EUROPEAN ASSESSMENT DOCUMENT

EAD 010013-00-0301

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LIGHTWEIGHT PANEL MADE OF MORTAR OF CEMENT AND GRANULATED EPS REINFORCED BY A GLASS FIBRE MESH AND AN INTERNAL STEEL RAILING

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1 SCOPE OF THE EAD

1.1 Description of the construction product

The construction product is a lightweight panel made of lightweight mortar of cement, sand, granulated EPS and possibly additives, reinforced by a glass fibre mesh connected to an internal galvanised steel railing (from now on, referred to as lightweight panel), that is positioned at a half panel thickness (see Figure 1).

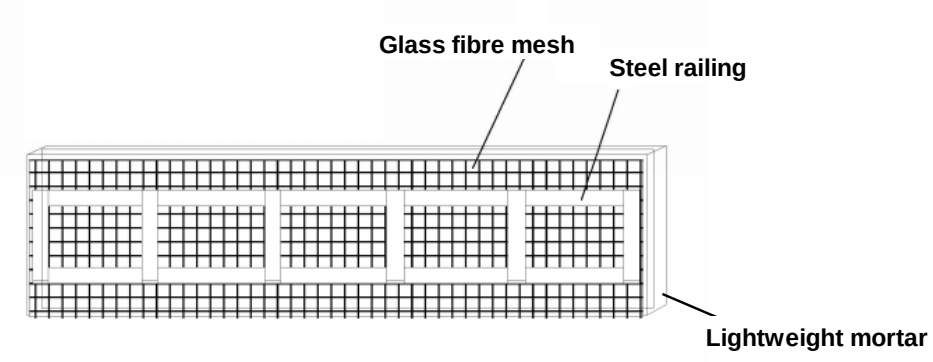

Figure 1 Illustration of the lightweight panel components

The cement used is in accordance with EN 197-1: main type(s) 42.5 (CEM I, CEM II), with a minimum characteristic compressive strength at 28 days of 42.5 MPa, e.g. CEM II/B-L 42.5.

The granulated EPS used is of uniform granulometry, with a nominal size range of 2 to 7 mm, and a nominal density range of 9 to 20 kg/m^3.

The glass fibre used has a suitable anti-alkaline protection. In addition, the glass fibre used has a nominal thickness range of 0.80 to 0.95 mm, the mesh opening has a nominal dimension range of 10.0 mm × 8.0 mm to 8.5 mm × 6.5 mm, at least 2 mm larger than the size of the granulated EPS, with a nominal mass per surface unit range of 0.22 to 0.34 kg/m^2.

The steel used is in accordance with EN 10346, with a minimum characteristic yield strength equal to 140 MPa. The nominal mass of the hot-dip zinc coating is at least 275 g/m^2.

The dosages of each material to produce the lightweight mortar are given in the manufacturer's technical document of the lightweight panel.

The steel railing is made of a number of perforated L-shaped cold-formed steel elements: two longitudinal and a minimum of four transversal. The latter are spaced by a maximum of 600 mm. The minimum nominal value of the steel railing cover is equal to 7.5 mm.

The lightweight panel is produced in standardised dimensions in factory conditions, using a semi-automated production line. The lightweight panel shall not have chases or openings.

The nominal ranges of the external dimensions of the lightweight panels are (see Figure 2):

Thickness (t): 40 mm to 80 mm.

Length (L): 600 mm to 2000 mm.

Width (B): 300 mm to 600 mm.

The lightweight panel is intended to be fixed longitudinally to a series of transverse cold-formed steel structural support elements, by means of connecting elements (self-drilling screws) driven through the internal steel railing at specific discrete locations. Both the support and the connecting elements are not part of the product. These shall be detailed in the ETA, namely providing the relevant geometrical

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characteristics (e.g. cross-section configuration and dimensions) and the relevant mechanical characteristics (e.g. yield strength of steel).

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

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

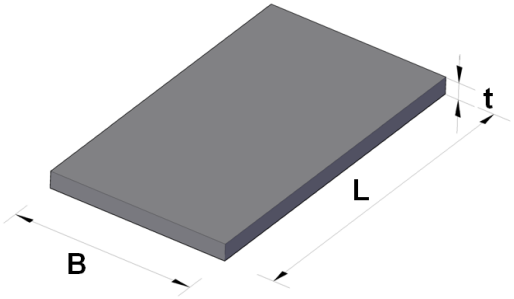

Figure 2 Illustration of the lightweight panel dimensions

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

1.2.1 Intended use(s)

The lightweight panel is intended for use as non-load bearing or load bearing element for planking or stiffening steel framed external and internal walls of buildings, typically single- or medium-rise residential buildings, in particular those using light steel framing (LSF) technology. See Figure 3 for an application example.

