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European Assessment Document for

Ultra-thin natural stone veneer sheets for internal and external wall finishes and roof coverings

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

Ultra-thin natural stone veneer sheets for internal and external wall finishes and roof coverings (in the following referred to as “ultra-thin natural stone veneer sheets”) are composite sheets with an extremely thin natural stone facing bonded to a fibreglass resin backing. The natural stone facing can be limestone, sandstone and slate.

The assessment methods as given in this EAD apply for thickness(es) as follows:

- for internal and external wall finishes:
  - thickness of the stone layer: 0,4 – 2,0 mm
  - thickness of the complete sheet: 1,0 – 3,0 mm
- for roof coverings:
  - thickness of the stone layer: 1,5 – 2,5 mm
  - thickness of the complete sheet: 2,0 – 3,0 mm

Figure 1.1.1 Typical layers of ultra-thin natural stone veneer sheets

Fixations of the product to walls (adhesive) or roofs (mechanical) are not covered by the EAD. When the sheets are bonded to the substrate, which is always the case when used for external or internal wall finishes, they can be laid with a visible joint using grouts or without joints placing them to each other directly. The grout is not covered by the EAD.

The application of the product can be done using fixations and grouts commonly available in the market. However, where fixing means (e.g., adhesives) or grouts are relevant for the determination of the performance regarding certain characteristics (e.g., reaction to fire), they shall be considered within the respective test methods and specified in the ETA.

The product is not fully covered by the following harmonised technical specifications:

- EAD 090078-00-0504, because this product is not a stiff slab but a flexible product due to the “ultra-thin” stone veneer facing.

  Specifically, the following essential characteristics of EAD 090078-00-0504, Use 1, do not apply:

  - breaking strength; not relevant since the product is flexible and fully supported by the substrate,
  - flexural tensile strength or modulus of rupture; not relevant since the product is flexible and fully supported by the substrate,
  - bond strength between layers - shear strength; not relevant since the product has a very thin and light stone layer with low mass,
  - durability for internal uses; not relevant since this characteristic relates to ceramic materials,
  - resistance to chemicals; not relevant since this characteristic relates to ceramic materials.

The assessment methods for essential characteristics other than those listed above and given in EAD 090078-00-0504, Use 1, can be used without changes (see references in Tables 2.1.1 to 2.1.3 to the relevant clauses of EAD 090078-00-0504) or with amendments as indicated in the relevant clause of chapter 2.2.

In addition, the following essential characteristics not listed in EAD 090078-00-0504, Use 1, have been added:

- water vapour resistance.

Use 2 and Use 3 of EAD 090078-00-0504 do not apply as this product, when it is used as an external wall finishing, is not fixed on a subframe and it is also not intended to be used on floorings.

- EN 1469[1], because this product is not a stiff slab but a flexible product due to the “ultra-thin” stone veneer facing and it is a composite sheet as opposed to a homogenous stone slab.

Specifically, the following essential characteristics of EN 1469 for the use in external wall finishes do not apply:

- mechanical resistance; not relevant since the product is flexible and fully supported by the substrate,
- resistance to fixing; not relevant since product is bonded when it is used as external wall finish,
- direct airborne sound insulation; not relevant since the product is very thin and has low mass and, therefore, does not contribute to direct airborne sound insulation,
- thermal resistance; not relevant since the product is very thin and has relatively high thermal conductivity and, therefore, does not contribute to thermal resistance,
- durability of flexural strength against freeze/thaw; not relevant since the product is flexible without flexural strength,
- resistance of marble to thermal and moisture cycling; not relevant since the product is very thin, fully supported and flexible, therefore, measurement of bowing and flexural strength do not apply.

The assessment methods for essential characteristics other than those listed above and given in EN 1469, external use, can be used with amendments as indicated in the relevant clause of chapter 2.2.

In addition, the following essential characteristics not listed in EN 1469, external use, have been added:

- water absorption,
- moisture expansion,
- bond strength/adhesion,
- bond strength between layers (strength perpendicular to the faces),
- durability – bond strength between layers (strength perpendicular to the faces) after alkaline aging,
- coefficient of linear thermal expansion.

Specifically, the following essential characteristics of EN 1469 for the use in internal wall finishes do not apply:

- flexural strength; not relevant since the product is flexible and this characteristic is required only for the use in ceilings,
- resistance to fixing; not relevant since product is bonded when it is used as internal wall finishes,
- direct airborne sound insulation; not relevant since the product is very thin and has low mass and, therefore, does not contribute to direct airborne sound insulation,
- thermal resistance; not relevant since the product is very thin and has relatively high thermal conductivity and, therefore, does not contribute to thermal resistance.

The assessment methods for essential characteristics other than those listed above and given in EN 1469, internal use, can be used without changes (see reference in Table 2.1.2 to the relevant clauses of EN 1469) or with amendments as indicated in the relevant clause of chapter 2.2.

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

In addition, the following essential characteristics not listed in EN 1469, internal use, have been added:

- water absorption,
- moisture expansion,
- bond strength/adhesion,
- bond strength between layers (strength perpendicular to the faces),
- durability – bond strength between layers (strength perpendicular to the faces) after alkaline aging,
- coefficient of linear thermal expansion.

Table 1 of EN 1469 also gives the thickness tolerances of slabs and the minimum thickness indicated therein is 12 mm. The thickness of the product as covered by this EAD is maximum 3,0 mm.

- EN 12326-1, because this product is a composite sheet as opposed to a homogenous slate product.

  Specifically, the following essential characteristics of EN 12326-1 for the use in roof coverings do not apply:

  - durability aspects including apparent calcium carbonate content, sulphur dioxide and non-carbonate carbon content; not relevant since these characteristics are needed to obtain the minimum individual thickness of the slates, which cannot be interpreted to ultra-thin natural stone veneer sheets.

  The assessment methods for essential characteristics other than those listed above and given in EN 12326-1, roof covering use, can be used without changes (see references in Table 2.1.3 to the relevant clauses of EN 12326-1) or with amendments as indicated in the relevant clause of chapter 2.2.

  In addition, the following essential characteristics not listed in EN 12326-1, roof covering use, have been added:

  - water vapour resistance,
  - bond strength between layers (strength perpendicular to the faces),
  - durability – bond strength between layers (strength perpendicular to the faces) after alkaline aging,
  - coefficient of linear thermal expansion.

