European Technical Approval ETA-13/1026

(English language translation, the original version is in French language)

Corrected edition of 14.03.2014

Trade name:
Nom commercial :
SLIMVAC®

Holder of approval:
Titulaire :
MICROTHERM N.V
Industriepark Noord 1
9100 SINT-NIKLAAS
BELGIQUE

Generic type and use of construction product:
Type générique et utilisation prévue du produit de construction :
Vacuum insulation panel consisting of a micro-porous core of amorphous silica enclosed by a multi-layer film.
Panneau isolant sous vide avec un cœur microporeux à base de silice amorphe protégé par un complexe barrière multicouche.

Validity (Validité) from (du):
to (au) :
30/06/2013
30/06/2018

Manufacturing plant:
Usine de fabrication :
SINT-NIKLAAS
(Belgique)

This European Technical Approval contains:
Le présent Agrément Technique Européen contient :
9 pages and 1 attachment which form an integral part of the document
9 pages et 1 annexe faisant partie intégrante du document.

European Organisation for Technical Approvals
Organisation pour l’Agrément Technique Européen
I. LEGAL BASES AND GENERAL CONDITIONS

This European Technical Approval is issued by the Centre Scientifique et Technique du Bâtiment (CSTB) in accordance with:

- Decree no. 92-647 / 8 July 1992\(^4\) on the fitness for use of construction products.

The Centre Scientifique et Technique du Bâtiment is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant (for example concerning the fulfilment of assumptions made in this European Technical Approval with regard to manufacturing). Nevertheless, the responsibility for the conformity of the products with the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.

This European Technical Approval is not to be transferred to manufacturers or agents of manufacturer other than those indicated on page 1; or manufacturing plants other than those indicated on page 1 of this European Technical Approval.

This European Technical Approval may be withdrawn by the Centre Scientifique et Technique du Bâtiment pursuant to Article 5 (1) of the Council Directive 89/106/EEC.

Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of the Centre Scientifique et Technique du Bâtiment. In this case, partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.

The European Technical Approval is issued by the approval body in its official language. This version corresponds to the version circulated within EOTA. Translations into other languages have to be designated as such.

---

\(^1\) Official Journal of the European Communities no. L 40, 11-02-1989, p. 12
\(^2\) Official Journal of the European Communities no. L 220, 30-08-1993, p. 1
\(^3\) Official Journal of the European Communities no L284, 31-10- 2003 p 25
\(^4\) Official Journal of France, 14 -07-1992
\(^5\) Official Journal of the European Communities no. L 17, 20-1-1994, p. 34
II. SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 DEFINITION OF PRODUCT AND INTENDED USE

1.1 Definition of product

The insulation product SLIMVAC® is a vacuum insulation panel, consisting of a micro-porous core of amorphous silica enclosed by a multi-layer film, a barrier against water vapour and air.

1.2 Intended use

The panel is a thermal insulation for buildings.

It is used in new construction and in renovation, under normal humidity and temperature conditions within the walls in the internal part of buildings:
- insulation at the inside of building shells,
- insulation of non-heating ceilings,
- insulation of flat roofs and pitched roofs (in association with another thermal insulation on the outside face),
- insulation under screed (except for floors with in-floor heating for which complementary insulation is required),
- insulation underneath the flooring (without in-floor heating).

A protection will need to be installed between the vacuum insulation panel and the interior of the building.

The vacuum insulation panel is to be installed protected from all humidity and liquid water.

NOTE: In those parts of the building in which the temperature or humidity are considerable (example: laundry rooms…) the SLIMVAC® product must not be used.

The correction factor for the influence of humidity is a provisional one in the CUAP 12.01/41; furthermore the applications are limited to intended uses where the temperature remains below 50°C.

2 CHARACTERISTICS OF PRODUCT AND METHODS OF VERIFICATION

2.1 Composition and manufacturing-process

The SLIMVAC® product contains:
- a core composed of amorphous silica, silicon carbide and cellulose filaments,
- a multilayer barrier film to water vapour and air, consisting of PE and PET film.

