



## EUROPEAN ASSESSMENT DOCUMENT

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# INSULATION MADE OF LOOSE-FILL OR COMPOUND GRANULATED EXPANDED CORK

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## Contents

<b>1</b>	<b>Scope of the EAD</b> .....	<b>4</b>
1.1	Description of the construction product	4
1.2	Information on the intended use(s) of the construction product	4
1.2.1	Intended use(s).....	4
1.2.2	Working life/Durability.....	4
1.3	Specific terms used in this EAD	5
1.3.1	Cork.....	5
1.3.2	Granulated cork.....	5
1.3.3	Insulation cork board.....	5
1.3.4	Granulated expanded cork.....	5
1.3.5	Loose-fill.....	5
1.3.6	Granulated expanded cork compound.....	5
<b>2</b>	<b>ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA</b> .....	<b>6</b>
2.1	Essential characteristics of the product	6
2.2	Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product	7
2.2.1	Reaction to fire.....	7
2.2.2	Continuous smouldering.....	7
2.2.3	Content, emission and/or release of dangerous substances.....	8
2.2.4	Biological resistance.....	8
2.2.5	Water vapour transmission.....	9
2.2.6	Compressive stress/strength.....	9
2.2.7	Deformation under specified load and temperature.....	9
2.2.8	Point load.....	9
2.2.9	Corrosion developing capacity.....	9
2.2.10	Impact sound reduction.....	9
2.2.11	Airborne sound insulation.....	10
2.2.12	Sound absorption.....	10
2.2.13	Dynamic stiffness.....	10
2.2.14	Airflow resistance.....	10
2.2.15	Compressibility.....	10
2.2.16	Thermal conductivity/resistance.....	10
2.2.17	Moisture absorption.....	11
2.2.18	Loose bulk density.....	11
2.2.19	Settlement.....	11
2.2.20	Water absorption.....	11
2.2.21	Particle size distribution.....	12
<b>3</b>	<b>Assessment and verification of constancy of performance</b> .....	<b>13</b>
3.1	System(s) of assessment and verification of constancy of performance to be applied	13
3.2	Tasks of the manufacturer	13
3.3	Tasks of the notified body	16
3.4	Special methods of control and testing used for the verification of constancy of performance	16
<b>4</b>	<b>Reference documents</b> .....	<b>17</b>

## **1 SCOPE OF THE EAD**

### **1.1 Description of the construction product**

The product is an insulation material composed by granulated expanded cork with or without a binding agent.

The granulated expanded cork is obtained by grinding and/or milling manufactured insulation cork boards and is considered such when the cork fragments have a granulometry superior to 0.25mm and inferior to 22.4mm.

The product can be delivered as a loose-fill granulated expanded cork or as a dry mixture of granulated expanded cork and binding agent (or as separate components), and can be applied for wall and roof insulation (loose-fill) or for floor insulation (compound or loose-fill inside cavities).

The final product which forms the insulation layer after installation is hereinafter referred to as insulation product.

The final product which forms the insulation layer after installation is hereinafter referred to as insulation product.

The product is not covered by a harmonised European standard (hEN).

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 insulation layer formed by the product serves the following intended use:

- Thermal and/or acoustic insulation of walls, roofs and floors.

The assessment of insulation product only applies if the product is protected from precipitation, wetting or weathering in built-in state and during transport, storage and installation and if it will not be used for construction elements with contact to water and soil or in constructions with a risk that the critical moisture content will be exceeded.

Concerning the application of the insulation product, the respective national regulations shall be observed.

#### **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 loose-fill granulated expanded cork and a mixture of granulated expanded cork and compound for the intended use of 50 years when installed in the works (provided that the loose-fill granulated expanded cork and a mixture of granulated expanded cork and compound 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<sup>1</sup>.

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.

## **1.3 Specific terms used in this EAD**

### **1.3.1 Cork**

Protective layer of the cork oak tree (*Quercus suber* L.) which may be periodically removed from its trunk and branches to provide the raw material for cork products.

### **1.3.2 Granulated cork**

Fragments of cork obtained by grinding and/or milling raw or manufactured cork.

### **1.3.3 Insulation cork board**

Pre-formed product made from ground granulated cork expanded and bonded exclusively with its own natural binder exuded from cork cell walls by heating under pressure.

### **1.3.4 Granulated expanded cork**

Fragments of expanded cork obtained by grinding and/or milling manufactured insulation cork boards.

### **1.3.5 Loose-fill**

Any of several thermal insulation materials in the form of fragments or that can be blown, injected or placed by hand.

### **1.3.6 Granulated expanded cork compound**

Compound is a mixture of granulated expanded cork with a binding agent and eventually with additional fine aggregates.

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<sup>1</sup> 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 loose-fill or a mixture of granulated expanded cork and compound is assessed in relation to the essential characteristics.

