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European Assessment Document for

Factory-made insulation mats made of glass fibres and amorphous silica

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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) 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 products “Factory-made insulation mats made of glass fibres and amorphous silica” consist of a uniformly distributed blend of glass fibres with embedded silica amorphous. During the production process glass fibre mats are impregnated with the water solution of aerogel amorphous silica and additives.

Glass fibres and amorphous silica are mandatory components of the product.

The product comprises no coating. It is produced from newly formed or recycled fibres and the percentage of recycled fibres can be till 100%. The EAD applies to the product manufactured with any percentage. The product is opaque (it is neither translucent nor transparent). The product may or may not contain binders. It may also contain high-temperature performance enhancers. An example of both are TiO_2 granules. This EAD applies to the product in the form of mats with a thickness not greater than 15 mm.

The product is not covered by a harmonised European standard (hEN). The product cannot be covered by hEN 13162 due to:

a.) It contains silica, while hEN covers factory-made mineral wool products only.
b.) It is intended to be used in building equipment and industrial installations too, while hEN 13162 covers civil engineering applications only.
c.) The assessment methods envisaged from hEN 13162 for some essential characteristics need to be modified for adapting them to the particularities of the mats
    - For what concerns short-term water absorption by partial immersion, hEN refers to a testing standard that has been withdrawn, while such assessment is needed for the product.
    - For what concerns water vapour diffusion resistance, the product should be measured. The two assessment alternatives to be used according to hEN for pure mineral wool products are of no relevance here due to the silica content in the product.
    - For what concerns bending strength, due to the small thickness and the curvature of the samples, 1.) the span prescribed in the EAD is smaller than those allowed in hEN and 2.) from two alternative diameters prescribed in hEN, the smaller from them is chosen in EAD.
    - For what concerns thermal conductivity and thermal resistance: 1.) hEN does not prescribe measuring moisture factors, which are prescribed to be measured in the EAD, and 2.) hEN prescribes measuring the values at 10°C, whereas the EAD allows them to be measured also at higher or lower temperatures.
    - For what concerns thickness hEN prescribes two possible pressure loads, which are too low for our product. Thus in EAD larger pressure loads are prescribed.
    - For what concerns compressive stress, compressive creep, and tensile strength perpendicular to faces in the hEN two different linear sizes of samples are prescribed. Due to the mechanical stiffness of the samples cut from the roles, the curvature of samples of those sizes would be too high; therefore smaller linear dimensions of samples in the EAD are prescribed.

d.) For some of the essential characteristics of the mats new assessment methods are needed and envisaged in this EAD: see chapter 2.

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 product is intended to be used in walls, floors, ceilings, building equipment and industrial installation as thermal and acoustic insulation for impact sound reduction.

The product shall be used where it is not exposed to wetting, weathering, heavy moisture transport, condensation or wind. The product can be exposed to compression loads.

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 "Factory-made insulation mats made of glass fibres and amorphous silica" for the intended use of 50 years when installed in the works (provided that the "Factory-made insulation mats made of glass fibres and amorphous silica" 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[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

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

2.1 Essential characteristics of the product

Table 2.1.1 shows how the performance of "Factory-made insulation mats made of glass fibres and amorphous silica" 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
2	Propensity to undergo continuous smouldering	2.2.2	Description
Basic Works Requirement 3: Hygiene, health and the environment			
3	Content, emission and/or release of dangerous substances	2.2.3	Description
4	Short-term water absorption by partial immersion	2.2.4	Level
5	Water vapour diffusion resistance	2.2.5	Level
6	Mould growth	2.2.6	Level
Basic Works Requirement 4: Safety and accessibility in use			
7	Nail tearing resistance	2.2.7	Level
8	Point load	4.3.5 of EN 13162	Level
9	Bending strength	2.2.8	Level
Basic Works Requirement 5: Protection against noise			
10	Dynamic stiffness	4.3.9 of EN 13162	Level
Basic Works Requirement 6: Energy economy and heat retention			
11	Thermal conductivity and thermal resistance	2.2.9	Level
12	Thickness	2.2.10	Level
13	Dimensional stability under specified temperature and humidity	4.3.2 of EN 13162	Level
14	Dimensional stability under specified compressive load and temperature conditions	2.2.11	Level
15	Compressive stress	2.2.12	Level
16	Compressive creep	2.2.13	Level
17	Tensile strength perpendicular to faces	2.2.14	Level
18	Tensile strength parallel to faces	2.2.15	Level
19	Maximum service temperature	2.2.16	Level
20	Minimum service temperature	2.2.17	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 product shall be tested, using the method(s) relevant for the corresponding reaction to fire class according to EN 13501-1. The product shall be classified according to the Commission Delegated Regulation (EU) No 2016/364 in connection with EN 13501-1.