  Section 5.2.3.1 of EN 12326-1 requires a minimum individual thickness of 2,0 mm, whilst the minimum thickness of the stone layer is 1,5 mm for roof covering use.

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 taking into consideration the following:
For bonded installation on internal and external walls:
- the surface of the substrate must be clean and dry, and free of dust, grease and other contaminants,
- the application of the adhesive depends on the type of the adhesive used and the instructions related to the adhesive shall always be followed,
- it is advisable to test the adhesive on the substrate before final application.
For mechanical installation on roofs:
- the fixings shall be valid for use on roofs and shall be compatible with the substrate,
- the application of the fixings depends on the type of fixing used and the instructions related to the fixings shall always be followed.

Relevant manufacturer's stipulations, e.g., with regard to the intended end use conditions, 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 as long as the details of the assessment methods as laid down in this EAD are respected.

1.2 Information on the intended uses of the construction product

1.2.1 Intended uses

Ultra-thin natural stone veneer sheets are intended to be used as external or internal wall finishes bonded to a substrate with common adhesives (e.g. modified silicone (MS) polymer adhesive, dispersion adhesive or cementitious adhesive (C) to EN 12004).

The application of the ultra-thin natural stone veneer sheets on thermal insulations as part of ETICS kits may require further tests and performance assessments of the entire kit including the ultra-thin natural stone veneer sheets. Thus, this application of the ultra-thin natural stone veneer sheets as part of ETICS kits are not covered by this EAD.

The ultra-thin natural stone veneer sheets are also intended to be used as roof covering with overlapping and mechanically fixed by nails or hooks to a subframe with a minimum slope of 15°. The products do not contribute to stiffening the roof structure.

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 ultra-thin natural stone veneer sheets for the intended use of 25 years when installed in the works. These provisions are based upon the current state of the art and the available knowledge and experience.

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

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

1.3 Specific terms used in this EAD

For the purpose of this document the following symbols apply.

1.3.1 Symbols

$\Delta l/L$	moisture expansion of ultra-thin natural stone veneer sheets [%]
n_{FT}	number of damaged specimens after 100 freeze-thaw cycles [-]
n_{sh}	number of specimens with visible defects after the completion of the thermal shock resistance test [-]
n_{tot}	total number of tested specimens during the thermal shock resistance test [-]
A_w	water permeability of ultra-thin natural stone veneer sheets [%]
E_v	water absorption of ultra-thin natural stone veneer sheets [%]
E_2	water absorption of ultra-thin natural stone veneer sheets after freeze-thaw cycles [%]

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

$F_{b,mean}$	mean value of bending forces of ultra-thin natural stone veneer sheets [N]
$F_{b,k}$	characteristic value of bending forces of ultra-thin natural stone veneer sheets [N]
F_d	deviation from flatness [%]
R_d	deviation from rectangularity [%]
R_σ^{ft}	residual strength of the mean values of the bond strength between layers (strength perpendicular to the faces) after freeze and thaw conditioning as a percentage of the as-delivered state [%]
R_σ^{a}	residual strength of the mean values of the bond strength between layers (strength perpendicular to the faces) after alkaline ageing as a percentage of the as-delivered state [%]
S_{dx}	deviation from edge straightness [%]
α_l	coefficient of linear thermal expansion of ultra-thin natural stone veneer sheets [10^{-6}/°C]
μ	water vapour diffusion resistance factor of ultra-thin natural stone veneer sheets [-]
$A_{s,m}$	mean value of bond strength between ultra-thin natural stone veneer sheets and the adhesive [MPa]
$A_{s,c}$	characteristic value of bond strength between ultra-thin natural stone veneer sheets and the adhesive [MPa]
σ_{m}^{T}	mean value of bond strength between layers (strength perpendicular to the faces) at the temperature T of ultra-thin natural stone veneer sheets [MPa]
σ_{c}^{T}	characteristic value of bond strength between layers (strength perpendicular to the faces) at the temperature T of ultra-thin natural stone veneer sheets [MPa]
$\sigma_{\mathrm{m}}^{ft,23\,°C}$	mean value of bond strength between layers (strength perpendicular to the faces) at 23°C after freeze and thaw aging of ultra-thin natural stone veneer sheets [MPa]
$\sigma_{\mathrm{max}}^{\mathrm{ft},23\,°C}$	maximum value of the single specimen of bond strength between layers (strength perpendicular to the faces) at 23°C after freeze and thaw aging of ultra-thin natural stone veneer sheets [MPa]
$F_{\mathrm{max}}^{ft,23\,°C}$	tensile breaking or maximum force recorded between layers (strength perpendicular to the faces) of the single specimen at 23°C after freeze and thaw aging of ultra-thin natural stone veneer sheets [N]
$\sigma_{\mathrm{m}}^{\mathrm{a},23\,°C}$	mean value of bond strength between layers (strength perpendicular to the faces) at 23°C after alkaline aging of ultra-thin natural stone veneer sheets [MPa]
$\sigma_{\mathrm{max}}^{\mathrm{a},23\,°C}$	maximum value of the single specimen of bond strength between layers (strength perpendicular to the faces) at 23°C after alkaline aging of ultra-thin natural stone veneer sheets [MPa]
$F_{\mathrm{max}}^{\mathrm{a},23\,°C}$	tensile breaking or maximum force recorded between layers (strength perpendicular to the faces) of the single specimen at 23°C after alkaline aging of ultra-thin natural stone veneer sheets [N]
A	cross-section area of the test specimen for bond strength between layers (strength perpendicular to the faces) [mm^2]

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 2.1.1 to Table 2.1.3 show how the performance of ultra-thin natural stone veneer sheets is assessed in relation to the essential characteristics relevant for external and internal wall finish and roof covering, respectively.