**Table 1** Essential characteristics of the product and assessment methods and criteria for the performance of the product in relation to those essential characteristics

No	Essential characteristic	Assessment method	Type of expression of product performance
<b>Basic Works Requirement 2: Safety in case of fire</b>			
1	Reaction to fire	See clause 2.2.1	Class
2	Continuous smouldering	See clause 2.2.2	See clause 2.2.2
<b>Basic Works Requirement 3: Hygiene, health and the environment</b>			
3	Content and/or release of dangerous substances	See clause 2.2.3	See clause 2.2.3
4	Biological resistance	See clause 2.2.4	Level
5	Water vapour transmission	See clause 2.2.5	Level
<b>Basic Works Requirement 4: Safety and accessibility in use</b>			
6	Compressive stress/strength <sup>1</sup>	See clause 2.2.6	Level
7	Deformation under specified load and temperature <sup>1</sup>	See clause 2.2.7	Level
8	Point load <sup>1</sup>	See clause 2.2.8	Level
9	Corrosion developing capacity	See clause 2.2.9	See clause 2.2.9
<b>Basic Works Requirement 5: Protection against noise</b>			
10	Impact sound reduction <sup>2</sup>	See clause 2.2.10	Level
11	Airborne sound insulation	See clause 2.2.11	Level
12	Sound absorption	See clause 2.2.12	Level
13	Dynamic stiffness <sup>1</sup>	See clause 2.2.13	Level
14	Airflow resistance	See clause 2.2.14	Level

No	Essential characteristic	Assessment method	Type of expression of product performance
15	Compressibility <sup>1</sup>	See clause 2.2.15	Level
<b>Basic Works Requirement 6: Energy economy and heat retention</b>			
16	Thermal conductivity /resistance	See clause 2.2.16	Level
17	Moisture absorption	See clause 2.2.17	Level
18	Loose bulk density	See clause 2.2.18	Level
19	Settlement <sup>3</sup>	See clause 2.2.19	Level
20	Water absorption	See clause 2.2.20	Level
21	Particle size distribution <sup>3</sup>	See clause 2.2.21	See clause 2.2.21
1 in case of compound product 2 in case of floor application 3 in case of loose-fill product			

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

Characterisation of products to be assessed shall be done in accordance with available specifications, notably thermal and acoustic properties.

### 2.2.1 Reaction to fire

The insulation product shall be tested, using the test method(s) relevant for the corresponding reaction to fire class, in order to be classified according to EN 13501-1.

Detailed instructions for mounting and fixing are set in Annex A.

### 2.2.2 Continuous smouldering

The performance of the product's propensity to undergo continuous smouldering shall be assessed in accordance with FprEN 16733.

The smouldering behaviour of a product depends on the density, thickness, composition and orientation of the product. The test results are only valid for the product tested and shall be expressed as stated in FprEN 16733, clause 11. If the test sample is tested with a thickness of 100mm, then the test results are also valid for greater thicknesses.

#### 2.2.2.1 Loose-fill product

For loose-fill product, the specimen holder shall be used with a wire mesh, as defined in FprEN 16733, clause 5.1.2. The density of the test sample on the specimen holder shall correspond to the density specified by the manufacturer.

### 2.2.2.2 Compound product

For compound product, the test sample shall be rectangular with the dimensions 800 x 300 ± 3 mm and its end-use thickness.

## 2.2.3 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 applicant after identifying the release scenarios (in accordance with EOTA TR 034) taking into account the intended use of the product.

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

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

IA 3: Product with no contact to and no impact on indoor air

SW2: Product with indirect contact to soil-, ground- and surface water

S/W 3: Product with no contact to soil, ground- and surface water

### 2.2.3.1 VOC and SVOC

The release of VOC and SVOC (individual VOC/SVOCs and the sum emission of VOC/SVOC) has to be determined according to the relevant parts of ISO 16000 and according to CEN TS 16516:2013 (or EN 16516 if available).

### 2.2.3.2 Biocides (others than wood preservatives): active substances

Only such active substances shall be applied which are approved according to Commission Directive 98/8/EC of the European Parliament and of the Council (the BPR - (EU) No. 528/2012- will apply EU-wide from 1<sup>st</sup> September 2013). As long as Annex I of Directive 98/8/EC is under development, only such biocides shall be applied which are notified for the applicable product type (Commission Decision 1451/2007 as amended).

The manufacturer has to declare the following information to the Technical Assessment Body:

- declaration of the biocide
- amount and stage of the treatment
- Chemical name(s) of the active agent(s)
- Concentration of the active agent.

### 2.2.3.3 Formaldehyde

The formaldehyde release of loose fill or compound for use in the intended release scenario IA2, shall be determined according to the test standard EN ISO 16000-9:2006 in combination with EN ISO 16000-3:2001 and EN ISO 16000-11:2006.

## 2.2.4 Biological resistance

For insulation product the determination of the growth of mould fungus shall be carried out according to Annex B.

The growth of mould fungus shall be expressed according to Table 4 of EN ISO 846.



### **2.2.5 Water vapour transmission**

Water vapour transmission shall be determined in accordance with EN 12086, test condition A, dry state. The samples shall be stored in accordance with EN 12086, clause 6.3.

In the case of loose-fill product, an appropriate specimen holder may be used, with a mesh size that retains the smallest particles.

The water vapour transmission (water vapour diffusion resistance factor  $\mu$ ) shall be stated in the ETA.

### **2.2.6 Compressive stress/strength**

Compressive stress/strength shall be evaluated only for compound product. The compressive stress at 10 % deformation, or the compressive strength, shall be determined according to EN 826 with at least 5 test samples of 150 mm x 150 mm. At least minimum and maximum insulation product thickness shall be tested.

