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European Assessment Document for

Hydrophilic thermal insulation product made of mineral wool for water retention in green roofs and similar applications

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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 construction product is a hydrophilic thermal insulation product made of mineral wool for water retention in green roofs and similar applications (hereafter named “Hydrophillic thermal insulation”).

The product is a factory-made mineral wool product, which is made in the form of mats or boards without any facing. Unlike products in accordance with EN 13162 [1], no hydrophobic oils are added to the products covered by this EAD, so they capture water, which can be used for green roofs and similar applications. Hydrophilic thermal insulation is produced similarly to conventional mineral insulation products e.g., by fiberizing a melt mixture consisting of volcanic rocks and milled wet a dry mineral waste, cement and bauxite.

The product is not fully covered by the harmonised technical specification EN 13162 because it does not include test methods for testing of thermal conductivity when the product is fully saturated by water (at maximum water capacity) and the water flow capacity in the plane. EN 13162 includes requirements for maximum long-term and short-term water absorption. Hydrophilic thermal insulation can absorb and retain water, which can affect its performance and durability. Therefore, the standard testing procedures outlined in EN 13162 may not fully capture the behavior of hydrophilic thermal insulation. Furthermore, products with a thermal conductivity greater than 0,060 W/(m·K) are not covered by the hEN (wet conditions of testing are not considered).

Density was included as an essential characteristic with regard to Basic Works Requirement 6 (Energy economy and heat retention) because plays a crucial role for the product. Density of the product affects the thermal conductivity, ensures that the material can hold a significant amount of water and supports the weight of the green system including plants, soil and water.

Water vapour permeability, dynamic stiffness, compressibility, air flow resistivity and sound absorption in accordance with Annex ZA of EN 13162 are not technically applicable taking into account water saturation of the product and installation above the waterproofing.

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, 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 use(s) of the construction product

1.2.1 Intended use(s)

The product is thermal insulation and bottom hydrophilic layer for water retention in green roofs and similar applications as on terraces, green balconies etc., (excluding green facades). The product effectively captures, filters and drains water, while maintaining its thermal insulation properties in both dry and wet conditions, enhancing water retention and management in green applications. By capturing and draining water, this dual capability of the product ensures that water is effectively captured for future use while addressing the need to quickly drain excess water when needed.

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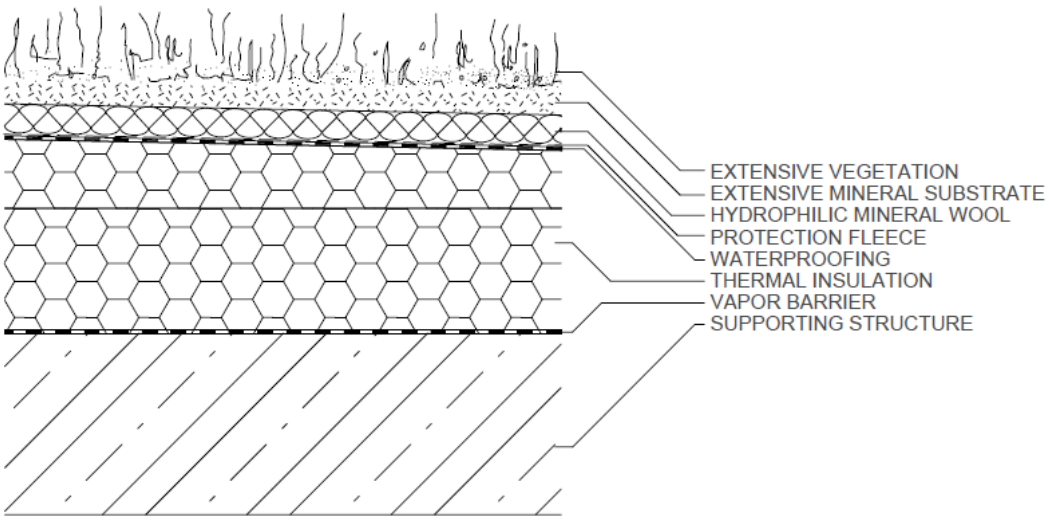
1 All undated references to standards in this EAD are to be understood as references to the dated versions listed in chapter 4.

Figure 1.2.1.1: An example of intended use of the product



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 hydrophilic thermal insulation for the intended use of 50 years when installed in the works (provided that the hydrophilic thermal insulation is subject to appropriate installation (see 1.1)). These provisions are based upon the current state of the art and the available knowledge and experience.

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

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

1.3 Specific terms used in this EAD

1.3.1 Hydrophilic thermal insulation

Hydrophilic thermal insulation is a product which is able to bind water but does not dissolve in it.

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

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 2.1.1 shows how the performance of hydrophilic thermal insulation 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 and release of dangerous substances	2.2.3	level
Basic Works Requirement 6: Energy economy and heat retention			
4	Maximum water capacity	2.2.4	level
5	Thermal conductivity at maximum water capacity	2.2.5	level
6	Thermal conductivity (dry state)	2.2.6	level
7	Density	2.2.7	level
8	Thickness	2.2.8	level
9	Water flow capacity in the plane	2.2.9	level
10	Compression behaviour	2.2.10	level
11	Point load	2.2.11	level
12	Tensile strength perpendicular to faces	2.2.12	level
13	Compressive creep	2.2.13	level
Aspects of durability			
14	Durability of characteristics	2.2.14	level/class

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.

The test specimens shall be chosen in such a way that the density range and the thickness range of the final product are covered. The test results are applicable for all greater thicknesses at the corresponding tested density.

Depending on the used test method/test standard the test specimens are sawn out of the manufactured board or mat, if no other provisions are stated in the following clauses. [3]

2.2.1 Reaction to fire

The hydrophilic thermal insulation shall be tested in accordance with clause 4.2.6 of EN 13162, using the method(s) relevant for the corresponding reaction to fire class in accordance with EN 13501-1. The hydrophilic thermal insulation shall be classified in accordance with the Commission Delegated Regulation (EU) No 2016/364 in connection with EN 13501-1.

The testing shall be done under standard laboratory conditions representing the worst possible condition as regards the intended use for this product.

The reaction to fire class shall be given in the ETA.

2.2.2 Propensity to undergo continuous smouldering

The performance of the product´s propensity to undergo continuous smouldering shall be tested and assessed in accordance with EN 16733.

The testing shall be done under standard laboratory conditions representing the worst possible condition as regards the intended use for this product.

The conditions and parameters which shall be taken into account within the test as well as the rules for the application of the test results are specified below.

Sampling:

In addition to EN 16733, the following conditions and parameters shall be considered when performing sampling and preparing of 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) [3]
- the product or product variant with the highest density as well as a density of about 100 kg/m^3 (±15%); if the highest density is lower than 115 kg/m^3, then the only the product or product variant with the highest density (density determined in accordance with EN ISO 29470);
- the product or product variant with the highest thickness. If the highest thickness is greater than 100 mm, then the specimen thickness shall be reduced from the reverse (non-exposed) side to the maximum testable thickness of about 100 mm. (thickness determined in accordance with EN ISO 29466 on at least three specimens).

[3] To permit the TAB to apply EXAP-rules for test results within the assessment, it is recommended that the manufacturer should provide (but he is not obliged to do it) sufficient information (e.g., on the basis of the composition of the product in question), allowing the TAB to determine which products or product variants shall be submitted to testing and to reduce the number of tests required.

