

EUROPEAN ASSESSMENT DOCUMENT

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FACTORY-MADE BOARDS AND PRODUCTS FORMED BY MOULDING OF AN EXPANDED POLYLACTIC ACID (EPLA) FOR THERMAL AND / OR

ACOUSTICAL INSULATION

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1 SCOPE OF THE EAD

1.1 Description of the construction product

The construction product is a factory-made board or preformed ware formed by moulding of expanded polylactic acid (EPLA) beads for thermal and / or acoustical insulation. The percentage of PLA (polylactic acid) and fillers shall be stated in the ETA.

The boards or preformed ware can be supplied with or without a facing.

The nature of the facing shall be stated in the ETA.

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

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

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

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

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

1.2.1 Intended use(s)

The intended use of the board or preformed ware is the following. Thermal insulation, whether or not exposed to compression loads, to be used for walls (including cellar walls), ceilings (floors), roofs, between rafters and timber work.

Acoustical insulation, to be used in e.g. walls or floors. The construction product shall not be used in places where it will be exposed to wetting or weathering.

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 of the factory-made board or preformed ware formed by moulding of expanded polylactic acid (EPLA) for the intended use of 50 years when installed in the works (provided that the factory-made board or preformed ware formed by moulding of expanded polylactic acid (EPLA) 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 works¹.

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.

The working life shall be stated in the ETA based on the conditions of testing (temperature and humidity) in relation to the intended use.

1.3 Specific terms used in this EAD

1.3.1 Board

Rigid insulation product (cut, moulded, or continuously foamed) of rectangular shape and cross section in which the thickness is significantly smaller than the other dimensions. Boards may be of uniform thickness or tapered. The board edges may be of various sorts (e.g., square, half lapped, tongue and groove). (See EN 13163 clause 3.1.3). The boards may be supplied with or without facings.

1.3.2 Preformed ware

Insulation shapes formed by cutting or routing from blocks or boards or by shape moulding.

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

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 1 shows how the performance of the board or preformed ware made of EPLA 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 2: Safety in case of fire | | | | | |
| 1 | 1 Reaction to fire Clause 2.2.18 Class | | | | | |
| | Basic Works Req | uirement 3: Hygiene, health and the | e environment | | | |
| 2 | Water vapour transmission | Clause 2.2.5 | | | | |
| | Basic Works Requirement 4: Safety and accessibility in use | | | | | |
| 3 | Compressive strength or compressive stress | Clause 2.2.6 | Level | | | |
| 4 | Dimensional stability (23 °C /50 % R.H.) ¹⁾ | Clause 2.2.7 | Class | | | |
| 5 | Dimensional stability – spec. temperature/ humidity conditions | Clause 2.2.8 | Class | | | |
| 6 | Bending strength ¹⁾ | Clause 2.2.11 | Level | | | |
| | Basic Works Requirement 5: Protection against noise | | | | | |
| 7 | Specific air flow resistivity | Clause 2.2.13 | Level | | | |
| 8 | Sound absorption (acoustic absorption index) | Clause 2.2.14 | Level | | | |
| 9 | Dynamic stiffness | Clause 2.2.15 | Level | | | |
| 10 | Compressibility (for impact sound material only) | Clause 2.2.16 | Level | | | |

| No | Essential characteristic | Assessment method | Type of expression of product performance |
|----|--|-----------------------------------|---|
| | Basic Works Red | quirement 6: Energy economy and I | neat retention |
| 11 | Thermal conductivity | Clause 2.2.2 | |
| 12 | Dimensions | Clause 2.2.1 | Class |
| 13 | Short-term water absorption by partial immersion | Clause 2.2.3 | See 2.2.3 |
| 14 | Long-term water absorption by immersion | Clause 2.2.4 | Level |
| 15 | Deformation under specified compressive load and temperature | Clause 2.2.9 | Level |
| 16 | Tensile strength perpendicular to the faces | Clause 2.2.10 | Level |
| 17 | Compressive creep | Clause 2.2.12 | Level |
| 18 | Biological resistance | Clause 2.2.17 | |

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

For sampling, conditioning and testing (dimensions of test specimens, minimum number of measurements, specific conditions), EN 13163 shall apply, unless otherwise is specified in the following clauses.