The minimum value for each tested thickness shall be stated in the ETA.

### **2.2.7 Deformation under specified load and temperature**

The determination of the deformation under specified compressive load and temperature conditions shall be carried out only for compound product according to EN 1605 with at least 3 test samples of 150 mm x 150 mm for test condition 1.

The maximum change of the relative deformation in % for the step: 20 kPa for  $(48 \pm 1)$  h at  $(80 \pm 1)$  °C, shall be stated in the ETA.

### **2.2.8 Point load**

The behaviour of insulation product under point load shall be determined only for compound product according to EN 12430 with 3 test samples of 300 mm x 300 mm.

The assessed thickness and the respective point load shall be stated in the ETA.

### **2.2.9 Corrosion developing capacity**

The corrosion developing capacity on metal construction products shall be assessed on the basis of the composition of the insulation product including possible additives.

If such an assessment is not feasible the test according to Annex C shall be applied.

Either the statement based on composition or the existence or not of notches or perforations within the central zone (3 mm off the edge of a coupon) shall be stated in the ETA.

### **2.2.10 Impact sound reduction**

The impact sound reduction,  $\Delta L$ , shall be determined only for floor applications according to EN ISO 10140-1, EN ISO 10140-3, EN ISO 10140-4 and EN ISO 10140-5. The test specimen shall reproduce the specific complete end use constructive solution and the result is valid only for the tested build-up. Using this data the weighted impact sound reduction,  $\Delta L_w$ , is calculated according to EN ISO 717-2. The weighted impact sound reduction  $\Delta L_w$  (if need be, for different build-ups) shall be stated in the ETA. The assessed floor build-up shall be described in detail in the ETA.

### 2.2.11 Airborne sound insulation

The airborne sound insulation,  $R$ , shall be determined according to EN ISO 10140-1, EN ISO 10140-2, EN ISO 10140-4 and EN ISO 10140-5. The test specimen shall reproduce the specific complete end use constructive solution and the result is valid only for the tested solution. The results shall be expressed in the ETA as a single number rating in accordance with EN ISO 717-1. The assessed build-up shall be described in detail in the ETA.

### 2.2.12 Sound absorption

The determination of the sound absorption coefficient shall be performed according to EN ISO 354. The absorption coefficient,  $\alpha_p$ , and the single number value for the weighted sound absorption coefficient,  $\alpha_w$  shall be calculated according to EN ISO 11654.

The obtained values for  $\alpha_p$  and  $\alpha_w$  shall be rounded to the nearest 0.05 ( $\alpha_p$  larger than 1 shall be expressed as  $\alpha_p = 1$ ).

The results for  $\alpha_p$  and  $\alpha_w$  shall be given in levels with steps of 0.05.

### 2.2.13 Dynamic stiffness

The determination of dynamic stiffness shall be carried out according to EN 29052-1 only for compound product. At least minimum and maximum insulation product thickness shall be tested. The mean value of dynamic stiffness for different insulation product and different thickness shall be expressed in the ETA in levels using steps of 1 MN/m<sup>3</sup>.

### 2.2.14 Airflow resistance

The determination of the specific airflow resistivity shall be carried out according to EN 29053 (ISO 9053), method A. The specific airflow resistance,  $R_s$ , shall be expressed in levels using steps of 1 kPa.s/m.

### 2.2.15 Compressibility

The determination of thickness  $d_L$  and  $d_B$  shall be carried out only for compound product according to EN 12431, with maximum insulation product thickness and a pause of 120 s before measuring  $d_B$ .

The compressibility  $c$  is defined as follows:

$$c = d_L - d_B$$

The nominal values  $d_L$  and the maximum value of the compressibility  $c$  shall be stated in the ETA.

### 2.2.16 Thermal conductivity/resistance

For loose-fill product, the thermal conductivity shall be determined at a mean temperature of 10°C in accordance with EN 12667. For compound product the thermal conductivity shall be determined at a mean temperature of 23°C in accordance with EN 12664.

The loose-fill samples shall be dried for 72 hours at a temperature of (70±2)°C, and the compound samples shall be dried at a temperature between 105°C and 110°C until constant mass, both in an oven ventilated with the air taken at (23±2) °C and (50±5) relative humidity.

The loose-fill samples shall be tested in a thin frame, made of a low conductivity material covered by a plastic film with a thickness lower than 50 µm.

The thermal conductivity  $\lambda_D$ , 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).

### 2.2.17 Moisture absorption

The moisture absorption shall be determined according to EN ISO 12571, desiccator method.

The maximum moisture absorption at 23°C and 50% relative humidity and at 23°C and 80% relative humidity shall be stated in the ETA.

### 2.2.18 Loose bulk density

The determination of the loose bulk density shall be carried out according to EN 1097-3.

The value of the loose bulk density (upper and lower limit) shall be stated in the ETA.

### 2.2.19 Settlement

The settlement depends on the density of the product, the thickness and the application. Therefore the settlement should be assessed for different nominal densities, at different thicknesses covering the intended use conditions. Per settlement, the following characteristics shall be determined

- the settlement S
- the bulk density  $\rho$
- the settled density  $\rho_s$

In the case of roofs (e.g. ventilated attics), the settlement characteristics of loose-fill product shall be determined according ISO/DIS 18393-1 with at least 3 test specimens. The insulation product is manually laid into the specimen box, or in accordance with the manufacturer's recommendations for installation.