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 relevant for external wall finishes

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 2: Safety in case of fire			
1	Reaction to fire	2.2.1	Class
Basic Works Requirement 3: Hygiene, health and the environment			
2	Water vapour resistance	2.2.3	Level μ [-]
3	Water absorption	EAD 090078-00-0504, clause 2.2.2	Level E_v [%]
4	Moisture expansion	EAD 090078-00-0504, clause 2.2.3	Level Δl/L [%]
5	Content, emission and/or release of dangerous substances	2.2.5	--
	- Leachable substances	2.2.5.2	Description
Basic Works Requirement 4: Safety and accessibility in use			
6	Bond strength/adhesion	2.2.6	Level $A_{s,m}$ [Mpa] $A_{s,c}$ [Mpa]
7	Bond strength between layers (strength perpendicular to the faces)	EAD 090078-00-0504, clause 2.2.10	Level σ_m^T [Mpa] σ_c^T [Mpa]
8	Freeze and thaw resistance	EAD 090078-00-0504, clause 2.2.16	Level and description n_{FT} [-] E_2 [%]
9	Thermal shock resistance	2.2.7	Level n_{sh}, n_{tot} [-]
10	Coefficient of linear thermal expansion	EAD 090078-00-0504, clause 2.2.15	Level α_l [10^{-6}/°C]
Basic Works Requirement 4: Safety and accessibility in use			
11	Durability – bond strength between layers (strength perpendicular to the faces) after freeze and thaw conditioning	2.2.8	Level R_{σ}^{ft} [%]
12	Durability – bond strength between layers (strength perpendicular to the faces) after alkaline ageing	2.2.9	Level R_{σ}^{a} [%]

Table 2.1.2 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics relevant for internal wall finishes

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 2: Safety in case of fire			
1	Reaction to fire	2.2.1	Class
Basic Works Requirement 3: Hygiene, health and the environment			
2	Water vapour resistance	2.2.3	Level μ [-]
3	Water absorption	EAD 090078-00-0504, clause 2.2.2	Level E_v [%]
4	Moisture expansion	EAD 090078-00-0504, clause 2.2.3	Level ΔI/L [%]
5	Content, emission and/or release of dangerous substances	2.2.5	--
	- SVOC and VOC	2.2.5.1	Description
	- Emission of radioactivity	EN 1469, clause 4.2.14.1	Description
Basic Works Requirement 4: Safety and accessibility in use			
6	Bond strength/adhesion	2.2.6	Level $A_{s,m}$ [Mpa] $A_{s,c}$ [Mpa]
7	Bond strength between layers (strength perpendicular to the faces)	EAD 090078-00-0504, clause 2.2.10	Level σ_m^T [Mpa] σ_c^T [Mpa]
8	Coefficient of linear thermal expansion	EAD 090078-00-0504, clause 2.2.15	Level α_l [10^{-6}/°C]
9	Durability – bond strength between layers (strength perpendicular to the faces) after alkaline ageing	2.2.9	Level $R_{\sigma}{}^{a}$ [%]

Table 2.1.3 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics relevant for roof coverings

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	External fire performance of roofs	2.2.2	Class
Basic Works Requirement 3: Hygiene, health and the environment			
3	Water vapour resistance	2.2.3	Level μ [-]
4	Water permeability	2.2.4	Level A_w [%]
5	Content, emission and/or release of dangerous substances	2.2.5	--
	- Leachable substances	2.2.5.2	Description
Basic Works Requirement 4: Safety and accessibility in use			
6	Bending force	2.2.10	Level $F_{b,mean}$ [N] $F_{b,k}$ [N]
7	Bond strength between layers (strength perpendicular to the faces)	EAD 090078-00-0504, clause 2.2.10	Level σ_m^T [Mpa] σ_c^T [Mpa]
8	Freeze and thaw resistance	EAD 090078-00-0504, clause 2.2.16	Level and description n_{FT} [-] E_2 [%]
9	Thermal shock resistance	2.2.7	Level n_{sh}, n_{tot} [-]
10	Coefficient of linear thermal expansion	EAD 090078-00-0504, clause 2.2.15	Level α_l [10^{-6}/°C]
11	Deviation from the specified length and width	EN 12326-1, clause 5.12.2	Length deviation [%] Width deviation [%]
12	Deviation from edge straightness	EN 12326-1, clause 5.12.3	S_{dx} [%]
13	Deviation from rectangularity	EN 12326-1, clause 5.12.4	R_d [%]
14	Deviation from flatness	EN 12326-1, clause 5.12.5	F_d [%]
15	Durability - bond strength between layers (strength perpendicular to the faces) after freeze and thaw conditioning	2.2.8	Level R_σ^{ft} [%]
16	Durability - bond strength between layers (strength perpendicular to the faces) after alkaline ageing	2.2.9	Level R_σ^{a} [%]
Aspects of durability			
17	Defects (relevant only for ultra-thin natural stone veneer sheets with slate facing)	2.2.11	Description

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.

If for any components covered by harmonised standards or European Technical Assessments the manufacturer of the component has included the performance regarding the relevant characteristic in the Declaration of Performance, retesting of that component for issuing the ETA under the current EAD is not required.

2.2.1 Reaction to fire

Purpose of the assessment

The purpose of the assessment is the evaluation of the reaction to fire of the ultra-thin natural stone veneer sheets.

Assessment method

The ultra-thin natural stone veneer sheets shall be tested, using the method(s) relevant for the corresponding reaction to fire class in accordance with EN 13501-1. The product shall be classified in accordance with the Commission Delegated Regulation (EU) No 2016/364 in connection with EN 13501-1. The provisions given in Annex A shall be taken into account within the tests and the classification.

Expression of results

The determined class shall be given in the ETA together with those conditions for which the classification is valid, including the substrate used for the testing.

2.2.2 External fire performance of roofs

Purpose of the assessment

The purpose of the assessment is the evaluation of the external fire performance of the ultra-thin natural stone veneer sheets when used as roof coverings.

Assessment method

The roof (including the complete roof covering) in which the product is intended to be incorporated, installed or applied shall be tested in accordance with the test methods referred to in EN 13501-5 and relevant for the corresponding external fire performance roof class, in order to be classified in accordance with Commission Decision 2001/671/EC, as amended by Commission Decision 2005/823/EC. Mounting and fixing provisions are given in Annex B.

The following parameters may be influential in the performance and shall be taken into account when preparing the specimens:
- type of test selected,
- defined slope and overlap of sheets,
- fixing of sheets,
- dimensions of sheets,
- thickness of sheets,

- each different chemical composition of the sheets[3],
- organic content of components,
- content of flame retardant products and
- assemblies of the roofs in which the sheets form part.

For the application of test results CEN/TS 16459 applies. Also, test results are valid for the product as tested and any variant that complies with:
- higher overlaps of sheets,
- lower dimensions of sheets,
- less organic content and
- higher content of flame retardant products.

Expression of results

The external fire performance class of the roof, including the test method used in accordance with EN 13501-5, clause 5, shall be stated in the ETA together with a detailed description of the roof assemblies and the conditions for which the classification is valid.