2.2.1 Dimensions

The length, I, and width, b, of the board or preformed ware shall be determined in accordance with EN 822.

The thickness, d, shall be determined in accordance with EN 823, using a load equal to 250 Pa \pm 5 Pa. The squareness, S_b, shall be determined in accordance with EN 824.

The flatness, P, shall be determined in accordance with EN 825. The maximum deviation from flatness, S_{max} , shall be stated.

For the dimensions of test specimens, minimum number of measurements to get one test result and specific conditions; see table 9 of EN 13163.

<u>Boards</u>

The values of length and width with the tolerance class shall be stated in the ETA, according to table 1 of EN 13163.

The thickness, d_N , with the tolerance class shall be stated in the ETA, according to table 1 of EN 13163. The squareness, S_b , with the tolerance class shall be stated in the ETA, according to table 1 of EN 13163. The maximum deviation from flatness, S_{max} , shall not exceed the tolerances given in table 1 of EN 13163.

Preformed ware

The dimensions with the associated tolerances of the preformed ware for a specific application are laid down on drawings of the manufacturer. The ETA shall detail that in the particular marking of the preformed ware it is stated that the dimensions "pass" the criteria as laid down in the drawing of the manufacturer.

2.2.2 Thermal resistance and thermal conductivity of the board or preformed ware

The thermal conductivity shall be determined in accordance with the procedure as detailed in clause 4.2.1 of EN 13163.

The measurements shall be carried out in accordance with EN 12667 or EN 12939 for thick products. A minimum of 10 tests are needed statistically with a minimum of 4 measurements, carried out in a notified testing laboratory.

The thermal conductivity determined in accordance with the procedures as detailed in clause 4.2.1 and Annex A of EN 13163 shall be stated in the ETA.

2.2.3 Short-term water absorption by partial immersion (for specific application only)

The short-term water absorption by partial immersion shall be determined in accordance with method A of EN 1609.

The value of the short-term water absorption by partial immersion shall be stated in the ETA.

2.2.4 Long-term water absorption by immersion (for specific application only)

The long-term water absorption by partial and total immersion shall be determined in accordance EN 12087, method 1A for partial immersion and method 2A for total immersion.

The values of the long-term water absorption by partial immersion shall be stated in the ETA in steps of 0,01 kg/m2. The values of the long-term water absorption by total immersion shall be stated in the ETA in steps of 1,0 % volume.

2.2.5 Water vapour transmission

The water vapour transmission properties, expressed as the water vapour diffusion resistance factor, μ , for homogeneous products or as the water vapour resistance, Z, for faced products shall be determined in accordance with EN 12086/ set B.

For homogenous products the water diffusion resistance factor, μ , shall be stated in the ETA. For faced products the water vapour resistance, Z, shall be stated in the ETA.

2.2.6 Compressive strength or Compressive stress (for specific application only)

The compressive strength, σ_m in kPa, or compressive stress σ_{10} at 10% relative deformation (whichever is reached first) shall be determined in accordance with EN 826.

For the dimensions of test specimens, minimum number of measurements to get one test result and specific conditions; see table 9 of EN 13163.

The compressive strength, σ_m in kPa, or compressive stress σ_{10} at 10% relative deformation shall be stated in the ETA according to table 3 of EN 13163.

2.2.7 Dimensional stability under constant normal laboratory conditions

The dimensional stability under constant normal laboratory conditions (23 °C, 50 % relative humidity) shall be determined in accordance with EN 1603.

The relative changes in length, $\Delta \epsilon_{l}$, and width, $\Delta \epsilon_{b}$, shall be stated in the ETA, according table 2 of EN 13163.