In the case of walls, the determination of the settlement characteristics of loose-fill product shall be carried out in accordance with EN 15101-1, Annex B, method B.2. The insulation product is manually laid into the specimen box, or in accordance with the manufacturer's recommendations for installation. A minimum thickness of 100 mm and a maximum of 240 mm shall be tested.

In the case of floors, the determination of the settlement characteristics of loose-fill product shall be carried out in accordance with EN 15101-1, Annex B, method B.1. The insulation product is manually laid into the specimen box, or in accordance with the manufacturer's recommendations for installation. A thickness of 300 mm shall be tested.

The settlement S and the settled density shall be stated in the ETA, as well as the tested depth used for the application in walls. The ETA shall include a note that the nominal thickness for calculating the thermal resistance shall be determined from settled thickness.

### 2.2.20 Water absorption

The determination of short term water absorption by partial immersion shall be carried out according to EN 1609 method A.

The specimen side length shall be 200 mm and a thickness of at least 100 mm. In the case of loose-fill product, an appropriate specimen holder (mesh box) must be used. The mesh size shall ensure that the smallest particles are retained.

The water absorption in kg/m<sup>2</sup> shall be stated in the ETA.

### **2.2.21 Particle size distribution**

The determination of dimensions of the particle size distribution of loose-fill granulated expanded cork shall be carried out in accordance with EN 933-1.

The particle size distribution shall be stated 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 as amended by 2001/596/EC.

The system to be applied is: **3**

In addition with regard to reaction to fire the applicable European legal act is: Decision 1999/91/EC as amended by 2001/596/EC.

The system(s) to be applied are: **1, 3 or 4**.

#### 3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the insulation product in the process 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 <sup>a</sup>
<b>Factory production control (FPC)</b> [including testing of samples taken at the factory in accordance with a prescribed test plan]					
<b>Loose-fill product</b>					
1	Reaction to fire	EN ISO 1182 and EN ISO 1716 (Class A1 and A2)	Classification according to EN 13501-1	1	Once a year
		EN 13823 (Class D to A2)		1	Once a year
		EN ISO 11925-2 (Class E to B)		1	1 per 2 weeks or 1 per 2 years and indirect testing <sup>2</sup>
2	Continuous glowing combustion	2.2.2	---	1	1 per year
3	Biological resistance	2.2.4	---	4	1 per year
4	Water vapour transmission	2.2.5	---	5	1 per year
5	Corrosion developing capacity	2.2.9	---	4	1 per year

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control <sup>a</sup>
6	Airborne sound insulation	2.2.11	---	1	1 per year
7	Sound absorption	2.2.12	---	1	1 per year
8	Airflow resistance	2.2.14	---	3	1 per year
9	Thermal/ resistance conductivity	2.2.16	---	1	1 per month or bulk density twice a week + manufacturer's method 1 per day
10	Moisture absorption	2.2.17	---	3	Quarterly
11	Loose bulk density	2.2.18	---	3	2 per week
12	Settlement	2.2.19	---	3	2 per year
13	Water absorption	2.2.20	---	4	Quartely
14	Particle size distribution	2.2.21	---	1	1 per week
<b>Compound product</b>					
1	Reaction to fire	EN ISO 1182 and EN ISO 1716 (Class A1 and A2)	Classification according to EN 13501-1	1	Once a year
		EN 13823 (Class D to A2)		1	Once a year
		EN ISO 11925-2 (Class E to B)		1	1 per 2 weeks or 1 per 2 years and indirect testing <sup>2</sup>
2	Continuous glowing combustion	2.2.2	---	1	1 per year
3	Biological resistance	2.2.4	---	4	1 per year
4	Water vapour transmission	2.2.5	---	5	1 per year
5	Compressive stress/strength	2.2.6	---	5	1 per week

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control <sup>a</sup>
6	Deformation under specified load and temperature	2.2.7	---	3	1 per year
7	Point load	2.2.8	---	3	1 per 5 years
8	Corrosion developing capacity	2.2.9	---	4	1 per year
9	Impact sound reduction	2.2.10	---	1	1 per year
10	Airborne sound insulation	2.2.11	---	1	1 per year
11	Sound absorption	2.2.12	---	1	1 per year
12	Dynamic stiffness	2.2.13	---	3	1 per week or 1 per year + manufacturer's method 1 per day
13	Airflow resistance	2.2.14	---	3	1 per year
14	Compressibility	2.2.15	---	3	1 per week
15	Thermal/ resistance conductivity	2.2.16	---	1	1 per month or bulk density twice a week + manufacturer's method 1 per day
16	Moisture absorption	2.2.17	---	3	Quarterly
17	Loose bulk density	2.2.18	---	3	2 per week
18	Water absorption	2.2.20	---	4	Quartely
<p><sup>a</sup> In case of discontinuous production these minimum frequencies should be adapted to an equivalent frequency.</p> <p><sup>1</sup> Indirect testing shall be based on current FPC particle size distribution and density results and a simplified ignitability test (same specimen holder as defined in clause A.4.1 and a simplified ignition source/small flame). Validation of indirect test method's screening ability to differentiate from class E and F performance shall be previously verified against standard EN ISO 11925-2 tests.</p> <p><sup>2</sup> Indirect testing shall be based on current FPC compound composition and density results and a simplified ignitability test (same specimen holder as defined in EN ISO 11925-2 and a simplified ignition source/small flame). Validation of indirect test method's screening ability to differentiate from classes F, E and B, C, D performance shall be previously verified against standard EN ISO 11925-2 tests.</p>					

### 3.3 Tasks of the notified body

The intervention of the notified body under system 1 is only necessary if a limitation of organic substance or the addition of fire-retardant takes place in the production process.