- 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 non-substantial facings, coating (or similar) – existing facings or coatings shall be removed when preparing the test specimens.

Preparation of test specimens

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

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

Extended application of test results:

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

- of the same defined product -family,
- with lower organic content,
- with all lower densities,
- with lower thickness and also with higher thickness when 100 mm thick specimens were tested,
- with all fibre orientations,
- with any non-substantial facings or coatings and
- for any end-use conditions.

In accordance with EN 16733, clause 11, the ETA shall specify the following information, depending on the outcome of the assessment:

- “The product does not show propensity to undergo continuous smouldering”;

- “The product shows propensity to undergo continuous smouldering” or

- “Assessment of the propensity to undergo continuous smouldering is not possible”.

2.2.3 Content and release of dangerous substances

The performance of the product regarding the content and/or release 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 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 scenario for this product and intended use with respect to dangerous substances is:

S/W2: Product with indirect contact to soil, ground- and surface water

The release of dangerous substances shall be determined as below.

Content of carcinogenic, mutagenic and reproductive toxic (CMR) substances

Assessment of the product is based on the detailed manufacturer's statements on dangerous substances or performance based on a manufacturer's declaration about the content of dangerous substances.

Expression of product performance with regard to content of CMR substances in accordance with Regulation (EC) No 1272/2008 for impact on soil and groundwater shall be stated in the ETA in the form of a table as Table 2.2.3.1.

Determination of leachable substances

The eluate is produced by a tank test according to 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/m². The eluates taken after 6 hours, 1 day, 2 days and 6 hours, 4 days, 9 days, 16 days, 36 days and 64 days shall be analysed for following environmentally relevant minimal parameters:

- antimony, arsenic, barium, lead, cadmium, chromium (total), chromate (Cr VI), cobalt, copper, molybdenum, nickel, mercury, thallium, zinc,
- chloride (Cl-), sulphate ($SO4^{2-}$), fluoride (F^-)
- total organic carbon (TOC),
- formaldehyde and total phenolic compounds

The parameters shall be analysed with a relevant analytical test method EN 17195, EN 17197, EN 17331, EN 17332 or EN 17200.

Specimens shall be taken as close as possible to the time of production.

Specimen shall be stored at (23±2) °C. Extreme temperatures may affect the properties of the specimens and the results of the analysis.

Storage shall be kept as short as possible to avoid any change in the chemical composition or properties of the specimens. If longer storage is necessary, the specimen shall be stored under conditions that minimise the possibility of changes in composition.

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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.

Specimens shall be transported in sealed, leak-proof containers that minimize the risk of contamination during transport. Packaging shall be strong enough to protect the specimens from mechanical damage. The same conditions shall be maintained during transport as during storage, i.e. stable temperature, protection from light and moisture.

The following product parameters shall be taken into account when testing the hydrophilic thermal insulation:

- Each hydrophilic thermal insulation mat or board with a different composition shall be tested separately
- The product with the highest thickness shall be considered
- In case of doubt, tests shall be performed separately on specimens with different specifications for each characteristic

Measured concentration of the leaching test according to EN 16637-2 of hydrophilic thermal insulation shall be expressed per step (time defined for the leaching process) for each parameter in mg/L. Additionally, the cumulatively released quantities shall be expressed for each parameter in mg/m^2.

The test results shall be reported for the relevant parameters (e.g. temperature and relative humidity, size of test specimen, conditioning, production date, arrival date, test period, specimen preparation procedure, test result) after 6 hours, 1 day, 2 days and 6 hours, 4 days, 9 days, 16 days, 36 days and 64 days testing.

The used test methods for the analysis of the parameters shall be documented including method detection limits and stated in the ETA. Expression of product performance with regard to leachable substances for impact on soil and groundwater shall be stated in the ETA in a form of a table as Table 2.2.3 shows.

Table 2.2.3.1 Expression of product performance for impact on soil and groundwater

Essential characteristic	**Performance**	
Content and release of dangerous substances		
CMR - substances		
Substance/s classified as EU-cat. Carc.1A and/or 1B[a)]	*An example of manufacturer´s statement:* The product does not contain these dangerous substances. [b)]	
Substance/s classified as EU-cat. Muta.1A and/or 1B[a)]		
Substance/s classified as EU-cat. Repr.1A and/or 1B[a)]		
Leachable substances	Eluate concentration in accordance with EN 16637-2 after 64 days [c)]	Cumulatively released quantities after 64 days [c)]
Antimony (Sb)	< obtained value in mg/L	< obtained value in mg/m^2
Arsenic (As)	< obtained value in mg/L	< obtained value in mg/m^2
Barium (Ba)	< obtained value in mg/L	< obtained value in mg/m^2
Lead (Pb)	< obtained value in mg/L	< obtained value in mg/m^2
Cadmium (Cd)	< obtained value in mg/L	< obtained value in mg/m^2
Chromium VI (Cr)	< obtained value in mg/L	< obtained value in mg/m^2
Chromium (total) Cr	< obtained value in mg/L	< obtained value in mg/m^2
Cobalt (Co)	< obtained value in mg/L	< obtained value in mg/m^2
Copper (Cu)	< obtained value in mg/L	< obtained value in mg/m^2
Molybdenum (Mo)	< obtained value in mg/L	< obtained value in mg/m^2
Nickel (Ni)	< obtained value in mg/L	< obtained value in mg/m^2
Mercury (Hg)	< obtained value in mg/L	< obtained value in mg/m^2
Thallium (Tl)	< obtained value in mg/L	< obtained value in mg/m^2
Zinc (Zn)	< obtained value in mg/L	< obtained value in mg/m^2
Chloride (Cl^-)	< obtained value in mg/L	< obtained value in mg/m^2
Fluoride (F^-)	< obtained value in mg/L	< obtained value in mg/m^2
Sulphate (SO_4^{2-})	< obtained value in mg/L	< obtained value in mg/m^2
TOC	< obtained value in mg/L	< obtained value in mg/m^2
Formaldehyde	< obtained value in mg/L	< obtained value in mg/m^2
Total phenolic compounds	< obtained value in mg/L	< obtained value in mg/m^2
Release scenario regarding BWR3: S/W2		

[a)] In accordance with Regulation (EC) No 1272/2008

[b)] Assessment based on the detailed manufacturer's statements on dangerous substances or Performance based on a manufacturer's declaration about the contained dangerous substances

[c)] Statement according to test report

2.2.4 Maximum water capacity

The maximum water capacity WK_{max} shall be determined in accordance with Annex A.

The mean value of maximum water capacity WK_{max} in volume % shall be given in the ETA.

2.2.5 Thermal conductivity at maximum water capacity

The thermal conductivity $\lambda_{(23;\ WKmax)}$ at maximum water capacity WK_{max} (see clause 2.2.4) immediately after the 2-hour dripping in accordance with A.4 of the product shall be tested on at least 3 test specimens in accordance with EN 12664. Guarded hot plate or heat flow meter method can be used for testing. Both methods can yield equivalent results if properly calibrated and used und appropriate conditions. However, due to its higher precision and direct measurement approach, the guarded hot plate method is designated as the reference method. The specimen of dimensions fitting the selected testing device (guarded hot plate or heat flow meter) and of maximum water capacity WK_{max} immediately after the 2-hour dripping in accordance with A.4 shall be enclosed under standard laboratory conditions at temperature of (23 ± 2) °C and relative humidity of (50 ± 5) % in a watertight and vapour-tight envelope (e.g., with use of double PE bags rolled at the end and sealed with adhesive tape with the seal located on the perimeter) to prevent water and moisture migration during testing. After sealing and visual verification of tightness, the specimen shall be inserted into the testing device without any other conditioning.