2.2.8 Dimensional stability under specified temperature and humidity conditions

The dimensional stability under specified temperature and humidity conditions shall be carried out in accordance with EN 1604.

The test shall be carried out after storage for 48 h at a specific temperature T°C (\pm 2°C) and relative humidity R.H. % (\pm 5%).

The temperature T shall be chosen from the range 23 °C, 40 °C, 55 °C, 60 °C or 70 °C. The relative humidity R.H. shall be chosen from the range dry, 50% or 90%.

The relative changes in length, $\Delta \epsilon_l$, width, $\Delta \epsilon_b$, and thickness, $\Delta \epsilon_d$, expressed as DS (T,R.H.)i, together with the chosen test conditions in relation to the intended use shall be stated in the ETA in steps of 1 %, whereby the value for "i" is the relative change.

2.2.9 Deformation under specified compressive load and temperature conditions (for specific application only)

The deformation under specified compressive load and temperature conditions shall be determined in accordance with EN 1605. The test shall be carried out on one or more of the test conditions as given in table 3 below.

For the dimensions of test specimens, minimum number of measurements to get one test result and specific conditions; see table 9 of EN 13163.

For each test condition the difference between the relative deformation, ϵ_1 , after step A and ϵ_2 , after step B as described in EN 1605, expressed as DLT(n)i, whereby "n" is the number of the test condition and "i" is the difference between the relative deformation,

ε1, after step A and, ε2, after step B in percentage, shall be stated in the ETA.

Table 3 – Levels of deformation under specified compressive load and temperature conditions

| Test condition | Requirement % | Level |
|---------------------------|---------------|---------|
| Test condition 0: | ≤ 5 | DLT(0)5 |
| load: 20 kPa | | |
| temperature : (50 ± 1) °C | | |
| time : (48 ± 1) h | | |
| Test condition 1: | ≤ 5 | DLT(1)5 |
| load: 20 kPa | | |
| temperature : (80 ± 1) °C | | |
| time : (48 ± 1) h | | |
| Test condition 2: | ≤ 5 | DLT(2)5 |
| load: 40 kPa | | |
| temperature : (70 ± 1) °C | | |
| time : (168 ± 1) h | | |
| Test condition 3: | ≤ 5 | DLT(3)5 |
| load: 80 kPa | | |
| temperature : (60 ± 1) °C | | |
| time : (168 ± 1) h | | |

2.2.10 Tensile strength perpendicular to the faces (for specific application only)

The tensile strength perpendicular to the faces, σ_{mt} , shall be determined in accordance with EN 1607.

For the dimensions of test specimens, minimum number of measurements to get one test result and specific conditions; see table 9 of EN 13163.

The tensile strength perpendicular to the faces, will be stated in the ETA, in kPa, according 4.3.6 of EN 13163.

2.2.11 Bending strength

The bending strength, σ_b in kPa, shall be determined in accordance with EN 12089/ Method B For the dimensions of test specimens, minimum number of measurements to get one test result and specific conditions; see table 9 of EN 13163.

The bending strength, will be stated in the ETA, in kPa, according table 4 of EN 13163.

2.2.12 Compressive creep (for specific application only)

This characteristic is only required for uses where the insulation product is exposed to long term compression loads.

The compressive creep, \mathcal{E}_{ct} , and the total thickness reduction, X_t , shall be determined following the procedure as detailed in clause 4.3.8 of EN 13163.

The compressive creep, \mathcal{E}_{ct} , and the total thickness reduction, X_t , at the stated stress, following the procedure as detailed in clause 4.3.8 of EN 13163, shall be stated in the ETA.

2.2.13 Specific air flow resistance (for airborne sound insulation)

The determination of the specific air flow resistance shall be carried out in accordance with EN 29053 (ISO 9053), Method A.

The measured value of the specific air flow resistance shall be stated in the ETA.