2.2.3 Water vapour resistance

Purpose of the assessment

The purpose of the assessment is the determination of the water vapour resistance of the ultra-thin natural stone veneer sheets. Water vapour resistance of the wall finish is needed for interstitial condensation calculations of walls to which the product is bonded.

Assessment method

The water vapour resistance of the ultra-thin natural stone veneer sheets shall be determined in accordance with EN ISO 12572. Although the ultra-thin natural stone veneer sheets are designated as „flexible", they are stiff enough to represent self-supported specimens for this test. The minimum thickness requirement of 20 mm as indicated in EN ISO 12572 relates to thermal insulation materials only, and therefore it does not apply to the ultra-thin natural stone veneer sheets.

The test conditions shall be Set A (23 – 0/50) in accordance with Table 1 of EN ISO 12572. The method given in Annex A of EN ISO 12572 shall be followed.

Expression of results

The average value (arithmetic mean) of the water vapour resistance factor μ [-] shall be given in the ETA.

2.2.4 Water permeability

Purpose of the assessment

The purpose of the assessment is the determination of the water permeability of the ultra-thin natural stone veneer sheets when used as roof coverings.

Assessment method

The water permeability of the ultra-thin natural stone veneer sheets shall be assessed in accordance with EN 12326-2, clause 11.

Thickness of the specimens shall be measured in accordance with EN 12326-2, clause 11.5, with the following deviations:

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3 In order to permit the TAB to apply rules for extended application of test results within the assessment, it is recommended that the manufacturer should provide (but he is not obliged to do so) sufficient information with regard to this parameter, allowing the TAB to determine which products or product variants should be submitted to testing and so to reduce the number of tests required.

- Measurements shall have an accuracy of 0,01 mm.
- Apart from the four points of measurements defined, four additional points randomly selected of each specimen shall be measured.
- Mean of thickness shall take into account these additional measurements.

Expression of results

The average value (arithmetic mean) of the water permeability A_w [%] shall be given in the ETA.

2.2.5 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[4] after identifying the release scenarios taking into account the intended uses 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 uses with respect to dangerous substances are:

IA1: Product with direct contact to indoor air (relevant only for the use in internal wall finishes)

S/W2: Product with indirect contact to soil, ground- and surface water (relevant for the uses in external wall finishes or roof coverings)

2.2.5.1 SVOC and VOC

For the intended use covered by the release scenario IA1 semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) shall be determined in accordance with EN 16516. The loading factor used for emission testing shall be 1,0 m^2/m^3.

The preparation of the test specimen shall be performed by using a representative sample of the product.

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

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

The product performance shall be expressed in [µg/m^3 or mg/m^3] and stated in the ETA.

2.2.5.2 Leachable substances

For the intended use covered by the release scenario S/W2 the performance of the ultra-thin natural stone veneer sheets concerning leachable substances shall be assessed.

A leaching test with subsequent eluate analysis shall take place, each in duplicate. Leaching tests of the test specimens shall be conducted in accordance with EN 16637-2. The leachant shall be pH-neutral demineralised water and the ratio of liquid volume to surface area shall be (80 ± 10) l/m^2.

Specimens shall be prepared in accordance with clause 8.2 of EN 16637-2.

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4 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 is **not** obliged 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 in accordance with Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the SGDS, taking into account the installation conditions of the construction product and the release scenarios resulting from there.

Any information provided by the manufacturer regarding the chemical composition of the products is not to be distributed to EOTA, to other TABs or beyond.

In eluates of "6 hours" and "64 days", the following biological tests shall be conducted:
- Acute toxicity test with Daphnia magna Straus in accordance with EN ISO 6341,
- Toxicity test with algae in accordance with EN ISO 15799,
- Luminescent bacteria test in accordance with EN ISO 11348-1.

For each biological test, EC20-values shall be determined for dilution ratios 1:2, 1:4, 1:6, 1:8 and 1:16.
If the parameter TOC is higher than 10 mg/l, the following biological tests shall be conducted with the eluates of "6 hours" and "64 days":
- Biological degradation in accordance with OECD Test Guideline 301, parts A, B or E.

Determined toxicity in biological tests shall be expressed as EC20-values for each dilution ratio and given in the ETA. Maximum determined biological degradability shall be expressed as "… % within … hours/days". The respective test methods for analysis shall be specified.

2.2.6 Bond strength/adhesion

Purpose of the assessment

The purpose of the assessment is the determination of the bond strength/adhesion between the ultra-thin natural stone veneer sheets and the specific adhesive.

Assessment method

The bond strength between the ultra-thin natural stone veneer sheets and the substrate shall be assessed on 10 specimens with a size of 50x50 mm. The substrate shall be in accordance with clause 8.3.1.2 of EN 12004-2.

The adhesive shall be modified silicone (MS) polymer adhesive with the following parameters:

- density to EN ISO 2811-1: $1{,}60 \pm 0{,}05$ g/cm^3
- Shore hardness to EN ISO 868: Shore A 60 ± 5
- secant modulus at 100% elongation to EN ISO 8339: $\geq 1{,}30$ N/mm^2
- elongation at break to EN ISO 8339: ≥ 150 %

In addition, at the manufacturer's request, further tests can be carried out using different types of adhesives (e.g. cementitious adhesive (C) to EN 12204).

The preparation of the test specimen shall be in accordance with clause 8.3.3.1 of EN 12004-2.

The test procedure shall be in accordance with clause 8.3.3.2 of EN 12004-2.

The evaluation of the results shall be in accordance with clause 8.3.4 of EN 12004-2. The average (arithmetic mean) of the bond strength, $A_{s,m}$, is equivalent to the tensile adhesion strength given in clause 8.3.4 of EN 12004-2.

Expression of results

The average (arithmetic mean), $A_{s,m}$, and 5%-fractile value, $A_{s,c}$, of the bond strength and the type of the adhesive shall be given in the ETA.

The characteristic value (5 % fractile) shall be determined by using the appropriate value of k_n for unknown V_X reported in EN 1990, Annex D, Table D1.

2.2.7 Thermal shock resistance

Purpose of the assessment

The purpose of the assessment is the evaluation of the thermal shock resistance of the ultra-thin natural stone veneer sheets.

Assessment method

The thermal shock resistance of the ultra-thin natural stone veneer sheets shall be determined in accordance with EN 14066 with the following amendments:
- number of the test specimens: at least 6,
- dimensions of the test specimens: 200 x 300 mm,
- for roof covering use the drying temperature during cycling is (110 ± 5) °C,
- after the cycling the specimens are only visually inspected.