The thermal conductivity $\lambda_{D(23;WKmax)}$ representing at least 90 % of the production with a confidence level of 90 % shall be determined on the basis of obtained results $\lambda_{10(23;WKmax)}$ in accordance with EN ISO 10456 (clause 5).

The mean value of the thermal conductivity $\lambda_{(23;\ WKmax)}$ in W/m·K and the thermal conductivity $\lambda_{D(23;WKmax)}$ in W/m·K shall be given in the ETA. The used testing method shall be stated in the ETA.

2.2.6 Thermal conductivity (dry state)

The thermal conductivity $\lambda_{10(23;50)}$ shall be determined in accordance with clause 5.3.2 of EN 13162.

~~Minimally~~ At least four test specimens shall be tested.

The thermal conductivity $\lambda_{D(23;50)}$ at 23 °C/50% RH representing at least 90 % of the production with a confidence level of 90 % shall be determined on the basis of obtained results $\boldsymbol{\lambda_{10(23;50)}}$ in accordance with EN ISO 10456 (clause 5).

The mean value of the thermal conductivity $\lambda_{10(23;50)}$ in W/m·K and the thermal conductivity $\lambda_{D(23;50)}$ in W/m·K shall be given in the ETA.

2.2.7 Density

The apparent density ρ_a shall be determined in accordance with EN ISO 29470 on at least 5 specimens. Before the test specimens shall be dried by storing the specimen at (105 ± 2) °C in a climatic chamber to constant mass. The mass is considered constant when the difference between two consecutive weighing, performed at least 24 hours apart, does not exceed 0.1 % of the specimen´s mass or 0.1 grams, whichever is greater.

The mean value of apparent density ρ_a shall be given in the ETA in kg/m^3.

2.2.8 Thickness

The thickness d shall be determined in accordance with EN ISO 29466. The test shall be conducted at a pressure of 50 Pa, except for products with a compressive stress or compressive strength level of 10 kPa or more, for which the load shall be 250 Pa. The test shall be performed on five test specimens.

The mean value of thickness d shall be given in the ETA in mm.

2.2.9 Water flow capacity in the plane

The mean value of in-plane water flow capacity $q_{p(20;0.1;\ 1)}$ and $q_{p(20;1.0;\ 1)}$ for 0°, 2° and 35° at (20 °C± 2)°C shall be determined in accordance with Annex B and shall be given in l/s/m in the ETA.

2.2.10 Compression behaviour

The compression behaviour under standard laboratory conditions at temperature of (23 ± 2) °C and relative humidity of (50 ± 5) % and wet conditions shall be determined in accordance with clause 4.3.3 of EN 13162.

Dimension of test specimen: 300 x 300 mm (width x length)

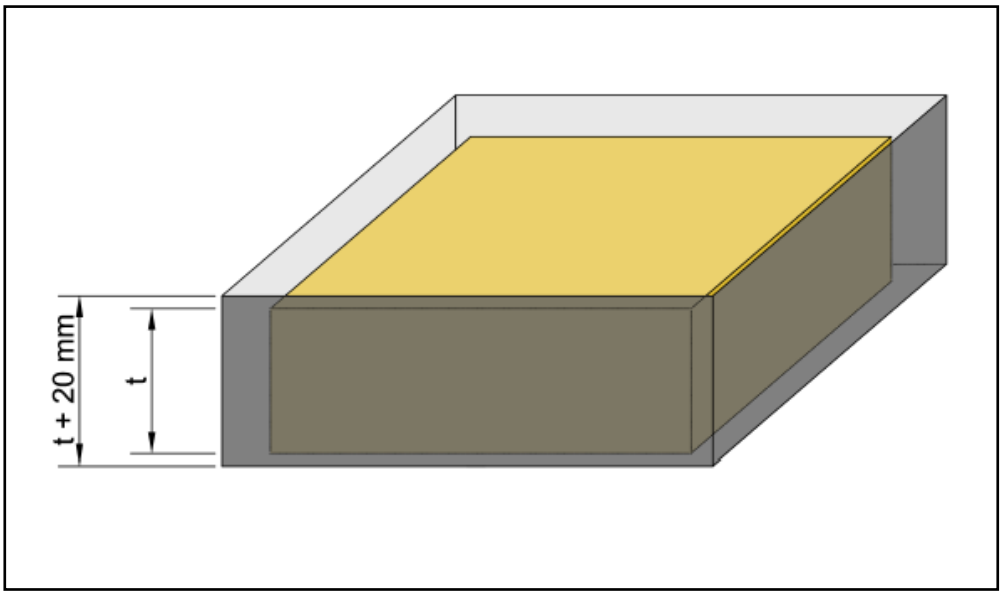
Minimum number of test specimens: 3

Wet conditions mean that the test specimen contains its maximum water capacity WK_{max} (see clause 2.2.4) immediately after the 2-hour dripping in accordance with A.4. For the testing under wet conditions auxiliary tray made of stainless steel (minimal wall thickness: 1.5 mm and width 350 mm; length 350 mm) in accordance with Figure 2.2.9.1 shall be used. For each test specimen a separate auxiliary tray shall be used. The height of the tray shall be by 20 mm higher than the thickness of the tested specimen. Test specimen shall be placed to the centre of the tray. The tray is designed to keep the specimen in place after soaking to avoid any handling that could alter its state or properties, ensuring accurate and consistent test results.

Specimens shall be conditioned for 24 hours and then standard testing on the wet specimens in the tray shall be performed.

Furthermore, metal pressure plate of minimal thickness 6 mm connected by a joint shall be used for testing.

Figure 2.2.9.1: An example of auxiliary tray for wet testing



The mean value of compressive stress at 10 % strain σ_{10} or the mean value of compressive strength σ_m under standard laboratory conditions and wet conditions shall be given in kPa in the ETA using the levels in accordance with clause 4.3.3 of EN 13162. It shall be specified whether these values are relative to standard or wet test conditions.

Residual proportion of compressive stress at 10 % strain $\Delta\sigma_{10}$ shall be determined in accordance with equation 2.2.9.1 or residual proportion of compressive strength $\Delta\sigma_m$ shall be determined in accordance with equation 2.2.9.2:

$$\Delta\boldsymbol{\sigma_{10}} = \frac{\sigma_{10,w}}{\sigma_{10,d}}\ x\ 100\ \ [\%] \qquad \text{(equation 2.2.9.1)}$$

where

$\Delta\sigma_{10}$ residual proportion of compressive stress at 10 % strain expressed in %;

$\sigma_{10,w}$ compressive stress at 10 % strain under wet conditions expressed in kPa;

$\sigma_{10,d}$ compressive stress at 10 % strain under standard laboratory conditions expressed in kPa.

$$\Delta\boldsymbol{\sigma_m} = \frac{\sigma_{m,w}}{\sigma_{m,d}}\ x\ 100\ \ [\%] \qquad \text{(equation 2.2.9.2)}$$

where

$\Delta\sigma_m$ residual proportion of compressive strength expressed in %;

$\sigma_{m,w}$ compressive strength under wet conditions expressed in kPa;

$\sigma_{m,d}$ compressive strength under standard laboratory conditions expressed in kPa.