NOTE: the specific airflow resistance is determined for quality control reasons to ensure that the acoustic properties (determined by national test methods) of the building elements incorporating boards or preformed ware made by moulding EPLA remain the same.

2.2.14 Sound absorption (acoustic absorption index) (for airborne sound insulation)

The determination of the sound absorption coefficient shall be carried out in accordance with EN ISO 354. The sound characteristics shall be calculated in accordance with EN ISO 11654, using the values for the sound absorption coefficient α_{p} , at the frequencies: 125 Hz, 250 Hz, 500 Hz, 2000 Hz and 4000 Hz and the single number value for the weighted sound absorption coefficient α_{w} .

The obtained results for α_p and α_w are rounded to the nearest 0,05 (α_p larger the 1 shall be expressed as $\alpha_p = 1$)

The values for α_p and α_w shall be stated in the ETA in steps of 0,05.

2.2.15 Dynamic stiffness (for impact sound material only)

The determination of the dynamic stiffness s' shall be carried out according to EN 29052-1 The value s' for different thicknesses shall be stated.

For the dimensions of test specimens, minimum number of measurements to get one test result and specific conditions; see table 9 of EN 13163.

2.2.16 Compressibility (for impact sound material only)

The Determination of thickness d_L and d_B shall be carried out according to EN 12431 with maximum insulation material thickness and a pause of 300 s before measuring d_B. The compressibility is defined as follows: $p = d_L - d_B$

The value p as measured shall be stated in the ETA

2.2.17 Biological resistance (for specific application only)

The resistance to mould fungus shall be stated according to clause A.6. of EOTA TR040 The resistance to mould fungus shall be stated in the ETA as the intensity of growth in accordance to clause A.6. of EOTA TR040.

The maximum intensity of growth shall be "1" in accordance with table 4 of EN ISO 846.

2.2.18 Reaction to fire

The board or preformed ware shall be tested, using the test method(s) relevant for the corresponding reaction to fire class, in order to be classified according to Commission Delegated Regulation (EU) 2016/364.

When the board or preformed ware are to be classified for a fire class B, C or D, then testing in accordance with EN 13823 shall be performed using the mounting and fixing as detailed in EN 15715.

The product shall be classified in the ETA according to Commission Delegated Regulation (EU) 2016/364.

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

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

For the products covered by this EAD the applicable European legal act is: Decision 1999/91/EC The system is: ${\bf 3}$

In addition, with regard to reaction to fire the applicable European legal act is: Decision 2001/596/EC for products covered by this EAD. The systems are: **1 or 3**

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of factory-made boards and preformed ware formed by moulding of EPLA for thermal and/or acoustical insulation in the procedure of assessment and verification of constancy of performance are laid down in Table 5.

| Table 5 | 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 |
|------|--|--------------------------------|-----------------------|------------------------------------|------------------------------------|
| [ind | Factory production for the factory production for the factory broad for the factory broa | uction contro actory in acc | ol (FPC) ordance w | vith a presc | cribed test plan]* |
| 1 | Dimensions | 2.2.1 | | 1 | |
| | Length and width | | | | 1 per 2 h ^a |
| | Thickness | | | | 1 per 2 h ^a |
| | Squareness | | | | 1 per 4 h ^a |
| | Flatness | | | | 1 per 8 h ^a |
| 2 | Tensile strength perpendicular to the faces | 2.2.10 | | | Per produced batch |
| 3 | Thermal conductivity | 2.2.2 | | | 1 per 24 h |
| 4 | Compressive strength or compressive stress | 2.2.6 | | | 1 per 8 h ª |
| 5 | Bending strength | 2.2.11 | | | Per produced batch |
| 6 | Compressibility | 2.2.12 | | | 1 per week |
| 7 | Dynamic stiffness | 2.2.15 | | | 1 per week |
| 8 | Reaction to fire | 2.2.18 | | EN 13163 Table B2 | EN 13163 Table B2 |

| No | Subject/type of control | Test or control method | Criteria, if any | Minimum number of samples | Minimum frequency of control |
|---|-------------------------|------------------------------|---------------------|------------------------------------|------------------------------------|
| ^a When statistically proven that test results vary not more than 2 %, the testing frequency can be lowered to 1 per 24 b | | | | | |

3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for factory-made boards and preformed ware formed by moulding of EPLA for thermal and/or acoustical insulation are laid down in Table 6.