For external wall finishes use the drying temperature during cycling is (70 ± 5) °C in accordance with EN 14066.

Expression of results

The number, n_{sh}, of specimens with visible defects after the completion of the test and the total number of tested specimens, n_{tot}, shall be given in the ETA.

2.2.8 Durability – bond strength between layers (strength perpendicular to the faces) after freeze and thaw conditioning

Purpose of the assessment

The purpose of the assessment is the evaluation of the bond strength perpendicular to the faces between layers after freeze and thaw conditioning of the ultra-thin natural stone veneer sheets.

Assessment method

Complete freeze and thaw conditioning treatment in accordance with EN ISO 10545-12 (100 cycles) shall be carried out on the following specimens: 5 specimens of dimensions = 50 mm x 50 mm. In particular, only the clauses 4.2, 5 and, partially, 6 of EN ISO 10545-12 (the latter clause only up to the paragraph in which the 100 cycles of freeze and thaw conditioning are described) are of concern. After the ageing, the 5 specimens 50 mm x 50 mm shall be subjected to test of bond strength between layers (strength perpendicular to the faces) as described in clause 2.2.10 of EAD 090078-00-0504, only for ambient conditions (T = 23 ± 2°C; R.H. =50 ± 5 %).

Expression of results

The residual strength, R_{σ}^{ft} [%], of the mean values as percentage of the as-delivered state (in accordance with clause 2.2.10 of EAD 090078-00-0504 and definition given in footnote 4 in 2.2.10 of EAD 090078-00-0504)) shall be calculated and given in the ETA.

The residual strength shall be calculated according to equation 2.2.8.1:

- $R_{\sigma}^{ft} = \frac{\sigma_m^{ft,23\,°C}}{\sigma_m^{23\,°C}} . 100$ (2.2.8.1)

where

- $\sigma_m^{ft,23\,°C}$ = mean value of the 5 specimens calculated on $\sigma_{max}^{ft,23\,°C}$, in MPa (2.2.8.2)

- $\sigma_{max}^{ft,23\,°C} = F_{max}^{ft,23°C} \Big/ A$ of each specimen, in MPa (2.2.8.3)

- $F_{max}^{ft,23°C}$ = is the tensile breaking or maximum force recorded of the single specimen tested at 23°C freeze and thaw aging, in N (2.2.8.4)

- $\sigma_m^{23\,°C} = \sigma_m^{T}$ at a temperature of 23°C without freeze and thaw aging, in MPa (2.2.8.5)

- A = cross-section area of the test specimen, in mm² (2.2.8.6)

2.2.9 Durability – bond strength between layers (strength perpendicular to the faces) after alkaline ageing

Purpose of the assessment

The purpose of this test is to assess the durability of the fibreglass reinforced polyester resin backing of the sheets when applied in the works using an adhesive which creates an alkaline condition on the back of the slab (e.g., cementitious adhesives).

Assessment method

The test shall be carried out on the following specimens: 5 specimens of dimensions = 50 mm x 50 mm.

The specimens are immersed for 28 days in alkaline solution at 23 ± 2°C. The composition of the solution is as follows: 1 g NaOH, 4 g KOH, 0,5 g Ca (OH)2 to one litre of distilled water.

At the end of the ageing the specimens are rinsed by immersion for 5 minutes in acid solution (5 ml HCl (35 % diluted) to 4 litres water) and then placed successively in 3 baths of water for 2 minutes for each bath (4 litres each). They shall be subsequently dried at 23 ± 2°C and 50 ± 5 % R.H. for 48 hours.

After the ageing, the 5 specimens shall be subjected to test of bond strength between layers perpendicular to the faces as described in clause 2.2.10 of EAD 090078-00-0504 only for ambient conditions (T = 23 ± 2°C; R.H. = 50 ± 5 %).

Expression of results

The residual strength, $R_\sigma{}^a$ [%], of the mean values as percentage of the as-delivered state (in accordance with clause 2.2.10 of EAD 090078-00-0504 and definition given in footnote 4 in 2.2.10 of EAD 090078-00-0504) shall be calculated and given in the ETA.

The residual strength shall be calculated according to equation 2.2.9.1:

- $R_\sigma^a = \frac{\sigma_m^{a,23\,°C}}{\sigma_m^{23\,°C}} \cdot 100$ (2.2.9.1)

where

- $\sigma_m^{a,23\,°C}$ = mean value of the 5 specimens calculated on $\sigma_{max}^{a,23\,°C}$, in MPa (2.2.9.2)
- $\sigma_{max}^{a,23\,°C} = {F_{max}^{a,23°C}}/{A}$ of each specimen, in MPa (2.2.9.3)
- $F_{max}^{a,23°C}$ = is the tensile breaking or maximum force recorded of the single specimen tested at 23°C after alkaline aging, in N (2.2.9.4)
- $\sigma_m^{23\,°C} = \sigma_m^T$ at a temperature of 23°C without alkaline aging, in MPa (2.2.9.5)
- A = cross-section area of the test specimen, in mm^2 (2.2.9.6)

2.2.10 Bending force

Purpose of the assessment

The purpose of the assessment is to determine the bending force which cause the failure of the sheet due to rupture or an inadmissible deflection.

Assessment method

The bending force shall be determined in accordance with EN 12326-2, clause 10, with the following modifications:

- Specimen dimensions shall be (125 ± 1,0) mm in width and between 250 mm and 300 mm in length.
- The product shall be tested in both directions (20 samples for each direction), unless it is known to be homogenous. Homogenous products with the same behaviour in longitudinal and transversal directions need only be tested in one direction (20 samples in one direction).
- Loading rate shall be defined in accordance with EN 12326-2, clause 10.4.
- The load is increased until the sheet breaks or the deflection at the centre of the sample reaches 50 mm. Deflection is measured as the displacement of the centre of the specimen from its initial position without the load applied. The maximum load reached is the bending force.

Expression of results

The mean bending force $F_{b,mean}$ is the mean value of the maximum loads reached in each test.
The characteristic bending force $F_{b,k}$ shall be calculated according to the following equation:

$$F_{b,k} = F_{b,mean} - 1{,}729 \cdot s \quad (2.2.10.1)$$

Where:
s = the standard deviation of series under consideration.
The mean bending force $F_{b,mean}$ (in N) and the characteristic bending force $F_{b,k}$ (in N) shall be given in the ETA.