Residual proportion of compressive stress at 10 % strain $\Delta\boldsymbol{\sigma_{10}}$ or residual proportion of compressive strength $\Delta\sigma_m$ (at failure only for lamellas) shall be given as integer in % in the ETA.

2.2.11 Point load

Point load F_p at deformation of 5 mm under standard laboratory conditions at temperature of (23 ± 2) °C and relative humidity of (50 ± 5) % and wet conditions shall be determined in accordance with clause 4.3.5 of EN 13162.

Dimension of test specimen: 300 x 300 mm (width x length).

Minimum number of test specimens: 3.

Wet conditions mean that the test specimen contains its maximum water capacity WK_{max} (see clause 2.2.4) immediately after the 2-hour dripping in accordance with A.4. For the testing under wet conditions auxiliary tray made of stainless steel (minimal wall thickness: 1.5 mm and width 350 mm; length 350 mm) in accordance with to Figure 2.2.9.1 shall be used. For each test specimen a separate auxiliary tray shall be used. The height of the tray shall be by 20 mm higher than the thickness of the tested specimen. Test specimen shall be placed to the centre of the tray and watered to its maximum water capacity. The tray is designed to keep the sample in place after soaking to avoid any handling that could alter its state or properties, ensuring accurate and consistent test results.

Specimens shall be conditioned for 24 hours and then standard testing on the wet specimens in the tray shall be performed.

Residual proportion of point load ΔF_p at deformation of 5 mm shall be determined in accordance with equation 2.2.10.1:

$$\Delta\boldsymbol{F_p} = \frac{\mathrm{Fp,w}}{\mathrm{Fp,d}}\ x\ 100\ \ [\%] \qquad \text{(equation 2.2.10.1)}$$

where

ΔF_p residual proportion of point load ΔF_p at deformation of 5 mm expressed in %;

$F_{p,w}$ point load F_p at deformation of 5 mm under wet conditions expressed in N;

$F_{p,d}$ point load F_p at deformation of 5 mm under standard laboratory conditions expressed in N.

Residual proportion of point load ΔF_p at deformation of 5 mm shall be given as integer in % in the ETA. The mean values of point load F_p at deformation of 5 mm tested under standard or wet conditions shall be given in N (rounded down to nearest 50 N) in the ETA. Both dry and wet test results shall be given using the symbols defined above.

2.2.12 Tensile strength perpendicular to faces

Tensile strength perpendicular to faces σ_{mt} shall be determined under standard laboratory conditions at temperature of (23 ± 2) °C and relative humidity of (50 ± 5) % and wet conditions in accordance with clause 4.3.4 of EN 13162.

Dimension of test specimen: 200 x 200 mm (width x length).

Minimal number of test specimens: 5.

Wet conditions mean that the test specimen contains its maximum water capacity WK_{max} (see clause 2.2.4) immediately after the 2-hour dripping in accordance with A.4.

Test specimens for testing under wet conditions shall be fixed using a two-component epoxy adhesive to steel plates/blocks (clause 5.2 of EN 1607) before wetting.

After curing the prepared specimens shall be inserted to auxiliary tray made of e.g., stainless steel with minimal bottom dimensions 250 x 250 mm and watered to maximum water capacity for 24 hours and then placed on a drip grid and allowed to drip for 2 hours before testing. Then the testing shall be performed in a standard way in accordance with clause 4.3.4 of EN 13162.

Residual proportion of tensile strength perpendicular to faces $\Delta\sigma_{mt}$ shall be determined in accordance with equation 2.2.11.1:

$$\Delta\boldsymbol{\sigma_{mt}} = \frac{\sigma_{mt,w}}{\sigma_{mt,d}}\ x\ 100\ \ [\%] \qquad \text{(equation 2.2.11.1)}$$

where

$\Delta\boldsymbol{\sigma_{mt}}$ residual proportion of tensile strength perpendicular to faces σ_{mt} expressed in %;

$\sigma_{mt,\,w}$ tensile strength perpendicular to faces σ_{mt} under wet conditions expressed in kPa;

$\sigma_{mt,\,d}$ tensile strength perpendicular to faces σ_{mt} under standard laboratory conditions expressed in kPa.

Residual proportion of tensile strength perpendicular to faces $\Delta\sigma_{mt}$ shall be stated as integer in % in the ETA.

The mean value of tensile strength perpendicular to faces σ_{mt} shall be given in kPa in the ETA.

Both dry and wet test results shall be given using the symbols defined above.

2.2.13 Compressive creep

The compressive creep X_{ct} and total deformation X_t (total reduction of thickness) shall be determined under standard laboratory conditions at temperature of (23 ± 2) °C and relative humidity of (50 ± 5) % and wet conditions after at least 122 days of testing in accordance with Annex C.

Wet conditions mean that the test specimen contains its maximum water capacity WK_{max} (see clause 2.2.4) immediately after the 2-hour dripping in accordance with A.4.

Compressive creep X_{ct} in mm and total deformation X_t in mm (total reduction of thickness) under standard laboratory conditions and wet conditions shall be given in the ETA.

2.2.14 Durability of characteristics

2.2.14.1 Durability of reaction to fire against heat, weathering, ageing/degradation

The reaction to fire may change during the working life of the product due to factors such as vegetation roots penetration and climatic conditions. However, testing under standard laboratory conditions at temperature of (23 ± 2) °C and relative humidity of (50 ± 5) % (dry conditions) represents the worst possible

testing condition for this product. Dry testing offers a more stringent and consistent baseline. Wet conditions could temporarily reduce flammability.

Reaction to fire shall be assessed in accordance with clause 2.2.1. Reaction to fire classification in accordance with the Commission Delegated Regulation (EU) No 2016/364 in connection with EN 13501-1 shall be given in the ETA.

2.2.14.2 Durability of thermal conductivity against heat, weathering, ageing/degradation

Durability of thermal resistance shall be assessed in accordance with clause 4.2.7.3 of EN 13162 and it is assumed that the thermal conductivity at maximum water capacity immediately after the 2-hour dripping in accordance with clause of 2.2.5 represents the worst possible condition which can occur. The mean value of the thermal conductivity $\lambda_{10(23;50)}$ in W/m·K and value of the thermal conductivity $\lambda_{D(23;50)}$ in W/m·K at maximum water capacity immediately after the 2-hour dripping in accordance with A.4 shall be given in the ETA.

2.2.14.3 Durability of compression behaviour against ageing/degradation

Durability of compression behaviour shall be determined in accordance with clause 2.2.13 and compressive creep covers this characteristic. Compressive creep X_{ct} in mm and total deformation X_t in mm (total reduction of thickness) shall be given in the ETA.

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

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

For the products covered by this EAD the applicable European legal act is Commission Decision 1999/91/EC, as amended by 2001/596/EC.

The applicable AVCP system is 3 for any use except for uses subject to regulations on reaction to fire (including propensity to undergo continuous smouldering).