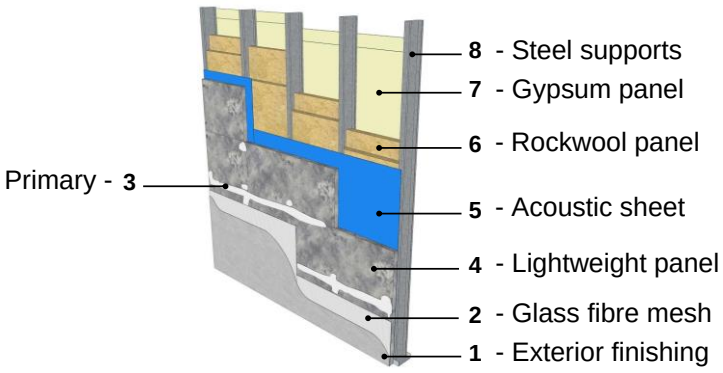

Figure 3 Example of application of the lightweight panel in external walls

The lightweight panel may also be used in composite floors fixed to thin-walled steel beams, spaced no more than 600 mm. See Figure 4 for an application example. The application of the lightweight panel in composite floors may require, when relevant, the use of an additional layer of an adequate structural material in order to satisfy the safety and serviceability criteria (see EN 1990).

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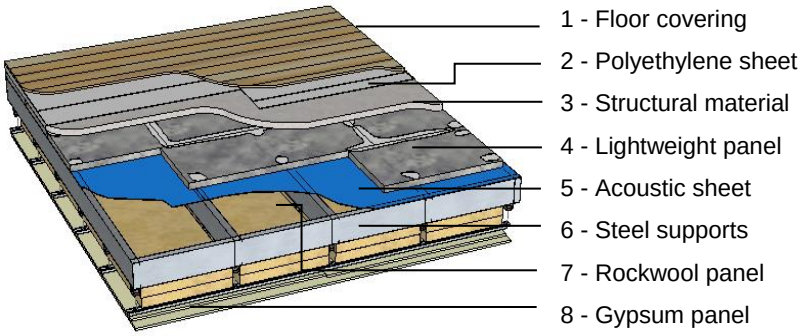

Figure 4 Example of application of the lightweight panel in a floor

The application of the lightweight panels in walls and in floors may have joints in the directions along the width and length of the panels. The joints along the width of panels shall be made discontinuous between two adjacent panels and shall not occur in the span between two supports.

The lightweight panels shall resist all applied loads. In floors, each panel shall resist its self-weight and any relevant variable loads applied normal to its surface. In walls, each panel shall resist its self-weight (but not the self-weight of other panels), the wind loads and any other relevant variable loads applied normal to its surface.

The lightweight panels are only intended to contribute to the racking resistance of the building.

The present document does not specify methods to assess the lightweight panel submitted to seismic actions.

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 lightweight panel for the intended use of 50 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[1].

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

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

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2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 1 shows how the performance of "Lightweight panel made of mortar of cement and granulated EPS reinforced by a glass fibre mesh and an internal steel railing" is assessed in relation to the essential characteristics.

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

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 1: Mechanical resistance and stability			
	Same as for BWR 4		
Basic Works Requirement 2: Safety in case of fire			
1	Reaction to fire	2.2.1	Class
2	Resistance to fire	2.2.2	Description
Basic Works Requirement 4: Safety and accessibility in use			
3	Flexural resistance	2.2.3	Level
4	Resistance to shear	2.2.4	Level
5	Racking resistance and stiffness	2.2.5	Level
6	Creep coefficient	2.2.6	Level
7	Impact resistance	2.2.7	Level
8	Durability against corrosion	2.2.8	Description
9	Pull-out resistance of connections	2.2.9	Level
10	Resistance to shear of connections	2.2.10	Level
11	Durability against freeze-thaw	2.2.11	Level
12	Water absorption of the lightweight mortar	2.2.12	Level
13	Dimensional stability of the lightweight mortar	2.2.13	Level
Basic Works Requirement 5: Protection against noise			
14	Airborne sound insulation	2.2.14	Level
15	Impact sound insulation	2.2.15	Level

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No	Essential characteristic	Assessment method	Type of expression of product performance
16	Sound absorption	2.2.16	Level
Basic Works Requirement 6: Energy economy and heat retention			
17	Thermal conductivity of the lightweight mortar	2.2.17	Level
18	Thermal resistance of the lightweight panel	2.2.18	Level

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

The principle of grouping of products into families may be applied. A family is a group of products for which the test results for one or more characteristics of a representative sample of a suitable range in the family are valid for all other products within the family. The most severe combination within ranges shall be tested. Intermediate combinations should be verified using methods of structural analysis.