2.2.11 Defects

Purpose of the assessment

The purpose of the assessment is the evaluation of the general durability aspects of the ultra-thin natural stone veneer sheets.

This assessment is relevant only when the ultra-thin natural stone veneer sheets are faced with slates.

Assessment method

A macroscopic examination of the slate facing in accordance with EN 12326-2, clause 16.6.1 shall be carried out on 5 whole sheets.

Expression of results

Physical or petrographic features, as listed in EN 12326-2, clause 16.6.1 b) and c), and any damage which would be detrimental to the performance of ultra-thin natural stone veneer sheets shall be given in the ETA.

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 Systems of assessment and verification of constancy of performance to be applied

Used as external or internal wall finishing

For the products covered by this EAD the applicable European legal act is Commission Decision 98/437/EC, as amended by Commission Decision 2001/596/EC.

The applicable AVCP system is 4 for any use except for uses subject to regulations on dangerous substances and reaction to fire.

For uses subject to regulations on dangerous substances the applicable AVCP system is 3.

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

Used as roof covering

For the products covered by this EAD the applicable European legal act is Commission Decision 98/436/EC, as amended by Commission Decision 2001/596/EC.

The applicable AVCP system is 4 for any use except for uses subject to regulations on dangerous substances, reaction to fire and external fire performance.

For uses subject to regulations on dangerous substances the applicable AVCP system is 3.

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

For uses subject to regulations on external fire performance the applicable AVCP systems regarding external fire performance are 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
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1	Incoming raw materials (stone, adhesive (between stone facing and fibreglass), fibreglass, resin) Minimum check: - for all: material - for stone: composition - for adhesive and resin: specific mass or density and viscosity - for fibreglass: tensile strength and elongation	Checking of suppliers' documents	As defined in the Control Plan	-	Each delivery
2	Bond strength between layers – strength perpendicular to the faces	EAD 090078-00-0504, 2.2.10	As defined in the Control Plan	3	Once every 2 weeks
3	Reaction to fire and external fire performance (indirect check)	Check that all relevant indirect parameters as determined within the fire tests are fulfilled, e.g.: - thickness - chemical composition and assembly - colour	As defined in the Control Plan	3	Once every 2 weeks
4	Bending force (for roof coverings)	2.2.13	As defined in the Control Plan	3	Once every 2 years
5	Water absorption (for wall finishes)	EAD 090078-00-0504, 2.2.2	As defined in the Control Plan	EAD 090078-00-0504, 2.2.3	Once every 2 years
6	Water permeability (for roof coverings)	2.2.5	As defined in the Control Plan	2.2.5	Once every 2 years
7	Reaction to fire (direct check)	2.2.1	As defined in the Control Plan	At least 1 (depending on the test method applied)	Once every 2 years

3.3 Tasks of the notified body

The intervention of a notified body under AVCP system 1 for this product is only necessary if 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 limitation of the amount of organic content) and the reaction to fire performance class of the product is A1, A2, B or C.

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 ultra-thin natural stone veneer sheets 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 *(for system 1 only)*					
1	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).	Verification of the complete FPC as described in the control plan agreed between the TAB and the manufacturer	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 *(for system 1 only)*					
2	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)	Verification of the controls carried out by the manufacturer as described in the control plan agreed between the TAB and the manufacturer with reference to the raw materials, to the process and to the product as indicated in Table 3.2.1	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

4 REFERENCE DOCUMENTS

EN 1469:2015	Natural stone products - Slabs for cladding -. Requirements
EN 1990:2023	Eurocode – Basis of structural and geotechnical design
EN 12004:2007+A1:2012	Adhesives for tiles - Requirements, evaluation of conformity, classification and designation
EN 12004-2:2017	Adhesives for ceramic tiles - Part 2: Test methods
EN 12326-1:2014	Slate and stone for discontinuous roofing and external cladding - Part 1: Specifications for slate and carbonate slate
EN 12326-2:2011	Slate and stone for discontinuous roofing and external cladding - Part 2: Methods of test for slate and carbonate slate
EN 13238:2010	Reaction to fire tests for building products - Conditioning procedures and general rules for selection of substrates
EN 13501-1:2018	Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests
EN 13501-5:2016	Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests
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 13888-1:2022	Grouts for ceramic tiles- Part 1: Requirements, classification, designation, marking and labelling
EN 14066:2013	Natural stone test methods - Determination of resistance to ageing by thermal shock
EN 16516:2017+A1:2020	Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air
EN ISO 868:2003	Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)
EN ISO 1182:2020	Reaction to fire tests for products - Non-combustibility test (ISO 1182:2020)
EN ISO 1716:2018	Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value) (ISO 1716:2018)
EN ISO 2811-1:2023	Paints and varnishes - Determination of density - Part 1: Pycnometer method (ISO 2811-1:2023)
EN ISO 6341:2012	Water quality - Determination of the inhibition of the mobility of Daphnia magna Straus (Cladocera, Crustacea) - Acute toxicity test (ISO 6341:2012)
EN ISO 6946:2017	Building components and building elements - Thermal resistance and thermal transmittance - Calculation methods (ISO6946:2017, Corrected version 2021-12)

EN ISO 8339:2005	Building construction - Sealants - Determination of tensile properties (Extension to break) (ISO 8339:2005)
EN ISO 10545-12:1997	Ceramic tiles - Part 12: Determination of frost resistance (ISO 10545-12:1995 including Technical Corrigendum 1:1997)
EN ISO 10545-13:2016	Ceramic tiles - Part 13: Determination of chemical resistance (ISO 10545-13:2016)
EN ISO 11348-1:2008+A1:2018	Water quality - Determination of the inhibitory effect of water samples on the light emission of Vibrio fischeri (Luminescent bacteria test) - Part 1: Method using freshly prepared bacteria (ISO 11348-1:2008+Amd1:2018)
EN ISO 11925-2:2020	Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2:2020)
EN ISO 12572:2016	Hygrothermal performance of building materials and products - Determination of water vapour transmission properties - Cup method (ISO 12572:2016)
EN ISO 15799:2022	Soil quality – Guidance on the ecotoxicological characterization of soils and soil materials (ISO 15799:2019)
CEN/TS 1187:2012	Test methods for external fire exposure to roofs
CEN/TS 16459:2019	External fire exposure of roofs and roof coverings – Extended application of test results from CEN/TS 1187
EN 16637-2:2023	Construction products:- Assessment of release of dangerous substances - Part 2: Horizontal dynamic surface leaching test
EAD 090078-00-0504	Ceramic multilayer slab for wall claddings and floorings
OECD 301:1992	OECD Guideline for testing of chemicals – ready biodegradability (adopted 17.07.1992)

ANNEX A

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

A.1 EN ISO 1182 and EN ISO 1716

These test methods are relevant for reaction to fire classes A1 and/or A2.