The production process uses the following raw materials: fumed silica, opacifiers, fibers, shrinkwrapping film and barrier film.

The microporous core material includes fumed silica, an opacifier and fibers. All ingredients are carefully weighed and mixed. The microporous powder is then pressed into a panel of the desired thickness; afterwards the panels are sawn to the right dimensions to be used as VIP cores.

The next steps of the manufacture of VIP include shrinkwrapping of the core, drying of the core, assembly of the dried core into the barrier film, evacuation and sealing in the vacuum equipment.
2.2 Nominal dimensions

<table>
<thead>
<tr>
<th></th>
<th>Length x width (mm)</th>
<th>Tolerance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Minimal Dimensions of panels</td>
<td>300x400 or 400x600</td>
<td>+2/-6</td>
</tr>
<tr>
<td>Nominal Maximal Dimensions of panels</td>
<td>1300x600</td>
<td>+2/-6</td>
</tr>
<tr>
<td>Minimum thickness (mm)</td>
<td>&lt;20</td>
<td>+/-1</td>
</tr>
<tr>
<td>Thickness (mm)</td>
<td>20≤t≤30</td>
<td>+1/-2</td>
</tr>
<tr>
<td>Maximum thickness (mm)</td>
<td>&gt; 30</td>
<td>+1/-3</td>
</tr>
</tbody>
</table>

Length and width:
Length and width are determined according to EN 822⁶.

Thickness:
The thickness of the product is determined according to European standard EN 823 ⁷.
The values obtained of thickness, length and width are all included within the tolerances.

2.3 Apparent density

The density of the products is determined according to European standard EN 1602⁸. The density of the VIP-core (excluding multi-layer film) is at least 160 kg/m³ and does not exceed 210 kg/m³.

2.4 Mass per square meter of the plastic foil

The mass per unit area of the plastic foil shall be determined with a calibrated scale with an accuracy of 0.01 g on samples at least 200mm x 200mm. The mass per unit area of the plastic foil shall be at least 108 g/m².

2.5 Tensile strength of the multilayer high barrier foil

The tensile strength of the multilayer high barrier foil shall be determined according to EN ISO 527-3⁹. The test shall be carried before and after ageing (Annex D of the CUAP 12.01/41). The value of the tensile strength before and after aging shall be declared.

2.6 Squareness

The squareness of the boards is determined according to European standard EN 824¹⁰. The deviation from squareness on length and width does not exceed 5 mm/m.

2.7 Flatness

The flatness \( S_{\text{max}} \) shall be determined in accordance with the methods described in to European standard EN 825¹¹. The declared flatness value mentioned above shall be specified in the ETA.

No test result shall deviate from the nominal values by more than: 5 mm/m.

---

⁶EN 822: 1994-11: Thermal insulation products for building applications - Determination of length and width
⁷EN 823: 1994-11: Thermal insulation products for building applications - Determination of thickness
⁸EN 1602: 1997-07: Thermal insulation products for building applications - Determination of the apparent density
¹⁰EN 824:1994-11: Thermal insulation products for building applications - Determination of squareness
¹¹EN 825:2013-05: Thermal insulation products for building applications - Determination of flatness
2.8 Dimensional stability under specified temperature and humidity

The dimensional stability of the insulation products is determined according to European standard EN 1604\textsuperscript{12}. The test is carried out after conditioning at a temperature of \((70 \pm 2) ^\circ C\) and \((50 \pm 5) \%\) relative humidity for 48 h.

Each single value of length and width change of dimensions is less than is \(\pm 1\%\).

Each single value of thickness change of dimensions is less than \(-2\% / +1\%\).

2.9 Behaviour under compressive stress

The behaviour under compressive stress shall be determined in accordance with the methods described in EN 826\textsuperscript{13}. Each single value of the compressive stress at 10 \% deformation is at least \(\sigma_{10\%} = 180\) kPa.