The lightweight panels shall be mounted in accordance with the manufacturer's installation specifications, with regard to the intended use (floor or wall), so that the test assembly corresponds to the end use conditions.

The support elements to be used shall reproduce specified conditions of use, particularly with respect to their nature, type and position. Additionally, the manner in which components are fixed to each other shall reproduce specified conditions of use, particularly with respect to the nature, type and position of the connecting elements and the distance between them.

If the manufacturer’s specifications foresee more than one possible end-use assembly, the assessment should at least be performed for the most critical one.

Auxiliary components used in testing (e.g. support and connecting elements) that influence the performance of the product, shall be detailed in the test report, as well as the procedure used to install them.

2.2.1 Reaction to fire

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

2.2.2 Resistance to fire

The part of the works or assembled system in which the lightweight panel is intended to be incorporated, installed or applied shall be tested, using the test method relevant for the corresponding fire resistance class, in order to be classified according to EN 13501-2.

2.2.3 Flexural resistance

2.2.3.1 Flexural resistance at ambient temperature

The determination of the flexural resistance of the lightweight panel shall be performed based on the test procedure specified in EN 1356 using a four-point load test. The tests shall be performed for the two faces of the product. A minimum of three tests per face shall be performed.

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The bending tests may be performed with the product simply supported over the end supports or connected to the end supports with connecting elements. One of the methods shall be used.

For each test, the flexural resistance at ambient temperature shall be expressed by the maximum bending moment in the lightweight panel. The characteristic value of the flexural resistance at ambient temperature should be obtained from section 2.2.19.

2.2.3.2 Flexural resistance at elevated temperature

Where relevant, e.g. in applications of the product in unprotected external walls, the determination of the flexural resistance of the lightweight panel should take into account the thermal effects due to temperature variations.

For positive temperature variations, the above may be determined by first installing an array of infra-red lamps for artificially irradiating the external face of the test panel up to a specified maximum test temperature after which the test procedure specified in section 2.2.3.1 shall be performed. The increase of temperature on the face of the test panel from ambient to the maximum test temperature should be introduced gradually using a rate of +10 °C per five minutes. The maximum test temperature shall be kept constant during the subsequent bending test. Contact thermocouples shall be set on the internal and external faces of the test panel to allow control of surface temperatures. The tests shall be carried out in laboratory conditions, at a temperature of (20 ± 5) °C. The specified maximum test temperature shall be +80°C.

For each test, the flexural resistance at elevated temperature shall be expressed by the maximum bending moment in the lightweight panel. The characteristic value of the flexural resistance at elevated temperature should be obtained from section 2.2.19.

2.2.3.3 Flexural resistance at negative temperature

Where relevant, e.g. in applications of the product in unprotected external walls, the determination of the flexural resistance of the lightweight panel should take into account the thermal effects due to temperature variations.

For negative temperature variations, the above may be determined by first submitting the external face of the test panel up to a specified negative test temperature after which the test procedure specified in section 2.2.3.1 shall be performed. The decrease of temperature on the face of the test panel from ambient to the minimum test temperature should be introduced gradually using a rate of -10 °C per five minutes. The minimum test temperature shall be kept constant during the subsequent bending test. Contact thermocouples shall be set on the internal and external faces of the test panel to allow control of surface temperatures. The tests shall be carried out in laboratory conditions, at a temperature of (20 ± 5) °C. The specified minimum test temperature shall be -20°C.

For each test, the flexural resistance at negative temperature shall be expressed by the maximum bending moment in the lightweight panel. The characteristic value of the flexural resistance at negative temperature should be obtained from section 2.2.19.

2.2.3.4 Flexural resistance at long-term

When relevant, e.g. in applications of the product in floor solutions, the long-term flexural resistance of the lightweight panel shall be determined by performing bending tests specified in section 2.2.3.1 on lightweight panels following the application of the loading conditions specified in section 2.2.6.

For each test, the flexural resistance at long-term shall be expressed by the maximum bending moment in the lightweight panel. The characteristic value of the flexural resistance at long-term should be obtained from section 2.2.19.

2.2.4 Resistance to shear

The determination of the resistance to shear of the lightweight panel shall be performed based on the test procedure specified in EN 1356 with the following adaptations.

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The failure mode of the tests shall be the shear failure of the product. This can be achieved either by adding intermediate support elements equally spaced over the length of the product so that failure is determined by the shear resistance of the product, or by a four-point bending test where the minimum distance of the load points to the nearest end support shall be such that failure is determined by the shear resistance of the product.

In the former case, the spacing of the support elements shall be the one specified in the technical documentation provided by the manufacturer as the reference solution to be used in practice.

In the latter case, the minimum distance of the load points to the nearest end support shall be included in the test report.