A.2 EN 13823 (SBI test)

This test method is relevant for reaction to fire classes A2 to D in accordance with EN 13501-1 simulating the use of the sheets as indoor and outdoor wall finishes as well as for external roof coverings.

Dimension of the test rig and the test specimens

The test rig consists of a right-angle corner with a long wing (1,0 m width) and a short wing (0,5 m width), each 1,5 m height. The dimensions of the specimens shall be:

	Assembly dimensions [mm – nominally]	
	Length	**Height**
Short wing	500	1500
Long wing	1000 + t	1500
Where t = thickness of the sheets		

On the long wing of each test specimen at least one vertical and one horizontal joint shall be considered as prescribed in the test standard (200 mm away from the inner corner of the test specimen and 500 mm above the floor of the specimen trolley).

Adhesives and grouts for external and internal wall finishes

The adhesive used for the test shall be modified silicone (MS) polymer with the following parameters:

- density to EN ISO 2811-1: $1{,}60 \pm 0{,}05$ g/cm^3
- Shore hardness to EN ISO 868: Shore A 60 ± 5
- secant modulus at 100% elongation to EN ISO 8339: $\geq 1{,}30$ N/mm^2
- elongation at break to EN ISO 8339: ≥ 150 %

Execution of the joints shall be done without grout material. In addition, at the manufacturer request, further test can be carried out with joints filled with grout material.

If the execution of the joints is also foreseen with grout material, the type of the grout shall be grout of class CG2W in accordance with Table 4 of EN 13888-1.

In addition, at the manufacturer's request, further tests can be carried out using different types of adhesives (e.g., cementitious adhesive (C) to EN 12004) or grouts.

Substrate for external and internal wall finishes and roof coverings

If an adhesive is foreseen for fixing purposes for external and internal wall finishes, the test specimens shall be glued onto a substrate with a reaction to fire class of A2-s1,d0.
If mechanical connectors are foreseen for fixing purposes for roof coverings, the test specimen shall be mechanically fixed onto a sub-construction in front of substrate with a reaction to fire class of D-s2,d0, which together form an air gap between the ultra-thin natural stone veneer sheets and the substrate.

In addition, at the manufacturer's request, further tests can be carried out using different types of substrates.

Sub-construction and fixing devices for roof coverings

In case of specimens with an air gap a sub-construction shall be used as support of the ultra-thin natural stone veneer sheets.
This sub-construction shall consist of a frame made of timber battens from non-fire retardant treated spruce wood of standard grade, saw-cut (density: 475 ± 25 kg/m³). The vertical members of the frame shall have a cross section of (40 ± 1) mm width and a depth of maximum 40 mm. They are positioned behind the lateral edges of the specimen wings as well as behind the vertical joint on the long wing of the specimen. The horizontal members of the frame shall have a cross section of (40 ± 1) mm width and a depth of maximum 15 mm. They are positioned behind the top and the bottom edge of the specimen wings and, if relevant, behind the horizontal joint on the long specimen wing.
In addition, at the manufacturer's request, a supporting frame made of steel or aluminium angles (dimension: 40 mm width x max. 40 mm depth x 1,5 mm thickness) can also be used for testing purposes. Positioning of the angles shall be the same as for the timber battens.
Results of tests with a timber frame are also valid for the use of the ultra-thin natural stone veneer sheets on metallic sub-constructions. Results of tests with a metal frame are only valid for the use of the ultra-thin natural stone veneer sheets on metal sub-constructions.
Mechanical fixing devices (e.g., metal screws or nails) shall be used for fixing the ultra-thin natural stone veneer sheets on the support frame using the highest possible distance between the two neighboured fixing points. The test results are valid for all mechanical fixing devices made of metal with equal or lower distances between two neighboured points.

Air gap and ventilation for roof coverings

Two cases regarding the depth of an air gap shall be considered:
- the minimum air gap depth (between the rear surface of the ultra-thin natural stone veneer sheets and the substrate) as stated in the manufacturer's product installation instructions and allowed by the subframe dimensions and geometry (but not less than 20 mm) and,
- a 40 mm air gap depth between the rear surface of the ultra-thin natural stone veneer sheets and the substrate.

First, an indicative test shall be performed for each of both air gap depths. The depth showing the worst results shall be completed (at least two additional tests) in order to obtain the worst classification.
If both indicative tests point to the same classification, any greater depth of the air gap than the tested minimum one shall be classified on this result, without additional testing.
If the indicative tests point to different classifications, additionally, the case (air gap depth) showing the best results in the indicative test can also be fully tested for classification (two additional SBI test specimens to complete the required three test results) to determine if a better classification is obtained. If so, this better classification will apply only to the best-case air gap depth and the rest of the range will have the classification obtained with the worst-case air gap depth, unless additional intermediate depths are tested to determine the point (air gap depth) where classification changes.

A ventilated air-gap shall be taken into account, therefore the boards of the SBI rig in accordance with clause 4.4.11 of EN 13823 shall be removed. In addition, an open joint at the bottom edge of the test specimen shall be considered on both the long and the short wing in order to ensure sufficient ventilation of the air gap. For this purpose, the lower edge of the ultra-thin natural stone veneer sheets shall end 10 mm above the U-profile of the SBI rig.

Test specimens for external and internal wall finishes and roof coverings

The following parameters shall be considered when preparing the test specimens:
- Chemical composition and assembly – each different composition and assembly (e.g., number, type and dimensions of the various layers of the sheets) shall be considered within the tests.
- Colour – if there is a range of different colours but no difference in the chemical composition itself, tests with a light, a dark and a medium colour (e.g,. White, Black and Red) shall be performed.
- Thickness – ultra-thin natural stone veneer sheets with the lowest thickness of stone layer and highest thickness of fibreglass resin backing layer shall be tested.

Due to the intended use of the ultra-thin natural stone veneer sheets as indoor and outdoor wall finishes as well as for external roof coverings the whole specimen (including the substrate) shall be positioned directly in front of the SBI backing board.
At least one test with any of the identified specimen configurations (based on the aforementioned parameters) shall be performed and two further tests with the most onerous specimen configuration as basis for the classification.