For reaction to fire testing of the product the instructions for mounting and fixing as well as for the extended application of the test results given in EN 15715 using the product specific details for mineral wool products (clause 5 and tables A.1 and A.2) shall apply accordingly for products covered by this EAD. In deviation from those provisions, the minimum and the maximum thickness of the product shall be tested.

The determined class shall be given in the ETA.

2.2.2 Propensity to undergo continuous smouldering

The propensity to undergo continuous smouldering of the product shall be tested according to EN 16733.

2.2.2.1 Sample taking

In addition to EN 16733, the following conditions and parameters shall be considered when performing sampling and preparing test specimens:

- the 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) [2];
- the product or product variant with the highest organic content (in percentage per mass), determined according to EN 13820;
- the product or product variant with the highest density as well as a density of about 100 kg/m³ (± 15 %); if this range is lower than 115 kg/m³, then only the product or product variant with the highest density (density determined in accordance with EN 1602);
- the product or the product variant with the highest thickness ;
- each different produced fibre orientation, i.e., lengthwise and crosswise to the length direction of the specimen as well as perpendicular to the surface of the specimen front side;
- without any facings, coatings (or similar) – existing facings or coatings shall be removed when preparing the test specimens.

2.2.2.2 Preparation of the test specimen

The tests shall be done on free-hanging specimens without consideration of the intended end-use conditions, because the propensity to undergo continuous smouldering is hardly affected by end-use conditions, and without any joints (see further).

If the product is only available with a length lower than 800 mm, the test specimens shall be prepared by using two (or more) smaller pieces of the product which shall be put together with a butt joint. This joint shall be positioned at the highest possible distance to the bottom edge of the test specimens. Connection of these pieces of the test specimens shall be carried out in such an appropriate manner that permanent and close contact is ensured between the pieces at the joint for the entire testing and monitoring time.

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2 To permit the TAB to apply EXAP-rules, the manufacturer should provide sufficient information (e.g., on the basis of the composition of the products in question), allowing the TAB to determine which products or product variants should be submitted to testing.

2.2.2.3 Extended application of the test results

The test results considering the aforementioned parameters are also valid for products:

- of the same product type,
- with lower organic content,
- with all lower densities,
- with lower thickness,
- with all fibre orientations,
- with any facings or coatings and
- for any end-use conditions.

The results of the testing and assessment are expressed and stated in the ETA according to points 10 and 11 of EN 16733.

2.2.3 Content, emission and/or release of dangerous substances

The performance of the product regarding 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(s) 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:

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

SVOC and VOC

For the intended use covered by the release scenario 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 taken from the following table:

Table 2.2.3.1 Loading factor L, depending on the product type (in accordance with EN 16516)

Intended use	Loading factor [m2/m3]
Walls	1.0
Floor, ceiling	0.4

The preparation of the test specimen is performed by using a representative sample of the product installed in accordance with the manufacturer's product installation instructions or in absence of such instructions the usual practice of the product installation.

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

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

The manufacturer may **not** be asked to:
- provide the chemical constitution and composition of the product (or of constituents of the product) to the TAB, or
- 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, 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 is not to be distributed to EOTA or to the TABs.

The test results have to be reported for the relevant parameters (e.g. chamber size, temperature and relative humidity, air exchange rate, loading factor, size of the test specimen, use of hydrophobic agents, conditioning, production date, arrival date, test period) after 3 and 28 days testing.

The relevant test results shall be expressed in [mg/m^3] and stated in the ETA. The result obtained on a thicker specimen is valid also for a thinner specimen.

2.2.4 Short-term water absorption by partial immersion

The determination of short-term water absorption by partial immersion shall be carried out according to EN ISO 29767, method A. At least four test specimens shall be measured on each thickness.