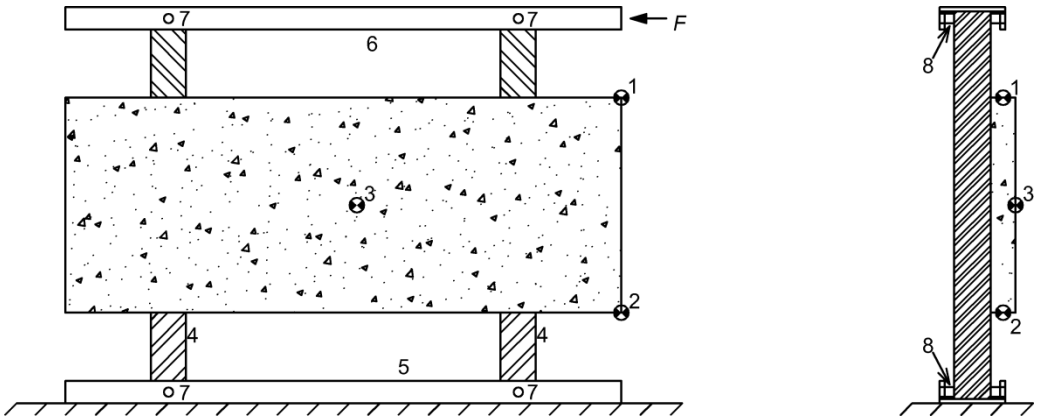
The tests may be performed for only one face of the product. A minimum of three tests per face shall be performed.

For each test, the shear resistance shall be expressed by the maximum shear force in the lightweight panel. The characteristic value of the shear resistance should be obtained from section 2.2.19.

2.2.5 Racking resistance and stiffness

The determination of the racking resistance and stiffness of the lightweight panel shall be performed based on the test procedure specified in sections 6.4.1 to 6.4.3 of EN 594, with the following adaptations.

The loading arrangement is shown in Figure 5. The racking load *F* shall be applied monotonically until the panel collapses. The test duration shall not be less than 10 min.



1 – Displacement sensor 1
2 – Displacement sensor 2
3 – Displacement sensor 3 (normal to panel plane)
4 – Support element
5 – Bottom element
6 – Top element
7 – Hinged joint
8 – Pin element

Figure 5: Loading arrangement set up to test the racking resistance and stiffness

For each test, the racking resistance shall be expressed by the maximum racking load applied to the lightweight panels.

The racking stiffness, K_R, shall be determined by:

$$K_R = \frac{\Delta F}{\Delta v} \quad (0)$$

where ΔF represents the variation of force F and Δv represents the variation of horizontal displacements between displacement sensor 1 and displacement sensor 2. The racking stiffness shall be determined from the linear elastic results.

Lateral restraints may be arranged but these shall not impede movement of the product in its plane.

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The top and bottom elements should not influence the test results. The latter should be fixed to the floor. The product shall be connected to all the support elements (end and intermediate, if applicable) with connecting elements. The spacing of the support elements shall be the one specified in the technical documentation provided by the manufacturer as the reference solution to be used in practice.

Tests shall be performed for two configurations: with one panel and with at least three panels. In the latter case, the joint between adjacent panels should be filled with the material specified in the technical documentation provided by the manufacturer as the reference solution to be used in practice.

A minimum of three tests for each test configuration shall be performed.

The characteristic values of the racking resistance and racking stiffness should be obtained from section 2.2.19.

2.2.6 Creep coefficient

The determination of the creep coefficient of the lightweight panel shall be performed based on the test procedure specified in section A.6 of EN 14509 with the following adaptations.

The test shall be carried out by subjecting a simply-supported lightweight panel to a uniformly distributed dead load. The value of the distributed load to be used in the creep test shall be 30% of the distributed load determined from the average value of the flexural resistance determined from section 2.2.3.1.

During the placing of the load, the panel shall be propped from below in such a way that the propping can be removed quickly and smoothly in order to initiate the test. Deflection measurements at mid span shall start as soon as the full load is applied.

The test shall be carried out under a constant load which shall be sustained undisturbed for a minimum of 1000 h. During this time, the deflection shall be regularly monitored to give a continuous relationship between deflection and time.

The creep coefficient shall be determined by:

$$\varphi = \frac{w_{1000} - w_0}{w_0} \quad (0)$$

where w_{1000} and w_0 represent the vertical deflection at mid span measured at 1000 hours and 0 hours (as soon as the full load is applied), respectively.

A minimum of one test shall be performed. The average value of the creep coefficient results shall be determined.