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

**Table 3 Control plan for the notified body; cornerstones**

No	Subject/type of control (product, raw/constituent material, component - indicating characteristic concerned)	Test or control method  (refer to 2.2 or 3.4)	Criteria, if any	Minimum number of samples	Minimum frequency of control
<b>Initial inspection of the manufacturing plant and of factory production control</b> (for system 1)					
1	Reaction to fire	Presence of suitable test equipment			Annually
		Presence of trained personnel			Annually
		Presence of an appropriate quality assurance system and necessary stipulations			Annually
<b>Continuous surveillance, assessment and evaluation of factory production control</b> (for system 1)					
1	Reaction to fire	Inspection of factory, of the production of the product and of the facilities for factory production control			Annually
		Evaluation of the documents concerning the factory production control			Annually
		Issuing a report of surveillance			Annually

### 3.4 Special methods of control and testing used for the verification of constancy of performance

Not relevant.



## 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.

EN ISO 1182	<i>Reaction to fire tests for products - Non-combustibility test</i>
EN ISO 1716	<i>Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value)</i>
EN 13823	<i>Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item</i>
EN ISO 11925-2	<i>Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test</i>
EN 13501-1	<i>Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests</i>
FprEN 16733	<i>Reaction to fire tests for building products – Determination of building product's propensity to undergo continuous smouldering</i>
ISO 16000	<i>Indoor air</i>
CEN TS 16516:2013	<i>Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air</i>
EN 15101-1	<i>Thermal insulation products for buildings - In-situ formed loose-fill cellulose (LFCI) products - Part 1: Specification for the products before installation</i>
EN 12086	<i>Thermal insulating products for building applications - Determination of water vapour transmission properties</i>
EN 826	<i>Thermal insulating products for building applications - Determination of compression behaviour</i>
EN 1605	<i>Thermal insulating products for building applications - Determination of deformation under specified compressive load and temperature conditions</i>
EN 12430	<i>Thermal insulating products for building applications - Determination of behaviour under point load</i>
EN ISO 10140-1	<i>Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products</i>
EN ISO 10140-3	<i>Acoustics - Laboratory measurement of sound insulation of building elements - Part 3: Measurement of impact sound insulation</i>
EN ISO 10140-4	<i>Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements</i>
EN ISO 10140-5	<i>Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment</i>
EN ISO 717-2	<i>Acoustics - Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation</i>
EN ISO 10140-2	<i>Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation</i>

EN ISO 717-1	<i>Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation</i>
EN ISO 354	<i>Acoustic measurement of sound absorption in a reverberation room</i>
EN ISO 11654	<i>Sound absorbers for use in buildings - Rating of sound absorption</i>
EN 29052-1	<i>Acoustics - Determination of dynamic stiffness - Part 1: Materials used under floating floors in dwellings</i>
EN 29053	<i>Acoustics - Materials for acoustical applications - Determination of airflow resistance</i>
EN 12431	<i>Thermal insulating products for building applications - Determination of thickness for floating floor insulating products</i>
EN 13171	<i>Thermal insulation products for buildings - Factory made wood fibre (WF) products – Specification</i>
EN ISO 10456	<i>Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values</i>
EN ISO 12571	<i>Hygrothermal performance of building materials and products - Determination of hygroscopic sorption properties</i>
EN 1097-3	<i>Tests for mechanical and physical properties of aggregates - Part 3: Determination of loose bulk density and voids</i>
ISO/DIS 18393-1	<i>Thermal insulation products - Determination of ageing by settlement - Part 1: Blown loose-fill insulation for ventilated attics</i>
EN 1609	<i>Thermal insulating products for building applications - Determination of short term water absorption by partial immersion</i>
EN 933-1	<i>Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method</i>
EN ISO 846	<i>Plastics – Evaluation of action of micro organisms</i>
EN 12667	<i>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</i>
EN 12664	<i>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</i>
EN 13170	<i>Thermal insulation products for buildings - Factory made products of expanded cork (ICB) – Specification</i>
EOTA TR 034	<i>General Checklist for EADs/ETAs - Content and/or release of dangerous substances in products</i>

## **ANNEX A: REACTION TO FIRE**

### **A.1 Conditioning**

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

### **A.2 Testing according to EN ISO 1182 and EN ISO 1716**

These methods are needed to determine classes A1 and A2 according to EN 13501-1. If required, the specimens shall be prepared and tested according to the provisions given in the test standards EN ISO 1182 and EN ISO 1716.

Each different chemical composition has to be considered when testing. In case of products with the same composition but different densities and different amounts of organic components, in particular expanded cork, the variation with the lowest density and the highest amount of expanded cork and additional organic components, if applicable, shall be tested.