The maximum short-term water absorption by partial immersion shall be stated in the ETA using steps of 0.1 kg/m^2. The result obtained on a thicker specimen is valid also for a thinner specimen.

2.2.5 Water vapour diffusion resistance

The determination of the water vapour transmission shall be carried out according to EN 12086, using set B of inner climate conditions. The climate conditions according to EN 12086, used for testing, shall be given in the ETA. At least five test specimens shall be measured on each thickness.

The mean value of the water vapour diffusion resistance factor μ for each thickness shall be stated in the ETA.

2.2.6 Mould growth

The determination of the growth of mould fungus shall be carried out according to Annex E of the EAD 070001-02-0504.

The intensity of growth of mould fungus according to the Table 4 of EN ISO 846 shall be stated in the ETA. The result obtained on a thicker specimen is valid also for a thinner specimen.

2.2.7 Nail tearing resistance

Nail tearing resistance shall be determined in accordance with EN 12310-1 in 2 perpendicular directions. At least five test specimens shall be measured for each of the perpendicular directions for each thickness.

The mean value of the nail tearing resistance (in N) shall be stated in the ETA. The result obtained on a thinner specimen is valid also for a thicker specimen.

2.2.8 Bending strength

Bending strength shall be determined in accordance with EN 12089, method B, where the span shall be 100 mm. The diameter of the supports shall be (30±3) mm. At least four test specimens shall be measured for each thickness.

The mean value of the bending strength (in kPa) shall be stated in the ETA in levels according to clause 4.3.17 of EN 13162. The result obtained on a thinner specimen is valid also for a thicker specimen.

2.2.9 Thermal conductivity and thermal resistance

Thermal conductivity shall be tested according to EN 12667 for each thickness. Following EN 12667 to ensure full surface contact (due to curvature and surface shape), thermal conductivity could be measured at an enhanced pressure load. In that case, the size of the pressure load shall be so high, that there are no air gaps visible between the sample and the measuring plate. The measurements shall be performed at a mean temperature of 10°C.

A minimum of 4 measurements shall be carried out/performed in dry conditions.

The conversion with regard to moisture content shall be carried out according to EN ISO 10456 performed at least 3 additional thermal conductivity measurements at 23°C/50% and/or at least 3 additional thermal conductivity measurements at 23°C/80%.

The thermal conductivity at a temperature of 10 °C in dry conditions ($\lambda_{10,dry,90/90}$) representing at least 90% of the production with a confidence level of 90% shall be determined according to Annex A. The calculated value $\lambda_{D(23,50)}$ according to Annex B shall be stated in the ETA The moisture conversion factors ($f_{u,1}$, $f_{u,2}$) and the moisture contents ($u_{23,50}$, $u_{23,80}$), shall be stated in the ETA. The detailed procedure of their determination is presented in Annex A.

Thermal conductivity can additionally be measured at higher and/or lower (also negative) temperatures than at 10°C mean temperature following the same measuring standards. The average results of these measurements shall be stated in the ETA together with mean temperatures.

2.2.10 Thickness

The determination of thickness shall be carried out following EN 823. The pressure loads are as follows:

- 500 Pa for the mats of a nominal thickness of less than 5 mm,
- 700 Pa for the mats of a nominal thickness greater or equal to 5 mm and less than 10 mm,
- 1000 Pa for the mats of a nominal thickness greater or equal to 10 mm.

For the specimens less than 25 m long, take at least 5 measurements with the measuring points d_1, d_2, d_3, d_4, d_5, …, d_n equally spaced in length. If the length of the test specimen is greater than 25 m, take a measurement at each 5 m (or less) with the measuring points d_1, d_2, d_3, d_4, d_5, …, d_n equally spaced in length. The measuring points are spaced in width as shown in Figure 2 of EN 823. The number of test specimens shall be 4.

The average thickness shall be given in the ETA including a class of the measuring tolerances following Table 1 of EN 13162. The pressure load, at which measurements of thickness were conducted, shall be given in the ETA.