2.2.7 Impact resistance

The determination of the resistance to impact from a soft body and from a hard body of the lightweight panel when used in walls shall be performed using the procedure specified in EOTA Technical Report TR 001. For “safety in use”, the evaluation of the tests shall be based on the “No collapse”, “No penetration” and “No projection” criteria as specified in EOTA Technical Report TR 001. For “serviceability”, the evaluation of the tests shall be based on the “No penetration” and “No degradation” criteria as specified in EOTA Technical Report TR 001.

The spacing of the support elements shall be the one specified in the technical documentation provided by the manufacturer as the reference solution to be used in practice.

2.2.8 Durability against corrosion

The determination of the durability against corrosion of the lightweight panel shall be performed based on methods 2 and 3 specified in section 6 of EN 990. A minimum of three tests shall be performed. In all tests no corrosion shall be observed.

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2.2.9 Pull-out resistance of connections

2.2.9.1 Pull-out resistance of connections at ambient temperature

The determination of the pull-out resistance of connections between the lightweight panel and its supports shall be performed based on the test procedure specified in EN 1356 with the following adaptations.

The failure mode of the tests shall be the pull-out failure of the connections. This shall be achieved by applying the load to the lightweight panel, which is facing down suspended by the support elements. The spacing of the support elements shall be the one specified in the technical documentation provided by the manufacturer as the reference solution to be used in practice.

A minimum of three tests shall be performed.

For each test, the pull-out resistance of one connecting element at ambient temperature shall be expressed by the maximum tensile force in the most stressed connecting element. The characteristic value of the pull-out resistance of one connecting element at ambient temperature should be obtained from section 2.2.19.

2.2.9.2 Pull-out resistance of connections at elevated temperature

Where relevant, the determination of the pull-out resistance of the connections should take into account the thermal effects due to temperature variations.

For positive temperature variations, the above may be determined by first installing an array of infra-red lamps for artificially irradiating the external face of the test panel up to a specified maximum test temperature after which the test procedure specified in section 2.2.9.1 shall be performed. The increase of temperature on the face of the test panel from ambient to the maximum test temperature should be introduced gradually using a rate of +10 °C per five minutes. The maximum test temperature shall be kept constant during the subsequent bending test. Contact thermocouples shall be set on the internal and external faces of the test panel to allow control of surface temperatures. The tests shall be carried out in laboratory conditions, at a temperature of (20 ± 5) °C. The specified maximum test temperature shall be +80°C.

For each test, the pull-out resistance of one connecting element at elevated temperature shall be expressed by the maximum tensile force in the more stressed connecting element. The characteristic value of the pull-out resistance of one connecting element at elevated temperature should be obtained from section 2.2.19.

2.2.9.3 Pull-out resistance of connections at negative temperature

Where relevant, the determination of the pull-out resistance of the connections should take into account the thermal effects due to temperature variations.

For negative temperature variations, the above may be determined by submitting the external face of the test panel up to a specified minimum test temperature after which the test procedure specified in section 2.2.9.1 shall be performed. The decrease of temperature on the face of the test panel from ambient to the minimum test temperature should be introduced gradually using a rate of -10 °C per five minutes. The minimum test temperature shall be kept constant during the subsequent bending test. Contact thermocouples shall be set on the internal and external faces of the test panel to allow control of surface temperatures. The tests shall be carried out in laboratory conditions, at a temperature of (20 ± 5) °C. The specified minimum test temperature shall be -20°C.

For each test, the pull-out resistance of one connecting element at negative temperature shall be expressed by the maximum tensile force in the more stressed connecting element. The characteristic value of the pull-out resistance of one connecting element at negative temperature should be obtained from section 2.2.19.

2.2.10 Shear resistance of connections

The determination of the shear resistance of connections between the lightweight panel and its supports shall be performed based on the test procedure specified in section 6.4 of EN 1740, with the following adaptations.

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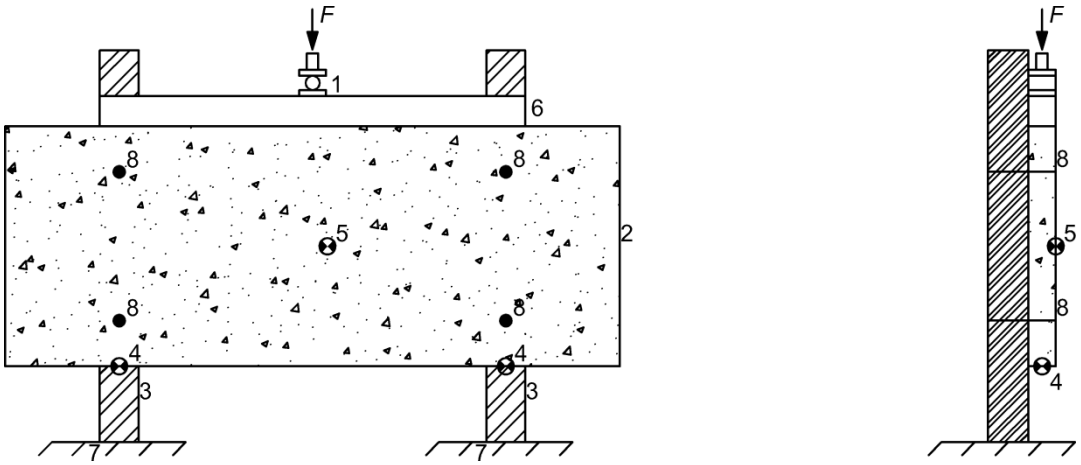
The failure mode of the tests shall be the shear failure of the connections; therefore, the instability of the support elements should be prevented. The loading arrangement is shown in Figure 6.