The results of tests taking into consideration completely the aforementioned parameters are valid for:
- only the chemical composition and assembly as tested,
- the complete range of colours,
- ultra-thin natural stone veneer sheets with a stone layer thickness of equal or higher and with a fibreglass resin backing layer thickness equal or lower than tested,
- any orientation of the sheets,
- for external and internal wall finishes, the tested adhesive and grout only with equal or lower coverages than tested, if an adhesive or grout according to manufacturer's product installation instructions was used, or
- for external and internal wall finishes, any modified silicone (MS) polymer adhesive as defined above with equal or lower organic content than tested (related to the mass in dried condition) and/or any cementitious grout of type CG in accordance with Table 4 of EN 13888-1, each with equal or lower coverage than tested.

A.3 EN ISO 11925-2 (Small ignition source test)

This test method is relevant for reaction to fire classes B to E in accordance with EN 13501-1 simulating both the use of the sheets as indoor and outdoor wall finishes as well as for external roof coverings.

Dimensions of the test specimens and preparation

The dimension of the test specimens shall be as prescribed in the test standard.
A lengthwise joint in the middle axis of the test specimen shall be taken into account for at least two tests. Execution of the joints shall be done with or without grout material in accordance with the manufacturer's product installation instructions or in absence of such instructions with the usual practice of the product installation.

Adhesives and grouts for external and internal wall finishes

The adhesive used for the test shall be modified silicone (MS) polymer with the following parameters:

- density to EN ISO 2811-1: $1{,}60 \pm 0{,}05$ g/cm^3
- Shore hardness to EN ISO 868: Shore A 60 ± 5
- secant modulus at 100% elongation to EN ISO 8339: $\geq 1{,}30$ N/mm^2
- elongation at break to EN ISO 8339: ≥ 150 %

Execution of the joints shall be done without grout material. In addition, at the manufacturer request, further test can be carried out with joints filled with grout material.

If the execution of the joints is also foreseen with grout material, the type of the grout shall be grout of class CG2W in accordance with Table 4 of EN 13888-1.

In addition, at the manufacturer's request, further tests can be carried out using different types of adhesives (e.g. cementitious adhesive (C) to EN 12004) or grouts.

Substrate for external and internal wall finishes and roof coverings

If an adhesive is foreseen for fixing purposes for external and internal wall finishes, the test specimens shall be glued onto a substrate with a reaction to fire class of A2-s1,d0.
In addition, at the manufacturer's request, further tests can be carried out using different types of substrates.
If mechanical connectors are foreseen for fixing purposes for roof coverings with an air gap and a sub-construction, the tests shall be conducted on free-hanging specimens without using a substrate.

Test specimens for external and internal wall finishes and roof coverings

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

- Chemical composition and assembly – each different composition and assembly (e.g., number, type and dimensions of the various layers of the sheets) shall be considered within the tests.
- Colour – if there is a range of different colours but no difference in the chemical composition itself, tests with a light, a dark and a medium colour (e.g., White, Black and Red) shall be performed.
- Thickness – ultra-thin natural stone veneer sheets with the lowest thickness of stone layer and highest thickness of fibreglass resin backing layer shall be tested.

The test specimens shall be tested with edge exposure as well as with surface exposure. Additionally, further tests shall be performed on specimens turned 90 degrees on their vertical axis with edge exposure on all relevant layers.
At least two tests with any of the identified specimen configurations (based on the aforementioned parameters) shall be performed and four further tests with the most onerous specimen configuration as basis for the classification.

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

- only the chemical composition and assembly as tested,
- the complete range of colours,
- ultra-thin natural stone veneer sheets with a stone layer thickness of equal or higher and with a fibreglass resin backing layer thickness equal or lower than tested,
- any orientation of the sheets,
- for external and internal wall finishes, the tested adhesive and grout only with equal or lower coverages than tested, if an adhesive or grout according to manufacturer's instructions was used, or
- for external and internal wall finishes, any modified silicone (MS) polymer adhesive as defined above with equal or lower organic content than tested (related to the mass in dried condition) and/or any cementitious grout of type CG in accordance with Table 4 of EN 13888-1, each with equal or lower coverage than tested.

ANNEX B

MOUNTING AND FIXING PROVISIONS OF THE RELEVANT EXTERNAL FIRE PERFORMANCE OF ROOFS TESTS

A.1 CEN/TS 1187 Method 1 test

Roof pitch of specimens shall be defined in accordance with CEN/TS 1187, clause 4.3 and based on the intended pitch of use (see CEN/TS 1187, clause 4.10.1 for direct field of application of test results).

Supporting decks shall be defined in accordance with CEN/TS 1187, clause 4.4.2 and based on the intended substrate of use (see CEN/TS 1187, clause 4.10.2 for direct field of application of test results).

Mounting and fixings of the product shall be in accordance with CEN/TS 1187 and end use conditions, as specified by the Manufacturer's Product Installation Instructions (MPII).

A.2 CEN/TS 1187 Method 2 test

Substrates shall be defined in accordance with CEN/TS 1187, clause 5.4.2.2 and based on the intended substrate of use (see CEN/TS 1187, clause 5.10 for direct field of application of test results).

Mounting and fixings of the product shall be in accordance with CEN/TS 1187 and end use conditions, as specified by the Manufacturer's Product Installation Instructions (MPII).

A.3 CEN/TS 1187 Method 3 test

Roof pitch of specimens shall be 30º as defined in CEN/TS 1187, clause 6.3 (see CEN/TS 1187, clause 6.10.1 for direct field of application of test results).

Supporting decks shall be defined in accordance with CEN/TS 1187, clause 6.4.2 and based on the intended substrate of use (see CEN/TS 1187, clause 6.10.2 for direct field of application of test results).

Mounting and fixings of the product shall be in accordance with CEN/TS 1187 and end use conditions, as specified by the Manufacturer's Product Installation Instructions (MPII).

A.4 CEN/TS 1187 Method 4 test

Roof pitch of specimens shall be 45º as defined in CEN/TS 1187, clause 7.3 (see CEN/TS 1187, clause 7.10.1 for direct field of application of test results).

Supporting decks shall be defined by the manufacturer (test results apply to the product installed on that supporting decks only).

Mounting and fixings of the product shall be in accordance with CEN/TS 1187 and end use conditions, as specified by the Manufacturer's Product Installation Instructions (MPII).