For uses subject to regulations on reaction to fire (including propensity to undergo continuous smouldering) the applicable AVCP systems regarding reaction to fire (including propensity to undergo continuous smouldering) 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*
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1	Reaction to fire	2.2.1	According to Control plan	According to Control plan	in accordance with Table B.2 of EN 13162 reflecting the resulting reaction to fire class and relevant test methods
2	Propensity to undergo continuous smouldering	2.2.2	According to Control plan	According to Control plan	once in 2 years
3	Content and release of dangerous substances	2.2.3	According to Control plan	According to Control plan	once in 5 years
4	Organic content *Indirect testing regarding reaction to fire and propensity to undergo continuous smouldering*	EN 13820	According to Control plan	According to Control plan	once in 4 hours
5	Maximum water capacity	2.2.4	According to Control plan	According to Control plan	once a month
6	Thermal conductivity at maximum water capacity	2.2.5	According to Control plan	According to Control plan	once in each 3 months
7	Thermal conductivity (dry state)	2.2.6	According to Control plan	According to Control plan	once in each 3 months
8	Density	2.2.7	According to Control plan	According to Control plan	once in 2 hours
9	Thickness	2.2.8	According to Control plan	According to Control plan	once in 2 hours
10	Water flow capacity in the plane	2.2.9	According to Control plan	According to Control plan	once in 2 years
11	Compression behaviour	2.2.10	According to Control plan	According to Control plan	once in 8 hours
12	Point load	2.2.11	According to Control plan	According to Control plan	once in 5 years
13	Tensile strength perpendicular to faces	2.2.12	According to Control plan	According to Control plan	once in 8 hours
14	Compressive creep	2.2.13	According to Control plan	According to Control plan	once in 5 years
*Notes: *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 (including propensity to undergo continuous smouldering) for products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire (including propensity to undergo continuous smouldering) classification (e.g., an addition of fire retardants or a limiting of organic material).

In this case the cornerstones of the tasks to be undertaken by the notified body under AVCP system 1 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 (including propensity to undergo continuous smouldering) *(for system 1 only)*					
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 (including propensity to undergo continuous smouldering), the notified body will consider especially the clearly identifiable stage in the production process which results in an improvement of the reaction to fire (including propensity to undergo continuous smouldering) 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 (including propensity to undergo continuous smouldering) *(for system 1 only)*					
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 (including propensity to undergo continuous smouldering) 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 (including propensity to undergo continuous smouldering) 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	2/year

4 REFERENCE DOCUMENTS

EN 13162:2012+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 16733:2016	Reaction to fire tests for building products - Determination of a building product's propensity to undergo continuous smouldering
EN ISO 29470:2020	Thermal insulating products for building applications – Determination of the apparent density
EN ISO 29466:2022	Thermal insulating products for building applications – Determination of thickness
EN ISO 12958-2:2020	Geotextiles and geotextile-related products - Determination of water flow capacity in their plane – Part 2: Performance test
EN 12664:2001	Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Dry and moist products of medium and low thermal resistance
EN 13820:2003	Thermal insulating materials for building applications - Determination of organic content
EN ISO 10456:2007	Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007)
EN ISO 16534:2020	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 16637-2: 2023	Construction products: Assessment of release of dangerous substances - Part 2: Horizontal dynamic surface leaching test
EN 17195:2023	Construction products: Assessment of release of dangerous substances – Analysis of inorganic substances in eluates
EN 17197:2023	Construction products: Assessment of release of dangerous substances – Analysis of inorganic substances in eluates and digests – Analysis by inductively coupled plasma optical emission spectrometry (ICP-OES)
EN 17331:2023	Construction products: Assessment of release of dangerous substances – Content of organic substances – Methods for extraction and analysis
EN 17332:2023	Construction products: Assessment of release of dangerous substances – Analysis of organic substances in eluates
EN 17200:2023	Construction products: Assessment of release of dangerous substances – Analysis of inorganic substances in eluates and digests – Analysis by inductively coupled plasma mass spectrometry (ICP-MS)

ANNEX A: DETERMINATION OF MAXIMUM WATER CAPACITY

A.1 Principle

Determination of amount of water received by the materials inside the cylindrical plastic vessel after complete immersion in water for 24 hours, which is then allowed to drip for 2 hours.

A.2 Test equipment

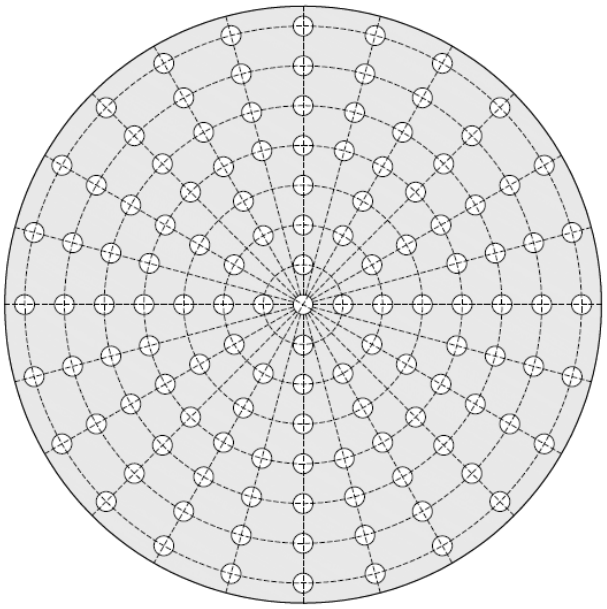
Cylindrical plastic vessels 150 mm inside diameter, 165 mm high with perforated bottom.

For the type of perforations see Figure A.2.1 and details below:

- radius interval of 15°
- perforation spacing around the perimeter: 10,0 mm
- perforation diameter: 5,0 mm
- total number of perforations: 125
- centre 1x1 = 1
- 90°intervals 4x7 = 28
- 30°/60° intervals 8x6 = 48
- Intervals 15°/45°/75° 12x4 = 48.

The perforations are arranged in concentric circles from the center to the circumference (number of perforations is 1,4,12,12,24,24,24,24).

Figure A.2.1: Details of perforations in the bottom side of cylindrical plastic vessel



- a spacious plastic rectangular container at least 200 mm deep designed for immersing specimens placed in cylindrical plastic vessels in water

- spacers of approximately 10 mm depth to allow water access through the perforated base

- a sieve with a mesh of approximately 1 mm, 148 mm in diameter, to cover the top of the specimens

- a weight for loading the specimens on the top of the specimens to be placed on the sieve

- a balance enabling the weight of the specimens to be determined to the nearest 0,1 g

- drying chamber

- digital calliper for determining the diameter in mm

- equipment for determining the thickness in accordance with EN ISO 29466, the load shall be 50 Pa, except for products with a compressive stress or compressive strength level of 10 kPa or more, for which the load shall be 250 Pa~~/~~.

A.3 Test specimens

A.3.1 Dimensions of test specimens

The test specimens shall be cylindrical in shape with a diameter of 150 mm. The minimum height of the cylinder is the product thickness before application of any load.

A.3.2 Number of test specimens

The determination shall be carried out on a minimum of 5 test specimens.

A.3.3 Preparation of test specimens

The test specimens of circular shape shall be cut out in such a way that the original structure of the product is not altered.