The load distribution beam should ensure a uniform distribution of the load to the lightweight panel, e.g. by adding an extra layer of an elastomer material below the load distribution beam.

Either a full-width or a half-width lightweight panel shall be used. The spacing of the support elements shall be the one specified in the technical documentation provided by the manufacturer as the reference solution to be used in practice.

A minimum of three tests shall be performed.

For each test, the shear resistance of one connecting element shall be expressed by the maximum shear force in the more stressed connecting element. The characteristic value of the shear resistance of one connecting element should be obtained from section 2.2.19.



1 – Hinge
2 – Lightweight panel
3 – Support elements
4 – Vertical displacement sensor
5 – Horizontal displacement sensor (not mandatory)
6 – Load distribution beam
7 – Fixed base
8 – Connecting elements (indicative positioning)

Figure 6: Loading arrangement set up to test the shear resistance of connections

2.2.11 Durability against freeze-thaw

The determination of the durability against freeze-thaw of the lightweight panel shall be performed based on the test procedure specified in EN 12091. The test specimens should be cut-off from full-size lightweight panels. The nominal dimensions of the test specimens shall be a parallelepiped with a square base of 500 mm side length and 40 mm thick. A minimum of three tests shall be performed by submitting the test specimens to 300 consecutive cycles at -20 ºC and at 20 ºC. The average value of the water absorption results in percentage of the volume shall be determined.

2.2.12 Water absorption of the lightweight mortar

The determination of the water absorption of the lightweight mortar shall be performed based on method A specified in EN 1609. A minimum of three tests shall be performed. The average value of the water absorption results shall be determined.

2.2.13 Dimensional stability of the lightweight mortar

The determination of the dimensional stability of the lightweight mortar shall be performed based on the test procedure specified in EN 1367-4. A minimum of three tests shall be performed. The average value of the shrinkage results shall be determined.

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2.2.14 Airborne sound insulation

The determination of the airborne sound insulation shall be performed according to EN ISO 10140-2.

The test sample shall be composed by a pane of lightweight panels fixed longitudinally to a series of transverse cold-formed steel structural/support elements reproducing the end-use wall and/or floor constructive solution.

The test arrangement is the full-size test opening referred to in clause 6.2 of EN ISO 10140-2.

The corresponding weighted airborne sound insulation, R_w, shall be calculated and rated according to EN ISO 717-1.

2.2.15 Impact sound insulation

The determination of the impact sound insulation shall be performed according to EN ISO 10140-3.

The test sample shall be composed by a pane of lightweight panels fixed longitudinally to a series of transverse cold-formed steel structural/support elements reproducing the end-use floor constructive solution.

The test arrangement is the full-size test floor as referred to in clause 6.2.1 of EN ISO 10140-3.

The corresponding weighted impact sound insulation, $L_{n,w}$, shall be calculated and rated according to EN ISO 717-2.

2.2.16 Sound absorption

The determination of the sound absorption coefficients of the lightweight panel shall be performed according to EN ISO 354.

The sound absorption index shall be calculated according to EN ISO 11654, using the values for the sound absorption coefficient α_p, at the frequencies: 125 Hz, 250 Hz, 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz and the single number value for the weighted sound absorption coefficient α_w. The obtained values for α_p and α_w shall be rounded to the nearest 0.05 (α_p larger than 1 shall be expressed as $\alpha_p = 1$)

The values for α_p and α_w shall be stated in levels with steps of 0.05.

2.2.17 Thermal conductivity of the lightweight mortar

The determination of the thermal conductivity of the lightweight mortar shall be performed based on the test procedure specified in EN 12664, EN 12667 or EN 12939. At least four measurements shall be performed under dry conditions. The average value of the thermal conductivity results shall be determined.

If relevant the correction factors due to the influence of moisture and temperature can be calculated using the procedures given in EN ISO 10456.