2.2.11 Dimensional stability under specified compressive load and temperature conditions

The determination of the dimensional stability under specified compressive load and temperature conditions shall be carried out based on EN 1605 for test condition 1 (20 kPa / 80°C) or test condition 2 (40 kPa / 70°C). At least three test specimens shall be measured for each thickness.

The mean values of relative change in thickness (in %) after step A and after step B are given in the ETA along with the set of the test conditions.

2.2.12 Compressive stress

For products exposed to compression load, the compressive stress at 10% deformation or the compressive strength shall be determined according to EN 826 and clause 4.3.3 of EN 13162. The test specimens shall have dimensions of 100 × 100 mm. At least five test specimens shall be measured for each thickness.

The mean value of compressive stress or compressive strength (both in kPa) is stated in the ETA in levels according to clause 4.3.3 of EN 13162.

2.2.13 Compressive creep

The compressive creep and the total thickness reduction shall be determined in accordance with EN 1606 and clause 4.3.6. of EN 13162. The test specimens shall have dimensions of 100 × 100 mm. At least three test specimens shall be measured for each thickness. Three or more different pressure loads are chosen according to the formulae at 7.2 of EN 1606.

The compressive creep and the total thickness reduction (both in mm) for each imposed load shall be stated in the ETA in levels according to clause 4.3.6 of EN 13162.

2.2.14 Tensile strength perpendicular to faces

Tensile strength perpendicular to faces shall be determined in accordance with EN 1607. The recommended dimensions of the test specimens are 100 × 100 mm. At least five test specimens shall be measured for each thickness.

The mean value of tensile strength perpendicular to faces (in kPa) shall be stated in the ETA in levels according to clause 4.3.4 of EN 13162. The result obtained on a thinner specimen is valid also for a thicker specimen.

2.2.15 Tensile strength parallel to faces

Tensile strength parallel to faces shall be determined in accordance with EN 1608. The measured specimen shall be 500 mm long. At least three test specimens for each thickness shall be measured.

The mean value of tensile strength parallel to faces (in kPa) shall be stated in the ETA. The result obtained on a thinner specimen is valid also for a thicker specimen.

2.2.16 Maximum service temperature

The maximum service temperature, ST(+), shall be determined in accordance with EN ISO 18097. The number of specimens needed for testing shall be at least 3. Testing shall be performed on multilayer system specimens. The thickness of the measured multilayer system shall be as close as possible to (100 ± 5) mm. Side dimensions of specimens shall be 300 × 300 mm. The initial load for measuring thickness d_0 shall be the same as for thickness measurement according to 2.2.10. Temperature rise shall be 300 K/hour.

At the maximum service temperature ST(+) no test result shall exceed a deformation under the defined load by more than 7%. Self-heating process shall be monitored according to EN ISO 18097/Figure A.1 and results of this assessment shall be presented in the ETA by a graph as of EN ISO 18097/Figure A.2 along with the maximum service temperature value, ST(+).

The maximum service temperature shall be declared in steps of not less than 10 °C.

2.2.17 Minimum service temperature

The minimum service temperature, ST(-) shall be assessed and stated in accordance with point 4.3.3 of the standard EN 14304 for each thickness.

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 1999/91/EC(EU) as amended by Commission Decision 2001/596/EC(EU).

The applicable AVCP system 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 regarding reaction to fire 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 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 (v)
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1	All raw material	As defined in the Control Plan	As defined in the Control Plan	Each delivery	All deliveries
2	Reaction to fire (i)				
	Reaction to fire (for class A1)	Direct test according to EN ISO 1182	As defined in the Control Plan	According to the test method and the Control Plan (iv)	At least once every two years (iii)
	Reaction to fire (for class A1 or A2)	Direct test according to EN ISO 1716	As defined in the Control Plan	According to the test method and the Control Plan (iv)	At least once every two years (iii)
	Reaction to fire (for class A2 to D)	Direct test according to EN 13823 (ii)	As defined in the Control Plan	According to the test method and the Control Plan (iv)	At least once every two years (iii)
	Reaction to fire (for class B to F)	Direct test according to EN ISO 11925-2	As defined in the Control Plan	According to the test method and the Control Plan (iv)	At least once every two years (iii)
	Reaction to fire (for any classification)	Indirect tests: - Loss on ignition (see row 21) - Density (see row 14)	Indirect tests: - Loss on ignition (see row 21) - Density (see row 14)	Indirect tests: - Loss on ignition (see row 21) - Density (see row 14)	Indirect tests: - Loss on ignition (see row 21) - Density (see row 14)