2.10 Internal pressure

The internal pressure shall be determined in a low pressure enclosure with the use of a laser sensor to determine the point of the shift of the barrier film during the pressure variation. The method is described in Annex C of the CUAP 12.01/41.

Each single value of the internal pressure is less than 5 mbar.

2.11 Evolution of the product mass while ageing

The evolution of the mass of the panel indicates the quantity of water vapour transmitted through the barrier complex and through the peripheral weld. This method is considered the most relevant for defining the ageing of the product when incorporated in the building.

The method is described in Annex B of the CUAP 12.01/41.

Each single value of increase of the mass after ageing is less than 2\% of the initial mass.

2.12 Core thermal resistance

The thermal resistance of the products is determined according to EN 12667\textsuperscript{14}. The declared value of thermal conductivity is determined according to EN 10 456\textsuperscript{15}.

The 90/90 fractile value of thermal resistance representing at least 90 \% of the production with a confidence limit of 90\% is determined as following:

\[ \begin{array}{|c|c|c|c|}
\hline
\text{Thickness mm} & \text{Thermal Resistance} \\
\hline
& R_{90/90} & \Delta R_a & R_D \\
& m^2.K/W & m^2.K/W & m^2.K/W \\
10 & 2.27 & 0.27 & 1.65 \\
15 & 3.41 & 0.41 & 2.48 \\
35 & 7.95 & 0.85 & 5.79 \\
40 & 9.09 & 1.09 & 6.61 \\
\hline
\end{array} \]

\textsuperscript{12} EN 1604:1997-07: Thermal insulation products for building applications - Determination of dimensional stability under specified temperature and humidity conditions

\textsuperscript{13} EN 826:1996-09: Thermal insulation products for building applications - Determination of compression behaviour

\textsuperscript{14} EN 12667: 2001: Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance

\textsuperscript{15} EN ISO 10 456: 2000: Thermal insulation - Building materials and products - Determination of declared and design values
2.13 Reaction to fire

The reaction to fire of the product is not determined according to EN 13501-1\textsuperscript{16}. The product is classified by default $F$.

<table>
<thead>
<tr>
<th>Product</th>
<th>thickness (mm)</th>
<th>class</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLIMVAC</td>
<td>10 to 40</td>
<td>$F$</td>
</tr>
</tbody>
</table>

2.14 Creep under compressive stress for uses under load

No performance determined.

2.15 Behaviour under point load for boards exposed to compression loads

No performance determined.

2.16 Deformation under specified load and temperature

No performance determined.

2.17 Release of dangerous substances or radiation

Note: In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

3 EVALUATION OF CONFORMITY AND CE MARKING

3.1 System of attestation of conformity

According to the decision 1999/91/EC of the European Commission\textsuperscript{17}, and described in the Council Directive 89/106 / EEC Annex III established by the European Commission\textsuperscript{18}, the system 3 of attestation of conformity applies.

3.1.1 This system of attestation of conformity of product by the manufacturer on the basis of:

(a) Tasks of the manufacturers:
   (1) factory production control;

(b) Tasks of the Notified Body:
   (2) Initial type-testing of the product.

\textsuperscript{16}EN 13501-1:2002 Classification of construction products and construction types about its fire behaviour – Part 1: Classification with the results of the test about fire behaviour of construction

\textsuperscript{17}Official Journal of the European Communities L29/44 of 03.02.1999

\textsuperscript{18}Official Journal of the European Communities L209/33 of 02.08.2001
3.2 Responsibilities

3.2.1 Tasks of the manufacturer,
The manufacturer has a factory production control system in its plant and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. This production control system ensures that the product is in conformity with the European Technical Approval.

In the framework of factory production control the manufacturer shall carry out tests and controls in accordance with the control plan which is fixed by this European Technical Approval.

Details of the extent, nature and frequency of testing and controls to be performed within the factory production control shall correspond to this control plan which is part of the technical documentation of this European Technical Approval.

The results of factory production control are recorded and evaluated. The records include at least the following informations:
- designation of the products and of the raw materials,
- type of control or testing,
- date of manufacture of the products and date of testing of the products or basic materials or components,
- result of control and testing and, if appropriate, comparison with requirements,
- signature of person responsible for factory production control.