2.2.18 Thermal resistance of the lightweight panel

The thermal resistance of the lightweight panel may be calculated based on the procedures given in EN ISO 6946 and EN ISO 10211, or other validated calculation methods (e.g. HEAT 3), using the thermal conductivity of the lightweight mortar and other tabulated values (EN ISO 10456).

2.2.19 Calculation of the characteristic values

Characteristic values shall be determined by:

$$X_k = m_X - k \cdot \sigma_X \quad (0)$$

where X_k represents the characteristic value, m_X and σ_X represent the mean value and the standard deviation value of the n sample results, respectively, and k represents the characteristic fractile factor that shall be determined in accordance with Annex D of EN 1990.

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3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

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

For the products covered by this EAD the applicable European legal act is: Decision 1999/94/EC as amended by Decision 2012/202/EU.

The systems are:

System 2+ (for structural use) or

System 4 (for non-structural or light structural use)

Light structural use refers to applications that in case of failure are not supposed to cause the collapse of the works or part of them, inadmissible deformations or injury to people.

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

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 2.

Table 2 Control plan for the manufacturer; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1	Visual inspection of the product and its components	1)	1)	–	100%
2	Flexural resistance	2.2.3	2)	1	Every 1 000 units or twice per month
3	Dimensions and squareness	3.4.1	2)	2	Every 20 units 3)
4	Clear cover on steel railing	3.4.1	2)	1	Once per week
5	Durability against corrosion	2.2.8	2)	1	Once per year
6	Density of the lightweight mortar	3.4.2	2)	1	Every 250 m³ or twice per month
7	Compressive strength of the lightweight mortar	3.4.3	2)	1	Every 250 m³ or twice per month
8	Flexural strength of the lightweight mortar	3.4.4	2)	1	Twice per year
9	Water absorption of the lightweight mortar	2.2.12	2)	1	Once per year

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No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
10	Dimensional stability of the lightweight mortar	2.2.13	2)	1	Once per year
11	Mechanical properties of the steel	3.4.5 4)	2)	1 5)	Each delivery
12	Properties of the glass fibre mesh	3.4.6 6)	2)	1	Each delivery
13	Thermal conductivity of the lightweight mortar	2.2.17	2)	1	Once per year

1) Visual inspections means completeness of configuration, damage, cracking, dimensions, flatness, correct marking or labelling, appropriate performance statement according to the product's specification.

2) As defined by the product manufacturer's Control Plan.

3) Per mixture and per produced panel configuration.

4) As an alternative, see inspection certificate "3.1" according to EN 10204.

5) Tensile tests may be carried out for the steel profiles before and after cold work or other manufacturing process such as drilling holes in the steel section.

6) As an alternative, see product certificate, or equivalent document.

3.3 Tasks of the notified bodies

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

The involvement of a notified product certification body is required only under the conditions defined in Decision 1999/94/EC as amended by Decision 2012/202/EC, in case of reaction to fire classes A1, A2, B and C of the product for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. a limiting of organic material and/or the addition of fire retardant).

Table 3 Control plan for the notified body; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control *(for systems 1 and 2+ only)*					
1	(for system 1 only) Control of the manufacturing plant and of the factory production carried out by the manufacturer regarding the constancy of performance related to reaction to fire and taking into account a limiting of organic material and/or the addition of fire retardant	As defined in clause 2.2.1 of the EAD	Shall be stated in the Control Plan		When starting the production

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No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
2	(for system 2+ only) Control of the manufacturing plant and of the factory production carried out by the manufacturer regarding the constancy of performance related to essential characteristics under the Basic Works Requirement 1, Mechanical resistance and stability, taking into account the structural use of the product	As defined in clauses 2.2.3 to 2.2.13 of the EAD	Shall be stated in the Control Plan		When starting the production
Continuous surveillance, assessment and evaluation of factory production control *(for systems 1 and 2+ only)*					
3	(for system 1 only) Continuous surveillance, assessment and evaluation of the factory production control carried out by the manufacturer regarding the constancy of performance related to reaction to fire and taking into account a limiting of organic material and/or the addition of fire retardant	As defined in clause 2.2.1 of the EAD	Shall be stated in the Control Plan		Annually
4	(for system 2+ only) Continuous surveillance, assessment and evaluation of the factory production carried out by the manufacturer regarding the constancy of performance related to essential characteristics under the Basic Works Requirement 1, Mechanical resistance and stability, taking into account the structural use of the product	As defined in clauses 2.2.3 to 2.2.13 of the EAD	Shall be stated in the Control Plan		Annually

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

3.4.1 Dimensions, squareness and clear cover on steel railing

The determination of the dimensions (length, thickness, width) and squareness of the lightweight panel shall be performed based on the methods specified in EN 991. For each characteristic a minimum of three measurements shall be performed. The average value of the results for each characteristic shall be determined.