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control (v)
3	Propensity to undergo continuous smouldering	Direct control method based on relevant clause 2.2.2	As defined in the Control Plan	One (iv)	At least once every two years (iii)
		Indirect tests: - Loss on ignition (see row 21) - Density (see row 14)	Indirect tests: - Loss on ignition (see row 21) - Density (see row 14)	Indirect tests: - Loss on ignition (see row 21) - Density (see row 14)	Indirect tests: - Loss on ignition (see row 21) - Density (see row 14)
4	Short-term water absorption by partial immersion	2.2.4	As defined in the Control Plan	As defined in the Control Plan	Twice a year
5	Water vapour diffusion resistance	2.2.5	As defined in the Control Plan	As defined in the Control Plan	Once a year
6	Mould growth	2.2.6	As defined in the Control Plan	As defined in the Control Plan	Once per 5 years and at each change of the production materials
7	Nail tearing resistance	2.2.7	As defined in the Control Plan	As defined in the Control Plan	Once per 5 years and at each change of the production materials
8	Point load	4.3.5 of EN 13162	As defined in the Control Plan	As defined in the Control Plan	Once per 5 years and at each change of the production materials
9	Bending strength	2.2.8	As defined in the Control Plan	As defined in the Control Plan	Once per 3 months
10	Dynamic stiffness	4.3.9 of EN 13162	As defined in the Control Plan	As defined in the Control Plan	Once per 6 months
11	Thermal conductivity and thermal resistance	2.2.9	As defined in the Control Plan	As defined in the Control Plan	Once per month
12	Thickness	2.2.10	As defined in the Control Plan	As defined in the Control Plan	Every batch or once per 4 hours
13	Dimensional stability under specified temperature and humidity conditions	4.3.2 of EN 13162	As defined in the Control Plan	As defined in the Control Plan	Once per 5 years and at each change of the production materials
14	Dimensional stability under specified compressive load and temperature conditions	2.2.11	As defined in the Control Plan	As defined in the Control Plan	Once per 5 years and at each change of the production materials
15	Density	3.4.2	As defined in the Control Plan	As defined in the Control Plan	Every batch or once per 4 hours
16	Compressive stress	2.2.12	As defined in the Control Plan	As defined in the Control Plan	Once per two weeks

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control (v)
17	Compressive creep	2.2.13	As defined in the Control Plan	As defined in the Control Plan	Once per 10 years and at each change of the production materials
18	Tensile strength perpendicular to faces	2.2.14	As defined in the Control Plan	As defined in the Control Plan	Once per 3 months
19	Tensile strength parallel to faces	2.2.15	As defined in the Control Plan	As defined in the Control Plan	Once per 3 months
20	Maximum service temperature	2.2.16	As defined in the Control Plan	As defined in the Control Plan	Once per 5 years and at each change of the production materials
21	Minimum service temperature	2.2.17	As defined in the Control Plan	As defined in the Control Plan	Once per 5 years and at each change of the production materials
22	Loss on ignition	Test according to EN ISO 3451-1	As defined in the Control Plan	As defined in the Control Plan	Once per 8 hours
23	Length and width	3.4.1	As defined in the Control Plan	As defined in the Control Plan	Every batch or once per 4 hours

(i) Indirect tests shall be applied independently from the source of their classification (Testing, Decision 96/603/EC as amended or any other applicable CWFT decision). Direct tests within the FPC shall only apply where the classification is based on the prescribed tests for the corresponding class(es) according to Commission Delegated Regulation (EU) 2016/364 and EN 13501-1.

(ii) If it is necessary to perform SBI tests within the FPC, that test set-up shall apply which was used as the worst case for the classification tests within the ETA procedure.

(iii) The performance is additionally verified by means of indirect tests (see rows 14 & 21). For this minimum frequency, the sufficient correlation between the foreseen system of indirect FPC measures and the direct tests shall be stated in the Control Plan.

(iv) The necessary number of specimens shall be more detailed in the control plan depending on the test method and the class to be verified within the FPC. The tests shall be performed on randomly taken specimens from the consecutive production process.