The location from which the test specimens are taken shall be selected to ensure that the measured density of the specimens is representative of the entire product.

A.3.4 Conditioning of test specimens

The test specimens shall be conditioned at (23 ± 2) °C and relative humidity of (50 ± 5) % until a constant mass is reached. The mass is considered constant when the difference between two consecutive weighing, performed at least 24 hours apart, does not exceed 0.1 % of the specimen´s mass or 0.1 grams, whichever is greater.

A.4 Procedure

Dry the specimens at (105 ± 2) °C in a drying chamber to constant mass and determine the mass of the dried specimen m_d.

Cover the surface of the product compressed in cylindrical plastic vessels with a mesh sieve and load it by 50 Pa, except for products with a compressive stress or compressive strength level of 10 kPa or more, for which the load shall be 250 Pa to prevent it from floating. Place a drip grid in the spacious plastic rectangular container. Furthermore, put the cylindrical plastic vessels in the spacious plastic rectangular container and slowly add water approximately 10 mm above the surface of the specimen.

To ensure continuous water level maintenance without the presence of laboratory personnel, implement an automated water replenishment system. This system incorporates a float valve mechanism, which activates when water levels fall below a predetermined threshold. After 24 hours of soaking, remove the cylindrical plastic vessels, place on a drip grid and allow to drip for 2 hours.

Remove the surface covering and the test specimen from the cylindrical plastic vessel after exposure and determine the weight of the specimen. Determine the mass of the specimen at maximum water capacity immediately after the 2-hour dripping in g. Calculate the specimen volume V in accordance with the equation (A.5.1) and then calculate the maximum water capacity W_{Kmax} in accordance with the equation (A.5.2).

The water content of the specimens in g/cm^3 results from the difference between the mass at maximum water capacity immediately after the 2-hour dripping and the dry mass.

A.5 Calculation and expression of test results

Calculation of specimen volume

$$V = \frac{\pi * d^2 * d_{th}}{4} \qquad \text{(A.5.1)}$$

V	volume of specimen in cm^3
d	diameter of specimen after exposure in cm
d_{th}	thickness of specimen in cm determined in accordance with EN ISO 29466
π	mathematical constant 3,14159265.

Calculation of maximum water capacity

$$WK_{max} = \frac{(m_{WK} - m_d) * 100}{V} \qquad \text{(A.5.2)}$$

WK_{max}	maximum water capacity immediately after the 2-hour dripping in accordance with A.4 expressed in vol. %
m_{WK}	mass of the specimen at maximum water capacity in g
m_d	dry mass of the specimen in g
V	specimen volume in cm^3.

ANNEX B: DETERMINATION OF WATER FLOW CAPACITY IN THE PLANE

B.1 Principle

Determination of the water flow capacity within the product plane, denoted as $q_{p(20;0.1;1)}$ and $q_{p(20;1.0;1)}$, under the following conditions:

- Slopes: 0°, 2°, and 35°
- Hydraulic gradients: i = 0.1 and i = 1.0
- Seating stresses: 2 kPa and 20 kPa (normal compressive load is used)
- Seating time: 1 hour
- Temperature: (20 ± 2) °C.

The principle of the testing is based on EN ISO 12958-2 with some deviations considering the material composition of the tested product and intended use of product. In practice, this means following the Manufacturer´s Product Installation Instruction (MPII) of the product with regard to its orientation etc. If the MPII is not available, then the current knowledge of state of art is followed. Soil is not used for this testing (boundary conditions are not taken into account) and creep is not taken into account.

Explanatory notes:

$q_{p(20;0.1;\ 1)}$ is water flow capacity within the plane of the product under normal compressive load (stress) σ of 20 kPa, hydraulic gradient i = 0.1 and seating time t = 1 hour.

$q_{p(20;1.0;\ 1)}$ is water flow capacity within the plane of the product under normal compressive load (stress) σ of 20 kPa, hydraulic gradient i = 1.0 and seating time t = 1 hour.

B.2 Test equipment

B.2.1 Constant-head in-plane water flow apparatus

The apparatus shall be capable of maintaining a constant head loss at different water levels corresponding to the hydraulic gradients 0.1 and 1.0, while maintaining a water head at the point of discharge not greater than 100 mm.

The testing equipment shall be additionally equipped with transparent lids (e.g., made from PVC) for closing of the water level and hydraulic jack to get the requested testing slope.

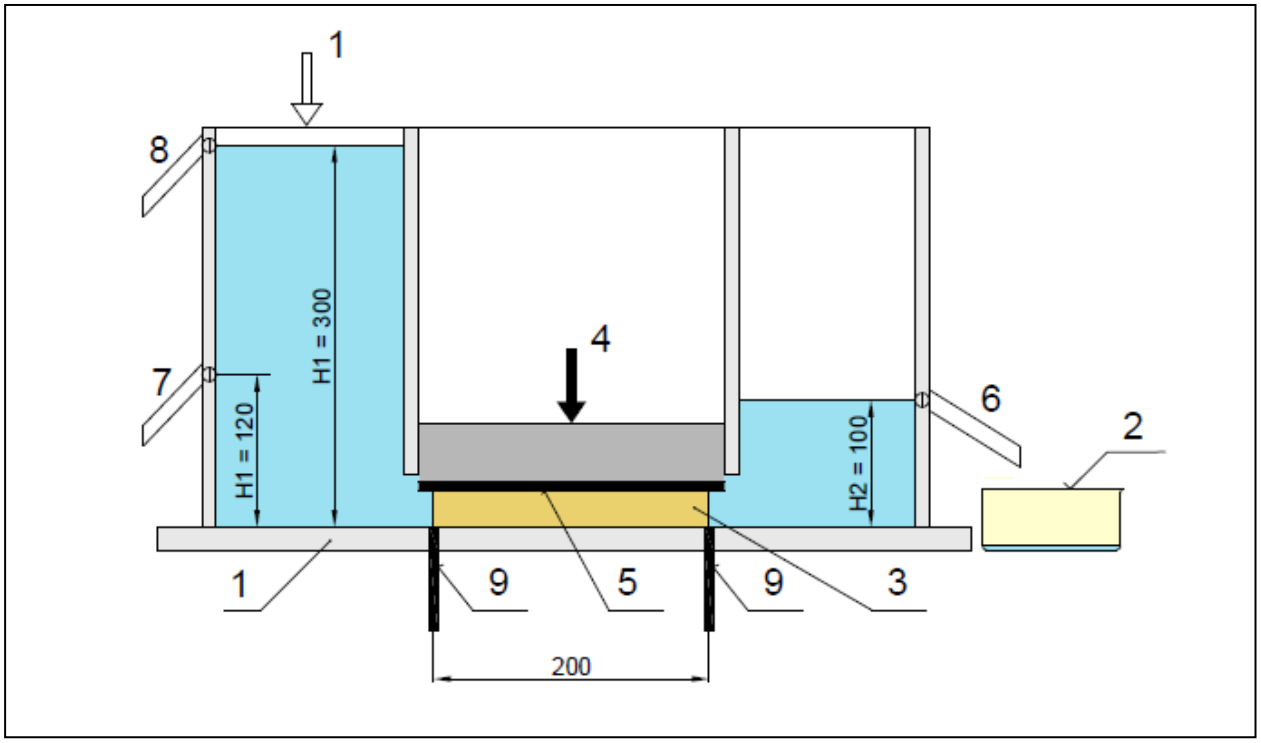
Reading of the water in open-tube piezometers or manometers shall be used.