A notified certification body should be involved only in case of reaction to fire classes A1, A2, B or C if a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants).

 Table 6
 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 manufacturi (for sy | ng plant and stems 1 only) | l of factory | productio | n control |
| Rea | ction to fire | Presence of suitable test equipment | | | Annually |
| | | Presence of trained personnel | | | Annually |
| | | Presence of an appropriate quality assurance system and necessary stipulations | | | Annually |
| | Continuous surveillance, assessment (for sy | and evaluat | ion of facto | ory produc | tion control |
| Reaction to fire | | Inspection of factory, of the production of the product and of the facilities for factory production control | | Annually | |
| | | Evaluation of the documents concerning the factory production control | | | Annually |
| | | Issuing a report of surveillance | | | Annually |

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 822 | Thermal insulating products for building applications – Determination of length and width |
|--|---|
| EN 823 EN 824 | Thermal insulating products for building applications – Determination of thickness Thermal insulating products for building applications – Determination of squareness |
| EN 825 EN 826 | Thermal insulating products for building applications – Determination of flatness Thermal insulating products for building applications – Determination of compression |
| EN 1602 | Thermal insulating products for building applications – Determination of apparent |
| EN 1603 | Thermal insulating products for building applications – Determination of dimensional stability under constant normal laboratory conditions (23 °C / 50% relative humidity) |
| EN 1604 | Thermal insulating products for building applications – Determination of dimensional |
| EN 1605 | Thermal insulating products for building applications – Determination of deformation under specified compressive load and temperature conditions |
| EN 1607 | Thermal insulating products for building applications – Determination of tensile strength |
| EN 1609 | Thermal insulating products for building applications – Determination of short-term |
| EN 12086 | Thermal insulating products for building applications – Determination of water vapour |
| EN 12087 | Thermal insulating products for building applications – Determination of long-term water |
| EN 12089 | Thermal insulating products for building applications – Determination of determination |
| EN 12430 | Thermal insulating products for building applications –Determination of behaviour under |
| EN 12431 | Thermal insulating products for building applications –Determination of thickness for |
| 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 |
| EN 12939 | high and medium thermal resistance Thermal performance of building materials and products – Determination of thermal resistance by means of guarded hot plate and heat flow meter methods –Thick |
| EN 13163 | Thermal insulation products for buildings – Factory made products of expanded |
| EN 13501-1 | Fire classification of construction products and building elements – Part 1: |
| EN 13823 | Reaction to fire tests for building products – Building products excluding floorings |
| EN 15715 | Thermal insulation products. Instructions for mounting and fixing for reaction to fire |
| EN 29052-1 | Acoustics – Determination of dynamic stiffness – Part 1: Materials used under floating floors in dwellings (ISO 9052-1: 1989) |
| EN 29053 | Acoustics. Materials for acoustical applications. Determination of airflow resistance (ISO 9053:1991) |
| EN ISO 354 EN ISO 846 EN ISO 11654 | Acoustics – Measurement of sound absorption in a reverberation room Plastics – Evaluation of the action of micro organisms (ISO 846: 1997) Acoustics- Sound absorbers for use in buildings – Rating of sound absorption |
| EOTA TD 024 | Construct = materials for acoustical applications = Determination of almow resistance |
| EOTA TR 040 | Factory-made boards and products formed by moulding of an expanded polylactic acid (EPLA) for thermal and / or acoustical insulation |
| (EU) 2016/364 | Commission Delegated Regulation (EU) 2016/364 |