(v) In case of discontinuous production these minimum frequencies should be adapted to an equivalent frequency.

3.3 Tasks of the notified body

The intervention of the notified body under AVCP system 1 is only necessary for reaction to fire 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 in the procedure of assessment and verification of constancy of performance for the product 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 number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control carried out by the manufacturer regarding the constancy of performance related to reaction to fire					
1	Where the intervention of the Notified Body is necessary only because the conditions for the applicability of system 1 are fulfilled for reaction to fire, the notified body will consider especially the clearly identifiable stage in the production process which results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material).	As defined in clause 2.2.1 of EAD	As defined in the control plan agreed between the TAB and the manufacturer	As defined in the control plan agreed between the TAB and the manufacturer	When starting the production or a new line
Continuous surveillance, assessment and evaluation of factory production control carried out by the manufacturer regarding the constancy of performance related to reaction to fire					
2	Where the intervention of the Notified Body is necessary only because the conditions for the applicability of system 1 in the Decisions regarding reaction to fire are fulfilled, the notified body will consider especially the clearly identifiable stage in the production process which results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material)	As defined in clause 2.2.1 of EAD	As defined in the control plan agreed between the TAB and the manufacturer	As defined in the control plan agreed between the TAB and the manufacturer	Once per year

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

3.4.1 Length and width

The determination of length and width shall be carried out according to EN ISO 29465. The number of test specimens shall be 4.

3.4.2 Density

The determination of apparent density shall be carried out according to EN 1602 in kg/m^3, whereas the measurement of thickness is taken from 2.2.10. The number of test specimens shall be 4.

4 REFERENCE DOCUMENTS

EN ISO 29465:2022	Thermal insulating products for building applications - Determination of length and width (ISO 29465:2022)
EN 823:2013	Thermal insulating products for building applications - Determination of thickness
EN 826:2013	Thermal insulating products for building applications - Thermal insulating products for building applications - Determination of compression behaviour
EN ISO 1182:2020	Reaction to fire tests for products - Non-combustibility test (ISO 1182:2020)
EN 1602:2013	Thermal insulating products for building applications - Determination of the apparent density
EN 1605:2013	Thermal insulating products for building applications - Determination of deformation under specified compressive load and temperature conditions
EN 1606:2013	Thermal insulating products for building applications - Determination of compressive creep
EN 1607:2013	Thermal insulating products for building applications - Determination of tensile strength perpendicular to faces
EN 1608:2013	Thermal insulating products for building applications - Determination of tensile strength parallel to faces
EN ISO 29767:2019	Thermal insulating products for building applications - Determination of short-term water absorption by partial immersion (ISO 29767:2019)
EN ISO 1716:2018	Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value) (ISO 1716:2018)
EN ISO 10456:2007 EN ISO 10456:2007/AC:2009	Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007)
EN 12086:2013	Thermal insulating products for building applications - Determination of water vapour transmission properties
EN 12089:2013	Thermal insulating products for building applications - Determination of bending behaviour
EN 12310-1:1999	Flexible sheets for waterproofing - Part 1: Bitumen sheets for waterproofing - Determination of resistance to tearing (nail shank)
EN 12430:2013	Thermal insulating products for building applications - Determination of behaviour under point load
EN 12667:2001	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 13162:2013+A1:2015	Thermal insulation products for buildings - Factory made mineral wool (MW) products – Specification
EN 13501-1:2018	Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests
EN 13820:2003	Thermal insulating materials for building applications - Determination of organic content
EN 13823:2020+A1:2022	Reaction to fire tests for building products – Building products excluding floorings exposed to the thermal attack by a single burning item
EN ISO 18097:2022	Thermal insulating products for building equipment and industrial installations - Determination of maximum service temperature (ISO 18097:2022)
EN 15715:2009	Thermal insulation products - Instructions for mounting and fixing for reaction to fire testing - Factory made products
EN 16733:2016	Reaction to fire tests for building products - Determination of a building product's propensity to undergo continuous smouldering
EN 14304:2016	Thermal insulation products for building equipment and industrial installations - Factory made flexible elastomeric foam (FEF) products - Specification
EAD 070001-02-0504:2023	Gypsum plasterboards, gypsum boards with fibrous reinforcement and expanded glass boards with fibrous reinforcement for sheathing and lining of building elements