The apparatus shall include a loading mechanism capable of exerting a constant normal compressive stress to the test specimen to a maximum permissible measurement error of 1% of the applied load or 1 kPa, whichever is greater, for a period of time exceeding the seating time.

The apparatus shall have a minimum width of 0.2 and a minimum net hydraulic length of 0.2 m.

Leakage through the apparatus shall not exceed 5% of the flow rate measured during the test. To verify the leak rate of the apparatus, a blank test shall be conducted periodically using a closed cell foam in place of the test specimen and tested. The leak check shall be performed using the highest hydraulic gradient i = 1.0.

Figure B.2.1.1: Drawing of testing equipment for testing at 0°

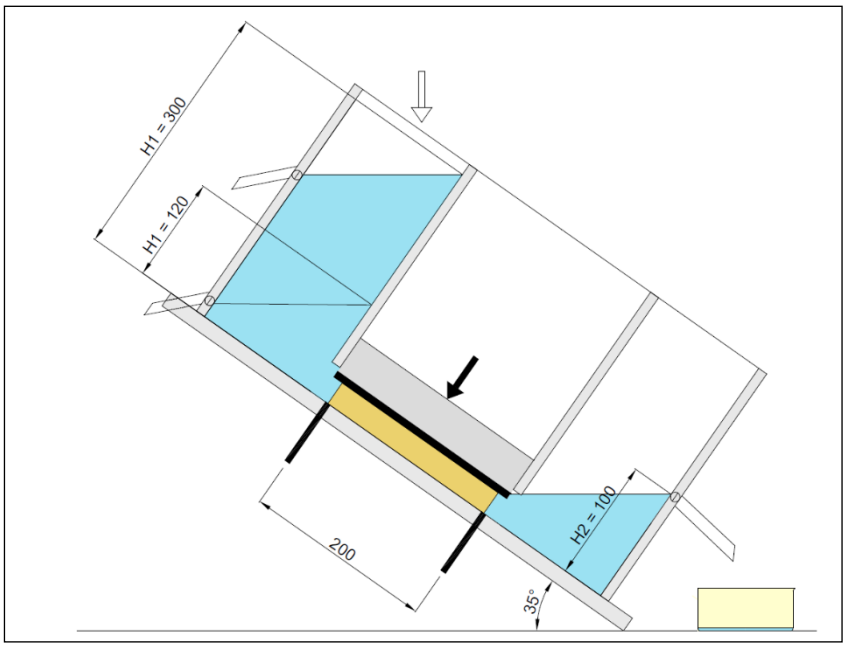


Legend:

1 water supply; 2 water collection and measuring vessel; 3 specimen; 4 normal compressive load; 5 loading plate; 6 downstream; 7 water overflow for hydraulic gradient i = 0.1; 8 water overflow for hydraulic gradient i = 1.0; 9 water head manometers/ piezometers.

H1 water head at the origin in [mm] – 120 mm is for i = 0.1 and 300 mm for i = 1.0; H2 water head at the point of discharge of 100 [mm] for i = 0.1 and i = 1.0; specimen width of 200 [mm].

Figure B.2.1.2 Drawing of testing equipment for testing at slope – namely 35° and i = 1.0



Legend:

The figure shows an identical equipment as in previous Figure B.2.1.1, but at a slope of 35°. Identical equipment shall be used for testing at slope of 2°, too. Specimen width is 200 [mm]; used slope of 35°; H1 water head at the origin in [mm]; H2 water head at the point of discharge.

B.2.2 Water

For requirements and detailed information see clause 5.2 of EN ISO 12958-2.

B.2.3 Stopwatch with a maximum permissible measurement error of 0.5 s.

B.2.4 Thermometer with a maximum permissible measurement error of 0.5 °C.

B.2.5 Equipment for determination the water flow rate to a maximum permissible measurement error of 2 %.

B.2.6 Measuring device for determination the applied hydraulic head to a maximum permissible measurement error of 1 mm.

B.2.7 Measuring device for determination the applied normal stress to a maximum permissible measurement error of 1 % or 1 kPa, whichever is greater.

B.2.8 Digital angle finder for determination of the applied angle.

B.3 Test specimens

B.3.1 Dimensions of test specimens

The test specimens shall be 200 mm x 200 mm x thickness of the delivered product.

B.3.2 Number of test specimens

The determination shall be carried out on a minimum of 3 test specimens for each hydraulic gradient i = 0.1 and i = 1.0. A new specimen shall be used for each determination.

B.3.3 Preparation of test specimens

The test specimens shall be cut out in such a way that the original structure of the product is not altered. To avoid disturbing the specimens, they shall be handled as rarely as possible. This is to ensure that the specimen is not disturbed, and its condition is not altered ensuring more accurate test results.

B.3.4 Specimen condition

Specimens shall be clean, free from surface deposits and without visible damage or fold marks at the time of installation.

B.4 Procedure

Measure the thickness of the test specimens in accordance with EN ISO 29466. The determination shall be conducted at a pressure of 50 Pa, except for products with a compressive stress or compressive strength level of 10 kPa or more, for which the load shall be 250 Pa. The thickness measurement ensures that the relevance and reliability of the test is maintained.

Place the specimens under water at laboratory temperature (23 ± 2) °C, gently stir to remove air bubbles and leave to saturate for at least 12 hours.

Install the product to be tested and apply a seating stress of 2 kPa to the test specimen and fill the inlet reservoir with water. Allow the water to flow through the test specimen in order to remove air. Take all necessary precautions to avoid preferential flow paths along the specimen. If such flows are observed, reseat or discard the specimen as necessary. Reseating is possible if the specimen shows minor irregularities or disturbances (small air bubbles, or minor surface imperfections that don't fundamentally affect the overall integrity of the specimen) that can be corrected by reseating. However, if the specimen

exhibits significant defects, damage, or persistent irregularities that cannot be resolved by reseating, it shall be discarded to ensure accurate test results.

Apply the normal load of 20 kPa for the seating time of 1 hour. Fill in the inlet reservoir to the level corresponding to the target hydraulic gradient (see for details Figure B.2.1.1) i = 0.1. Allow water to flow through the specimen for 120 s. Collect the water passing through the system over a fixed period of time in the measuring vessel. The volume of water collected shall be at least 0.5 l. The collection time shall be at least 5 s. Record the volume of water collected and water temperature. Repeat this procedure two more times, i.e. take three flow readings in total. Determine the average of volume of water collected per unit time.

Should the three flow measurements show a decrease over time of 5 % between two consecutive measurements, the first value (the highest flow measurement) shall be retained for further calculation and reporting. If a discharge gauge is used then the discharge rate shall be the average of three consecutive readings with a minimum time interval between readings of 15 s. The time needed to perform all flow measurements shall not exceed 10 % of the seating time corresponding to the measurement being made. The exact seating time associated to a given measurement shall be reported to reflect the time at which each measurement was actually made. Increase the hydraulic gradient to i = 1.0, while maintaining the stress value. Repeat the procedure.