The clear cover of the internal steel railing shall be measured by suitable methods, such as using a calibrated calliper. A minimum of six measurements shall be performed from holes drilled in the panel or from samples cut from the panel, as appropriate. An equal number of measurements shall be performed in the longitudinal direction and in the transversal direction of the panel. The average value of the clear cover of the internal steel railing results shall be determined.

3.4.2 Density of the lightweight mortar

The determination of the density of the lightweight mortar shall be performed based on the test procedure specified in EN 992 with possible adaptations of the size and shape of the samples tested and of the drying temperature considered.

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3.4.3 Compressive strength of the lightweight mortar

The determination of the compressive strength of the lightweight mortar shall be performed based on the test procedure specified in section 9.2 of EN 196-1.

3.4.4 Flexural resistance of the lightweight mortar

The determination of the flexural resistance of the lightweight mortar shall be determined based on the test procedure specified in section 9.1 of EN 196-1.

3.4.5 Mechanical properties of the steel

The determination of the yield and tensile strength of the internal steel railing shall be performed according to ISO 6892 and EN 10346.

3.4.6 Properties of the glass fibre mesh

The determination of the mesh dimensions shall be performed using a calibrated calliper. For each dimension a minimum of three measurements shall be performed.

The determination of the mass per surface unit shall be performed using the test procedure specified in ISO 3374. A minimum of three tests shall be performed.

The determination of the the tensile strength, elongation at fracture and durability shall be performed using the test procedure specified in ISO 4606, before and after ageing as specified in Section 5.6.7.1 of ETAG 004. After ageing the tensile strength shall comply with the requirements specified in Section 6.6.7.1 of ETAG 004. \

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4 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment, is of relevance.

EN 196-1	*Methods of testing cement. Determination of strength*
EN 197-1	*Cement. Composition, specifications and conformity criteria for common cements*
EN 594	*Timber structures – Test methods – Racking strength and stiffness of timber frame wall panels*
EN 990	*Test methods for verification of corrosion protection of reinforcement in autoclaved aerated concrete and lightweight aggregate concrete with open structure*
EN 991	*Determination of the dimensions of prefabricated reinforced components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure*
EN 992	*Determination of the dry density of lightweight aggregate concrete with open structure*
EN 1356	*Performance test for prefabricated reinforced components of autoclaved aerated concrete or lightweight aggregate concrete with open structure under transverse load*
EN 1367-4	*Tests for thermal and weathering properties of aggregates. Determination of drying shrinkage*
EN 1609	*Thermal insulating products for building applications. Determination of short term water absorption by partial immersion*
EN 1740	*Performance test for prefabricated reinforced components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure under predominantly longitudinal load (vertical components)*
EN 1990	*Eurocode 0. Basis of structural design*
EN 10204	*Metallic products. Types of inspection documents*
EN 10346	*Continuously hot-dip coated steel flat products for cold forming. Technical delivery conditions*
EN 12091	*Thermal insulating products for building applications. Determination of freeze-thaw resistance*
EN 12664	*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 12667	*Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods. Products of high and medium thermal resistance*
EN 12939	*Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods. Thick products of high and medium thermal resistance*
EN 13501-1	*Fire classification of construction products and building elements. Classification using test data from reaction to fire tests*

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EN 13501-2	*Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation services*
EN 14509	*Self-supporting double skin metal faced insulating panels. Factory made products. Specifications.*
EN ISO 140	*Acoustics. Measurement of sound insulation in buildings and of building elements*
EN ISO 354	*Acoustics. Measurement of sound absorption in a reverberation room*
EN ISO 717-1	*Acoustics –Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation*
EN ISO 717-2	*Acoustics – Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation*
EN ISO 6892	*Metallic materials. Tensile testing. Method of test at ambient temperature*
EN ISO 6946	*Building components and building elements – Thermal resistance and thermal transmittance – Calculation method*
EN ISO 10140-2	*Acoustics – Laboratory measurement of sound insulation of building elements – Part 2: Measurement of airborne sound insulation*
EN ISO 10140-3	*Acoustics – Laboratory measurement of sound insulation of building elements – Part 3: Measurement of impact sound insulation*
EN ISO 10211	*Thermal bridges in building construction – Heat flows and surface temperatures – Detailed calculations*
EN ISO 10456	*Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values*
ISO 3374	*Reinforcement products – Mats and fabrics – Determination of mass per unit area*
ISO 4606	*Textile glass – Woven fabric – Determination of tensile breaking force and elongation at break by the strip method*
ETAG 004	*European Technical Approval Guideline 004: External thermal insulation composite systems with rendering*
EOTA TR 001	*Determination of impact resistance of panels and panels assemblies*

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