If the product contains flame retardant, the variation with the lowest amount of the flame retardant shall be tested.

The test result is valid for that variation tested and all variation of the products:

- with the same chemical composition,
- with higher densities,
- of any thickness,
- with lower amounts of expanded cork and additional organic components, if applicable, and
- with higher amounts of the same type of flame retardant as the one which has been tested, if applicable.

### **A.3 Testing according to EN 13823 (SBI)**

This method is relevant for determining of the classes A2, B, C and D as well as for the additional classifications s1, s2, s3, d0, d1 and d2 regarding smoke production and flaming droplets.

#### **A3.1 Loose fill product**

The mounting and fixing of loose fill product shall be made using cages 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 (according to EN 13238).

To enable testing of small particles, the mesh size shall be 4 mm x 4 mm and wire thickness of 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.

The thickness giving the worst test result shall be determined. If the worst test is not known minimum and maximum thickness shall be tested.

The test results are valid for:

- higher densities,
- all thickness between those evaluated in the tests,
- higher amounts of the same type of flame retardant as the one which has been tested, if applicable.

#### **A3.2 Compound product**

The end use applications have to be taken into account when testing compound products according to EN 13823. Two different types of substrates are possible in end use – solid floor structures made of mineral material (e. g. concrete) and floor structures made of beams with timber floorboards or wood based panels on the upper side. Hence a particle board according to EN 13238 shall be used as substrate for testing representing both types of substrates in practice. If other substrates are possible in the end use application, other substrates according to EN 13238 exactly representing the substrate of the end use application can be used for testing. Since the reaction to fire performance of the insulation material shall be evaluated all test shall be conducted without any covering (e.g. screeds) to the compound product.

The following test configuration shall be used:

1. The samples (compound product + substrate) will be produced in the dimensions of the SBI test specimens.
2. Due to the kind of production – casting of the insulation material on site without joints – no joints shall be considered when preparing the long wing of the SBI specimens.
3. Both the short and the long wing of each sample shall be mounted together on the SBI trolley after conditioning.
4. The sample shall be mounted in a distance of 80 mm to the backing board of the SBI apparatus. For samples with a thickness greater than 120 mm the distance can be reduced to 40 mm. The cavity behind the sample shall be non-ventilated. Samples with a thickness greater than 160 mm shall be mounted directly in front of the backing board of the SBI apparatus without any distance to the backing board.
5. The samples shall be fixed on the substrate only mechanically by screws with a diameter of 6 mm (see Figure A1 and A2).
6. The correct length of the screws shall be derived from Figure A3.
7. Before fixing the sample, pilot holes with a diameter of 4 mm shall be drilled into the substrate according to Figure A1 and A2.

Instead of fixing the insulation on the substrate using screws the whole sample can be mounted in a steel frame made of U-profiles covering the lateral edges and the top edge of the sample.

The following parameters of the compound product shall be taken into account when conducting the SBI tests:

- each different chemical composition,
- the greatest and lowest thickness,
- the lowest density,
- the highest amount of expanded cork and additional organic components and
- the lowest amount of flame retardant.

The test results are valid for the variation tested and any variations of the product:

- with the same chemical composition,
- with higher densities,
- all thickness between those evaluated in the tests,
- with lower amounts of expanded cork and additional organic components, if applicable and
- with higher amounts of the same type of flame retardant as the one which has been tested, if applicable.

Test results of samples with a thickness of 200 mm (that means an insulation thickness of about 190 mm) are also valid for greater thickness.

Test results on the standard particleboard substrate or on other standard substrates are valid for those end use substrates for which the standard substrate is representative according to the rules given in EN 13238.

#### **A.4 Testing according to EN ISO 11925-2**

This method is relevant for determining the reaction to fire classes B, C, D and E of EN 13501-1.

#### **A.4.1 Loose-fill product**

The mounting and fixing of loose-fill material shall be carried out according to EN ISO 11925-2, clause 4.5. A specimen holder as shown in Figure 3 c) of EN 11925-2 shall be used. The size of the mesh of the specimen holder may be reduced in order to retain the small size particles.

The following parameters shall be taken into account when preparing the specimens:

- the thickness (40 mm according to the specimen holder characteristics),
- the lowest and highest density,
- the lowest amount of flame retardant, if applicable.

The test results are valid for thicknesses greater than the tested one and for the whole range of densities between those evaluated.

#### **A.4.2 Compound product**

Due to the thickness of the insulation material used in practice, the low energy level of the ignition source and the short time of flame exposure the influence of the end use condition can be considered as negligible when testing the specimens. Hence the insulation material shall be tested without any substrate behind.

Testing of all specimens shall be conducted with edge exposure according to clause 7.3.3.2 of the test standard.

The following parameters shall be taken into account when preparing the specimens:

- each different chemical composition,
- the greatest thickness (usually that means the greatest testable thickness of 60 mm),
- the lowest density,
- the highest amount of expanded cork and additional organic components, and
- the lowest amount of flame retardant.

The test results are valid for the variation tested and any variant of the product

- with the same chemical composition,
- with higher densities,
- with lower amounts of expanded cork and additional organic components,
- with higher amounts of the same type of flame retardant as the one which has been tested and
- of any thickness, if the maximum testable thickness of 60 mm was tested.