ANNEX A: DETERMINATION OF THERMAL RESISTANCE, THERMAL CONDUCTIVITY AND THE MASS-RELATED MOISTURE CONVERSION COEFFICIENT TO HIGH MOISTURE CONTENT

A.1 Determination of the fractile value of thermal conductivity at 10 °C, at dry conditions ($\lambda_{10,dry,90/90}$)

A.1.1 Measurement of the thermal conductivity at 10 °C at dry conditions

A.1.1.1 Test specimens for the determination of the thermal conductivity λ at 10 °C shall be conditioned to dryness after storage for at least 72 hours at (65 ± 2)°C in an oven ventilated with air taken at (23 ± 2)°C and (50 ± 5)% relative humidity.

A 1.1.2 The thermal conductivity of the test specimens conditioned according to A.1.1.1 shall be measured according to EN 12667 at a mean temperature of (10 ± 0.3)°C.

During the measurement, precaution shall be taken to avoid moisture absorption by the specimen. It is acceptable, for instance, to put the test specimen into a thin plastic bag.

A.1.2 Calculation of the fractile value of thermal conductivity at 10 °C, at dry conditions ($\lambda_{10,dry,90/90}$)

A.1.2.1 The λ fractile value at 10°C, at dry conditions ($\lambda_{10,dry,90/90}$) representing at least 90 % of the production with a confidence limit of 90 % shall be calculated using the principles as detailed in EN 13162, Annex A. It shall be noted that the λ_D and R_D shall be calculated in accordance with A.3.

A.2 Determination of the mass-related moisture conversion coefficient ($f_{u,1}$)

For the determination of the mass-related moisture conversion coefficient $f_{u,1}$, two sets of measurements are needed.

Set 1

At least three measurements on dry test specimens, to determine $\lambda_{10,dry}$ and u_{dry} (moisture content mass by mass).

Set 2

At least three measurements on test specimens conditioned at (23 ± 2)°C and (50 ± 5)% relative humidity, to determine $\lambda_{10,(23,50)}$ and $u_{23,50}$ (moisture content mass by mass).

A.2.1 Procedure

A.2.1.1 Set 1

A.2.1.1.1 Dry the test specimens following the procedure in A.1.1.1.

A.2.1.1.2 Determine for each test specimen the mass in dry condition. Average the values to determine the m_{dry}. The u_{dry}, being the moisture content in dry condition, is by definition set to 0.

A.2.1.1.3 Determine for each test specimen the value of thermal conductivity at 10 °C following the procedure in A.1.1.2. Average the values to determine the $\lambda_{10,dry}$.

A.2.1.2 Set 2

A.2.1.2.1 Condition the test specimens at (23 ± 2)°C and (50 ± 5)% relative humidity following the procedures detailed in EN 13171, clause 5.2, step 2.

A.2.1.2.2 Determine for each test specimen the mass at (23 ± 2)°C and (50 ± 5)% relative humidity. Average the values to determine the mass at 23 °C and 50 % relative humidity as $m_{23,50}$.

A.2.1.2.3 Calculate $u_{23,50}$ by the following formula:

$$u_{23,50} = \frac{m_{23,50} - m_{dry}}{m_{dry}}$$

where,

$m_{23,50}$ is the mass at 23 °C and 50 % relative humidity according to A.2.1.2.2

m_{dry} is the mass according to A.2.1.1.2

A.2.1.2.4 Measure the λ value in accordance with EN 12667 at a mean temperature of (10 ± 0,3)°C for each test specimen conditioned according to A.2.1.2.1

Average the values to determine $\lambda_{10,(23,50)}$.

A.2.1.3 Calculation of the mass-related moisture conversion coefficient ($f_{u,1}$)

The mass-related moisture conversion coefficient $f_{u,1}$ shall be calculated by the following formula (derived from ISO 10456, formula 4):

$$f_{u,1} = \frac{\ln \frac{\lambda_{10,(23,50)}}{\lambda_{10,dry}}}{u_{23,50} - u_{dry}}$$

where,

$\lambda_{10,(23,50)}$ is determined according to A.2.1.2.4;

$\lambda_{10,dry}$ is determined according to A.2.1.1.3;

$u_{23,50}$ is determined according to A.2.1.2.3;

u_{dry} is determined according to A.2.1.1.2 - is defined to be 0.