Average volume measured V in litres, collection time t in seconds, width W of the specimen in metres, water temperature in degrees Celsius, correction factor R_T for converting to a water temperature of 20 °C (in accordance with Annex A of EN ISO 12958-2) shall be recorded.

B.5 Calculation and expression of test results

In-plane water flow capacity per unit width at a defined stress σ, gradient i, seating time t, slope, in litres per metre second [(l/s)/m], $q_{p(\sigma;i;\,t)}$ at 20°C for each given hydraulic gradient i = 0.1 and i = 1.0, normal stress 20 kPa and seating time of 1 hour shall be calculated in accordance with Formula 1 of clause 8.1 of EN ISO 12958-2.

The mean value of in-plane water flow capacity $q_{p(20;0.1;\,1)}$ and $q_{p(20;1.0;\,1)}$ for 0°, 2° and 35° shall be determined on the basis of at least 3 determinations and shall be stated in l/s/m in the ETA in relation to the thickness of the test sample. "

ANNEX C: DETERMINATION OF COMPRESSIVE CREEP

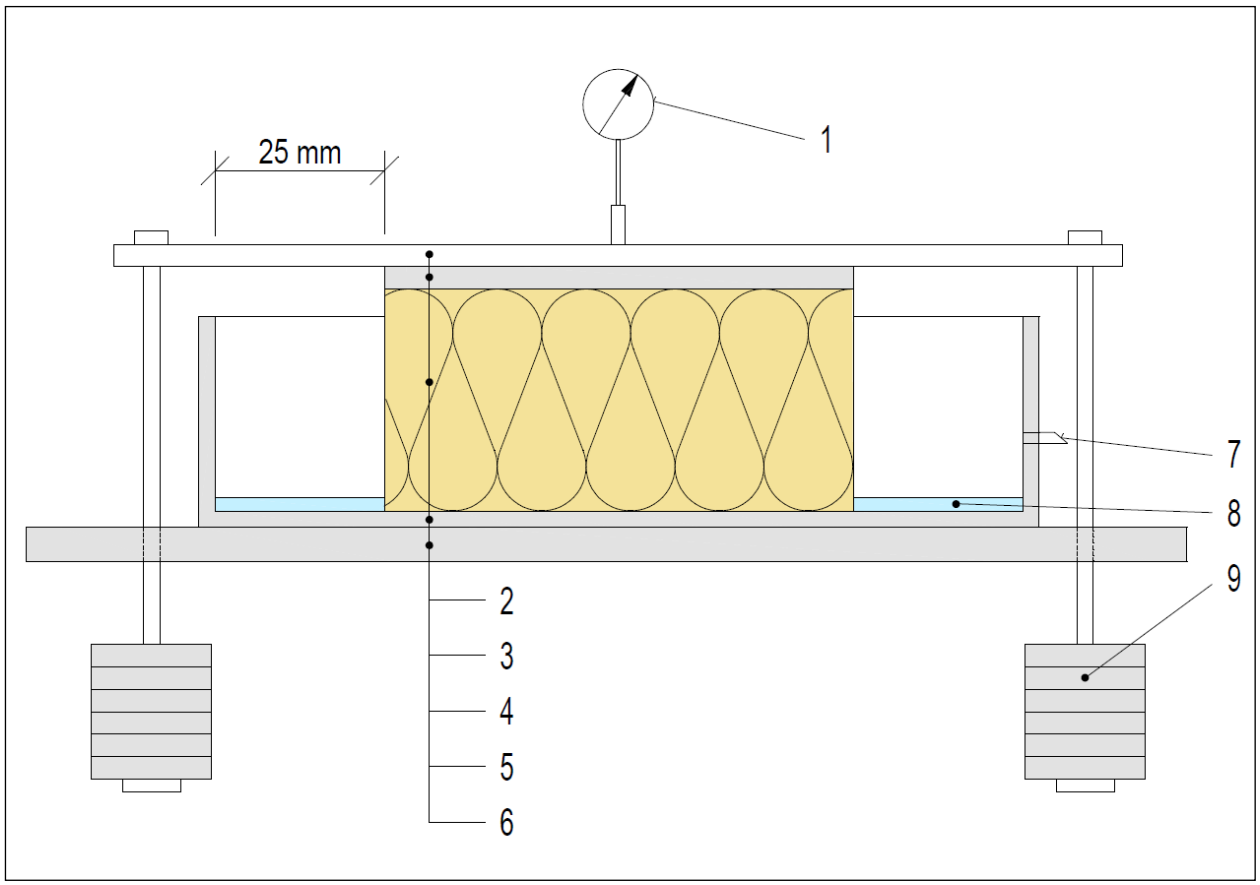
C.1 Principle

The compressive creep X_{ct} and total deformation X_t (total reduction of thickness) shall be determined under standard laboratory conditions at temperature of (23 ± 2) °C and relative humidity of (50 ± 5) % and wet conditions after ~~minimally~~ at least 122 days of testing in accordance with EN ISO 16534. Wet conditions mean that the test specimen contains its maximum water capacity WK_{max} (see clause 2.2.3) immediately after the 2-hour dripping in accordance with A.4.

C.2 Test equipment

Testing equipment in accordance with clause 6 of EN ISO 16534 shall be used. For testing under wet conditions, the test equipment shall be additionally equipped with a steel water vessel (see Figure C.2.1 for details).

Figure C.2.1: Test equipment for testing under wet conditions equipped with a steel water vessel



Legend: 1 displacement sensor or dial gauge; 2 load bridge; 3 load distribution plate (movable, self-aligning); 4 test specimen; 5 steel water vessel; 6 storage beam/plate; 7 water overflow; 8 water squeezed out of the test specimen; 9 load weight.

C.3 Test specimens

C.3.1 Dimensions of test specimens

200 x 200 mm/300 x 300 mm (width x length).

C.3.2 Number of test specimens

Minimal number of test specimens: 5 (for dimension 200 x 200 mm) and 3 (for dimension 300 x 300 mm).

C.3.3 Preparation of test specimens

Test specimens shall be taken from the same sample with a total area not less than 1 m^2 and sufficient to cover the needed testing. The test specimen shall be taken from the same sample and prepared in the same way as test specimens for the compression test in accordance with clause 2.2.9.

For further details with regard to preparation see clause 6.4 of EN ISO 16534.

C.3.4 Conditioning of test specimens

The test specimens shall be conditioned for at least 24 hours at the test conditions (23 ± 2) °C and relative humidity (50 ± 5) %.

C.4 Procedure

Stress σ_c for the creep test shall be derived from either the compressive strength σ_m (at failure only for lamellas) or the compressive stress at 10% strain σ_{10}, measured in accordance with clause 2.2.9 and shall be determined by calculation as given below for three types of stresses.

$\sigma_c = 0{,}15 \times \sigma_m$ or $\sigma_c = 0{,}15 \times \sigma_{10}$

$\sigma_c = 0{,}20 \times \sigma_m$ or $\sigma_c = 0{,}20 \times \sigma_{10}$

$\sigma_c = 0{,}25 \times \sigma_m$ or $\sigma_c = 0{,}25 \times \sigma_{10}$.

The testing shall be performed in accordance with clause 8.3 of EN ISO 16534.

Testing time: at least 122 days.

C.5 Calculation and expression of test results

Calculation and expression of test results shall be performed in accordance with clause 9 of EN ISO 16534.