If a lower thickness than 60 mm was used for testing, test results are valid for lower thicknesses.

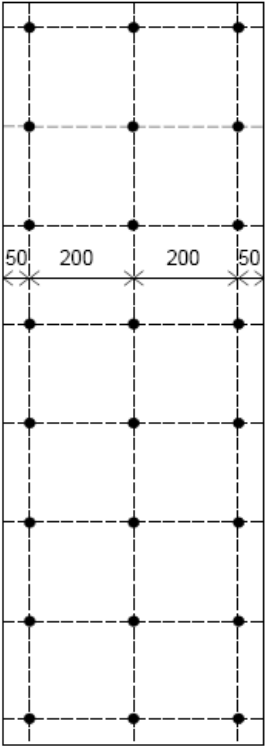
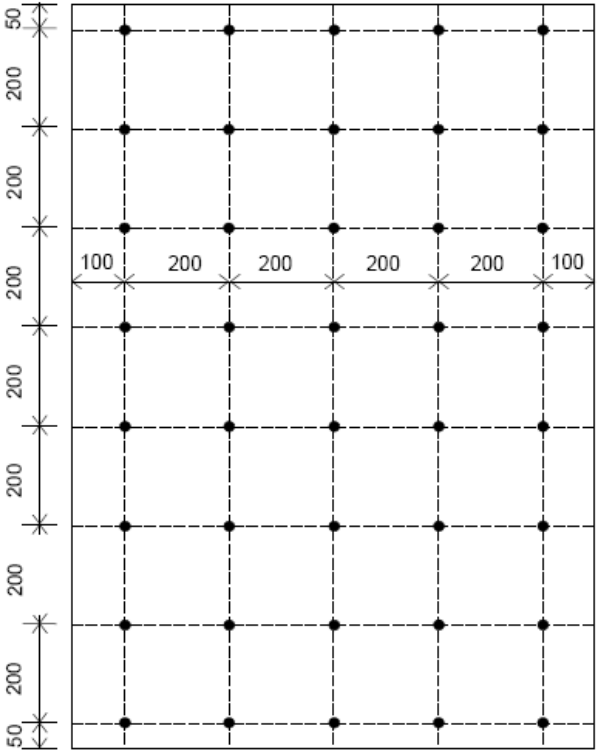


Figure A1



Scale unit in mm  
• = Position of screw

Figure A2

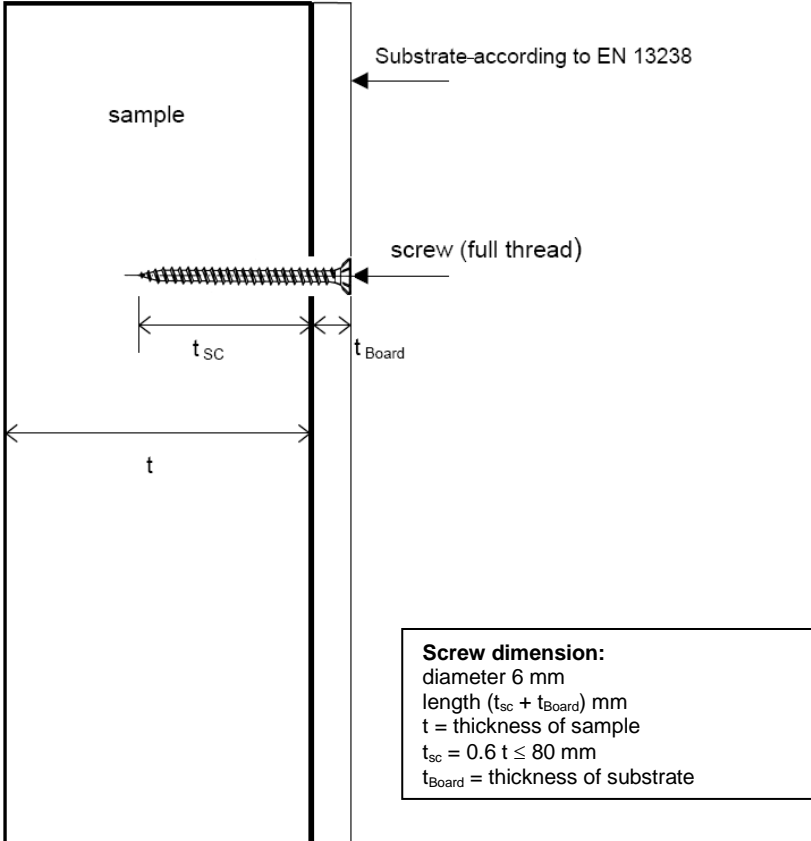


Figure A3

## **ANNEX B: DETERMINATION OF RESISTANCE TO MOULD FUNGUS**

### **B.1 Principle**

A test specimen is exposed for a defined period of time at constant temperature to a high moisture climate. After this period of time the test specimen is visually inspected for the presence of mould fungus.

### **B.2 Apparatus**

**B.2.1** Desiccator, of sufficient size, that can contain a test specimen of 50 mm x 20 mm x 30 mm or for loose-fill product a cage of wire according to B.2.2.

**B.2.2** Cage made of stainless steel with an internal volume of approx. 0.05 litres for loose-fill products.

Cage A, for large particles, with a mesh size of 10 mm x 10 mm and wire thickness of 0.4 mm.

