down in Table 3.

Table 3 Control plan for the notified body; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control *(for systems 1 only)*					
1	Reaction to fire: - Presence of suitable test equipment	-	Control plan	-	When starting the production
	- Presence of trained personnel	-	Control plan	-	
	- Presence of an appropriate quality assurance system an necessary stipulations	-	Control plan	-	
Continuous surveillance, assessment and evaluation of factory production control *(for systems 1 only)*					
2	Reaction to fire - Inspection of factory, of the production of the product and of the facilities for factory production control	-	Control plan	-	Annually
		-	Control plan	-	
	- Evaluation of the documents concerning the factory production control - Issuing a report of surveillance	-	Control plan	-	

4 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment is of relevance, unless a dated reference is given in clause 2.2 of this EAD.

EN 826	Thermal insulating products for building applications - Determination of compression behaviour
EN 933-1	Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method
EN 1097-3	Tests for mechanical and physical properties of aggregates - Part 3: Determination of loose bulk density and voids
EN 12086	Thermal insulating products for building applications - Determination of water vapour transmission properties
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 13055-1	Lightweight aggregates - Part 1: Lightweight aggregates for concrete, mortar and grout
EN 13169	Thermal insulation products for buildings – Factory made expanded perlite board (EPB) products - Specification
EN 13501-1	Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests
EN 13820	Thermal insulating products for building applications - Determination of organic content
EN 14316-1	Thermal insulating products for buildings – In-situ thermal insulation formed from expanded perlite (EP) products
EN 15715	Thermal insulation products - Instructions for mounting and fixing for reaction to fire testing - Factory made products
ISO 18287	Soil quality – Determination of polycyclic aromatic hydrocarbons (PAH) – Gas chromatographic method with mass spectrometric detection (GC-MS)
ISO 13877	Soil quality – Determination of polynuclear aromatic hydrocarbons – Method using high-performance liquid chromatography
EOTA TR 034	General BWR 3 - Checklist for EADs / ETAs – Content and/or release of dangerous substances in construction products
AfPS GS 2014:01	PAK – Testing and assessment of polycyclic aromatic hydrocarbons (PAHs) in the course of awarding the GS mark; Annex: Testing instructions, ´Harmonised method for the determination of polycyclic aromatic hydrocarbons (PAH) in polymers´

ANNEX A INSTRUCTIONS FOR REACTION TO FIRE TESTS

<table>
<tr><td rowspan="2">Product

parameters</td><td colspan="4">Validity of test results</td></tr>
<tr><td>EN ISO 1182</td><td>EN ISO 1716</td><td>EN 13823 (SBI)</td><td>EN ISO 11925-2

(Ignitability)</td></tr>
<tr><td>Thickness</td><td>No influence</td><td rowspan="2">No influence</td><td>The thickness giving the worst test result shall be determined for the declaration. If the worst test is not known minimum and maximum thickness shall be tested.

Test results on 180 mm thickness are also valid for higher thicknesses.</td><td>No influence</td></tr>
<tr><td>Density</td><td>Minimum and maximum density shall be tested</td><td colspan="2">The result is valid for the tested density ±15 %.

or

The result is valid for the range between tested minimum and maximum density.</td></tr>
<tr><td>Type of products</td><td>Test on highest amount of organic content (expressed in kg/m³) valid for lower organic contents of the same product type.</td><td>Test on highest amount of organic content (expressed in kg/m³) valid for lower organic contents of the same type of binder.</td><td colspan="2">For the tested type only.</td></tr>
<tr><td>Type of facing(s)</td><td colspan="4" rowspan="4">Not applicable</td></tr>
<tr><td>Thickness/area weight of facing(s)</td></tr>
<tr><td>Type and amount of glue for facing(s)</td></tr>
<tr><td>Asymmetry</td></tr>
</table>

Installation parameter	Validity of test results	
	EN 13823 (SBI)	EN ISO 11925-2 (Ignitability)
Exposure to thermal attack	Test result is valid for products as placed on the market.	Tests with surface flame attack.
Substrate	see EN 13238	Not applicable
Air gaps/cavities	Not applicable	
Joints/edges	Not applicable	
Size and positioning of test specimen	Test valid for all products sizes.	
Product orientation and geometry	No influence	No influence
Fixing of test specimen	For the purpose of testing loose fill material cages shall be used. The cages shall be made of a galvanized steel frame (25 x 25 x 3 mm steel angle) and galvanized steel meshes. The rear of the cages is to be formed by the SBI backing board (EN 13238). To enable testing of fibres > 5 mm the mesh size shall be 4 mm x 4 mm and wire thickness 0,5 mm. To avoid moulding of the cages a reinforcement by a second mesh layer with a mesh size of 50 mm x 50 mm and wire thickness of 2 mm shall be used.	Specimen holder acc. EN ISO 11925-2 clause 4.5.