A.3 Calculation of the thermal conductivity λ_D and thermal resistance R_D

The thermal conductivity λ_D shall be calculated using the following formula:

$$\lambda_{(23,50)} = \lambda_{10,dry,90/90} * e^{f_{u,1}(u_{23,50} - u_{dry})}$$

where,

$\lambda_{10,dry,90/90}$ is determined according to A.1.2;

$f_{u,1}$ is determined according to A.2.1.3;
$u_{23,50}$ is determined according to A.2.1.2.3;
u_{dry} is determined according to A.2.1.1.2 and is defined to be 0.

The calculated value of thermal conductivity $\lambda_{(23/50)}$ shall be rounded upwards to the nearest 0,001 W/(m K) and stated as $\lambda_{D(23,50)}$.

Thermal resistance R_D shall be calculated and stated as follows: $R_D = d/\lambda_{D(23,50)}$, whereas d is the mean thickness of the specimens at all measurements taken into account.

A.4 Determination of the mass-related moisture conversion coefficient ($f_{u,2}$) to high moisture content

For the determination of the mass-related moisture conversion coefficient to high moisture content $f_{u,2}$, two sets of measurements are needed.

Set 1
At least three measurements on test specimens conditioned at (23 ± 2)°C and (50 ± 5)% relative humidity, to determine $\lambda_{10,(23,50)}$ and $u_{23,50}$ (moisture content mass by mass).

Set 2
At least three measurements on test specimens conditioned at (23 ± 2)°C and (80 ± 5)% relative humidity, to determine $\lambda_{10,(23,80)}$ and $u_{23,80}$ (moisture content mass by mass).

A.4.1 Procedure

A.4.1.1 Set 1
Determine the $\lambda_{10,(23,50)}$ and $u_{23,50}$ in accordance with A.2.1.2

A.4.1.2 Set 2

A.4.1.2.1 Condition the test specimens at (23 ± 2)°C and (80 ± 5)% relative humidity following the procedures detailed in EN 13171, clause 5.2, step 2.

A.4.1.2.2 Determine for each test specimen the mass at (23 ± 2)°C and (80 ± 5)% relative humidity. Average the values to determine the mass at 23 °C and 80 % relative humidity as $m_{23,80}$.

A.4.1.2.3 Calculate $u_{23,80}$ by the following formula:

$$u_{23,80} = \frac{m_{23,80} - m_{dry}}{m_{dry}}$$

where,

$m_{23,80}$ is the mass at 23 °C and 80 % relative humidity according to A.4.1.2.2 and
m_{dry} is the mass according to A.2.1.1.2.

A.4.1.2.4 Measure the λ value in accordance with EN 12667 at a mean temperature of (10 ± 0,3)°C. for each test specimen conditioned according to A.4.1.2.1.
Average the values to determine $\lambda_{10,(23,80)}$.

A.4.1.3 Calculation of the mass-related moisture conversion coefficient to high moisture content ($f_{u,2}$)
The mass-related moisture conversion coefficient to high moisture content $f_{u,2}$ shall be calculated by the following formula (derived from ISO 10456, formula 4):

$$f_{u,2} = \frac{\ln \frac{\lambda_{10,(23,80)}}{\lambda_{10,(23,50)}}}{u_{23,80} - u_{23,50}}$$

where,

$\lambda_{10,(23,80)}$ is determined according to A.4.1.2.4;
$\lambda_{10,(23,50)}$ is determined according to A.2.1.2;
$u_{23,80}$ is determined according to A.4.1.2.3;
$u_{23,50}$ is determined according to A.2.1.2.

NOTE 1: For the determination of the mass-related moisture conversion coefficient $f_{u,1}$ and the mass-related moisture conversion coefficient to high moisture content $f_{u,2}$, the test specimens shall be taken from the same production run.

NOTE 2: Thermal conductivity may also be measured at mean temperatures other than 10 °C, providing that the accuracy of the relationship between the temperature and thermal properties is well documented.