Cage B, for small particles, with a mesh size of 1 mm x 1 mm and a wire thickness of and a wire thickness of 0.25 mm.

### **B.3 Testing conditions**

The exposure shall be performed at constant temperature of  $(23 \pm 2)$  °C.

**Note:** *This constant temperature is necessary to avoid any condensation during the exposure period.*

### **B.4 Procedure**

- The desiccator is filled at the bottom with water;
- The sample is then put in the desiccator, taking care that no part of the sample can come into contact with water;
- The desiccator is then closed tightly and put in the temperature-conditioned room for a period of four weeks;
- After four weeks the desiccator is opened and the sample visually inspected on the presence of mould fungus according to EN ISO 846, clause 9.1.

### **B.5 Expression of results**

The presence of mould fungus is expressed according to Table 4 of EN ISO 846.



## ANNEX C: DETERMINATION OF METAL CORROSION DEVELOPING CAPACITY

**Note:** *The determination method is adapted from EN 15101-1, Annex E.*

### C.1 Principle

This test is intended to provide a basis for the acceptance or rejection of the level of corrosivity displayed by the insulation product where water may cause chemical constituents to migrate to thin copper or zinc-coated elements adjacent to the insulation.

**Note:** *This is an accelerated test and analytical laboratory hygiene is required at all stages.*

*Note: Product passing this test is deemed acceptable when installed adjacent to thick-sectioned steel components (e.g. nails) which may be present in a loft. Thin-sectional steel components devoid of zinc coating or other protection are at risk in any humid loft environment irrespective of the nature of any insulation present.*

### C.2 Conditioning

Each test specimen shall be conditioned at  $(23 \pm 2)$  °C and  $(50 \pm 5)$  % relative humidity at least 24 h prior to testing.

### C.3 Reagents and materials

**C.3.1** Four metal test coupons, two of copper foil of 99.9 % purity and two of zinc foil of 99.9 % purity, each 50 mm x 50 mm x 0.075 mm thick, judged free of tears, distortions, scratches, perforations, corrosion or other flaws when viewed under and over a 40 W coiled coil incandescent light bulb.

**C.3.2** Trichloroethylene, of analytical reagent quality.

**Note:** *Attention is drawn to the possible health risks when using this material.*

**C.3.3** Sulphuric acid, (C)  $\text{H}_2\text{SO}_4 = 0.5 \text{ mol/l}$  to  $1 \text{ mol/l}$ .

**C.3.4** Saturated ammonium acetate solution.

### C.4 Apparatus

**C.4.1** Humidity chamber maintained at  $(40 \pm 2)$  °C and 90 % to 95 % relative humidity.

**C.4.2** Four cylindrical glass crystallising dishes, well washed, nominally 90 mm in diameter and 50 mm deep.

**C.4.3** Rubber or PVC gloves.

**C.4.4** Stainless steel spatula.

**C.4.5** Tweezers.

### C.5 Procedure

Carry out the procedure as follows:

Wash each metal coupon successively in two glass dishes of the trichloroethylene to remove any grease or oil, and dry at room temperature. At this and all subsequent handling of the coupons, thin rubber or PVC gloves should be worn and tweezers used.

- a) Take four 20 g samples of the insulation product and mix each with 150 ml of distilled or deionized water at room temperature in clean glass beaker.
- b) Transfer approximately half of one sample of the saturated insulation product, using gloved hands and a clean stainless spatula, to one of the crystallising dishes and tamp level such that a layer of 10 mm to 15 mm thickness is formed. Place one of the metal coupons horizontally on this layer by introducing one end at slight angle to the saturated material, progressively pressing the remainder of the coupon gently down and shaking the dish slightly, in such a way that all air bubbles are expelled from the underside of the coupon. If necessary, gently tamp the saturated layer and coupon level again.

Transfer the remainder of the sample of saturated fibrous insulation as before, together with any free liquor, to cover the first layer and coupon evenly. Remove carefully any air (silvery bubbles) still visible through the glass and then gently tamp the compact level.

Repeat the above procedure so that composite test assemblies are produced for all four metal coupons.

- c) Transfer the four composite test assemblies without delay to the preconditioned humidity chamber.

The assemblies are not covered, but if the chamber is capable of dripping onto them, position a guard so as to prevent it.

- d) Leave the test assemblies undisturbed in the humidity chamber for  $(336 \pm 4)$  h (14 days), except for brief and occasional opening of the chamber for visual inspection or the introduction of the other test assemblies. If, as a result of a visual inspection, it is found that a detectable drying of the surface of a composite test assembly has occurred, the minimum quantity of distilled or deionized water necessary to restore the original condition may be sprayed onto that surface, and a check made on the functioning of the chamber.
- e) Upon completion of the test period, take the metal coupons from the assemblies and remove loose corrosion products by immersion for not longer than 30 s, as follows:
  - i. copper coupons in sulphuric acid at room temperature,
  - ii. zinc coupons in saturated ammonium acetate solution at room temperature.

Wash the coupons immediately under running water and dry without delay.

- f) Immediately after cleaning, examine the metal coupons for perforation over the 40 W light bulb. Discount any notches or perforations within 3 mm of the edge of a coupon and note only those perforations within the remaining central zone.