On request the records shall be presented to the CSTB.

3.2.2 Tasks of the Notified Bodies
For initial type testing the results of the tests performed as part of the assessment for the European Technical Approval shall be used unless there are changes in the production line or plant. In such cases the necessary initial type testing has to be agreed between the CSTB and the approved bodies involved.

3.3 CE marking
The CE marking shall be affixed on the product. The symbol « CE » shall be accompanied by the following information. The symbol "CE" shall be accompanied by the following information:
- identification of products (trade name),
- name or identifying mark of the producer and manufacturing plant,
- the last two digits of the year in which the CE marking was affixed,
- number of the European technical approval,
- nominal dimensions: thicknesses, length and width,
- mass per unit area of the barrier film,
- declared intrinsic thermal resistance
- Category 1 and/or Category 2
- reaction to fire (Euroclass).
Example

<table>
<thead>
<tr>
<th>Euroclass</th>
<th>Thickness (mm)</th>
<th>R (m².K)/W</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>............</td>
<td>...........</td>
</tr>
<tr>
<td>panels/package</td>
<td>m²/package</td>
<td>L (mm)</td>
</tr>
<tr>
<td>........</td>
<td>........</td>
<td>........</td>
</tr>
</tbody>
</table>

The product shall be protected from humidity during transport, storage and installation.

4 ASSUMPTIONS UNDER WHICH THE FITNESS OF THE PRODUCT FOR THE INTENDED USE WAS FAVOURABLY ASSESSED

4.1 Manufacturing

The European Technical Approval is issued for the product on the basis of agreed data/information, deposited with CSTB, which identifies the product that has been assessed.

Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to the CSTB before the changes are introduced. CSTB will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

4.2 Installation

The thermal insulation boards may only be installed in structures where they are protected from precipitation, weathering and moisture.

During installation the processing instructions supplied by the manufacturer shall be taken into account.

The installation of the thermal insulation boards may only be performed by specialized companies trained by the manufacturer that are kept in a list by the applicant.

The product shall be protected from moisture and mechanical damage during installation.

The correction factor for the influence of humidity is a provisional one in CUAP 12.01/41. Furthermore the applications are limited to intended uses where the temperature remains below 50°C.

4.2.1 Parameters for the design of construction works or parts of construction works

4.2.1.1 Design value of thermal conductivity

The design value of the thermal resistance or thermal transmission coefficient 𝑈 of a wall is to be determined in accordance with the national regulations and based on the provisions of implementation notably in terms of fire, wind resistance, risk of condensation and sustainability buildings.
4.2.2 Parameters for the installation in the construction works or parts of construction works

The fitness for use of the product is subject to the following conditions of implementation:

- implementation by trained personnel, with experience in the installation of the material under the supervision of the head of construction,
- implementation complies with the manufacturer's specifications and data.

During the installation the following shall in particular be observed:

- With each delivery, the thermal insulation boards shall be checked by visual inspection.
- The thermal insulation boards must not be mechanically damaged by sawing, cutting or drilling.
- The substrate for laying the thermal insulation boards shall be flat.
- Adequate protection of the thermal insulation boards from damage shall be ensured also during the working phase, for example, by attaching a facing shell.

5 RECOMMENDATIONS

5.1 Packaging, transport and storage

The product has to be protected from moisture and dust during installation. The processing guidelines of the manufacturer have to be followed.

The thermal insulation boards shall be packed such that they are protected from moisture and mechanical damage during transport and storage, and the vacuum is not destroyed by causing damage to the multi-layer film.

5.2 Accompanying information

In the information accompanying the CE marking the manufacturer shall specify that the product shall be installed following the installation instructions of the manufacturer and shall be protected from moisture and mechanical damage during transport, storage and installation.

5.3 Use, maintenance and repair

The product must be used only in the places where it will not be exposed to damping or disintegration.

The original version is signed by
Le Directeur Technique

C.BALOCHE