
**Toplotnoizolacijski proizvodi za opremo stavb in industrijske inštalacije -
Proizvodi iz ekspaniranega perlita (EPB) in vermikulita (EV) - Specifikacije**

Thermal insulation products for building equipment and industrial installations -
Factory made expanded perlite (EP) and exfoliated vermiculite (EV) products -
Specification

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ICS

English Version

Thermal insulation products for building equipment and industrial installations - Factory made expanded perlite (EP) and exfoliated vermiculite (EV) products - Specification

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Produits manufacturés en perlite expansée (EP) et à base de vermiculite exfoliée (EV) - Spécification

Wärmedämmstoffe für die Haustechnik und für betriebstechnische Anlagen - Werkmäßig hergestellte Produkte aus Blähperlit (EP) und expandiertem Vermiculite (EV) - Spezifikation

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 88.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (prEN 15501:2006) has been prepared by Technical Committee CEN/TC 88 “Thermal insulating materials and products”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports the essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA which is an integral part of this standard.

Locally responsible authorities and contracting entities, who are bound by EU Directives to specify their requirements using European harmonized product standards, shall be allowed to demand additional properties outside the provisions of this standard if this is technically necessary due to prevailing operational conditions of the building equipment or the industrial installation projected or due to safety regulations.

This European Standard contains five annexes:

Annex A (normative)	Factory production control
Annex B (normative)	Testing for reaction to fire
Annex C (normative)	Special conditions to be used for the determination of organic content
Annex D (informative)	Additional properties
Annex ZA (informative)	Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

This European standard contains a Bibliography.

This European Standard is one of a series of standards for insulation products used in building equipment and industrial installations, but this standard may be used in other areas where appropriate.

1 Scope

This European Standard specifies the requirements for factory made expanded perlite and exfoliated vermiculite products which are used for the thermal insulation of building equipment and industrial installations with an operating temperature in the range of approximately 0°C to + 1 300°C.

The products are manufactured in the form of boards, pipe sections, segments and prefabricated ware.

This standard describes product characteristics and includes procedures for testing, evaluation of conformity, marking and labelling.

Products covered by this standard are also used in prefabricated thermal insulation systems and composite panels; the performance of systems incorporating these products is not covered.

This standard does not specify the required level of a given property that shall be achieved by a product to demonstrate fitness for purpose in a particular application. The levels required for a given application are to be found in regulations and invitations to tender.

This standard does not cover products intended to be used for the insulation of building structure.

The standard does not cover the following acoustical aspects: direct airborne sound insulation, impact noise index and sound absorption.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 822, *Thermal insulating products for building applications — Determination of length and width.*

EN 823, *Thermal insulating products for building applications — Determination of thickness.*

EN 824, *Thermal insulating products for building applications — Determination of squareness.*

EN 825, *Thermal insulating products for building applications — Determination of flatness.*

EN 826, *Thermal insulating products for building applications — Determination of compression behaviour.*

EN 993-14, *Methods of test for dense shaped refractory products. Determination of thermal conductivity by the hot-wire (cross-array) method.*

EN 1094-6, *Insulating refractory products — Determination of permanent change in dimensions of shaped products on heating.*

EN 1604, *Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions.*

EN 12086, *Thermal insulating products for building applications — Determination of water vapour transmission properties.*

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 13172:2001, *Thermal insulating products — Evaluation of conformity.*

EN 13238, *Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates.*

EN 13467, *Thermal insulating products for building equipment and industrial installations — Determination of dimensions, squareness and linearity of preformed pipe insulation.*

EN 13468, *Thermal insulating products for building equipment and industrial installations — Determination of trace quantities of water soluble chloride, fluoride, silicate and sodium ions and pH.*

EN 13501-1:2002, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire test.*

EN 13823, *Reaction to fire tests for building products — Building products excluding flooring exposed to the thermal attack by a single burning item.*

EN ISO 1182, *Reaction to fire tests for building products — Non-combustibility test (ISO 1182:2002).*

EN ISO 1716, *Reaction to fire tests for building products — Determination of the heat of combustion (ISO 1716:2002).*

EN ISO 8497, *Thermal insulation — Determination of steady-state thermal transmission properties of thermal insulation for circular pipes (ISO 8497:1994)*.

prEN ISO 9229, *Thermal insulation — Definitions of terms (ISO/DIS 9229:1997)*.

EN ISO 11925-2, *Reaction to fire tests — Ignitability of building products subjected to direct impingement of flame — Part 2: Single flame source test (ISO 11925-2:2002)*.

EN ISO 13787, *Thermal insulating products for building equipment and industrial installations — Determination of declared thermal conductivity (ISO 13787:2003)*.

3 Terms, definitions, symbols, units and abbreviated terms

3.1 Terms and definitions

For the purpose of this European standard, the following terms and definitions apply.

3.1.1 Terms and definitions as given in prEN ISO 9229

3.1.1.1

expanded perlite

lightweight granular (insulation) material manufactured from naturally occurring volcanic rock expanded by heat to form a cellular structure

3.1.1.2

exfoliated vermiculite

insulation material which results from expanding or exfoliating a natural micaceous mineral by heating

3.1.1.3

board, slab

rigid or semi-rigid (insulation) product of rectangular shape and cross section in which the thickness is uniform and substantially smaller than the other dimensions

NOTE Boards are usually thinner than slabs. They may also be supplied in tapered form.

3.1.1.4

pipe section

(insulation) product in the shape of a cylindrical annulus which may be split to facilitate application

3.1.1.5

segment

rigid insulation product for application to large diameter cylindrical or spherical equipment

3.1.1.6

block

(insulation) product generally of rectangular cross section and with a thickness not significantly smaller than the width

3.1.2 Additional terms and definitions

3.1.2.1

level

given value which is the upper or lower limit of a requirement. The level is given by the declared value of the characteristic concerned

3.1.2.2

class

combination of two levels of the same property between which the performance shall fall

3.1.2.3**prefabricated ware**

pieces cut, abraded or otherwise formed

3.1.2.4**production line**

assemblage of equipment that produces products in a continuous process. For ITT and FPC, each line is considered separately

3.1.2.5**production unit**

assemblage of equipment that produces products in a discontinuous process. For ITT and FPC, units using the same process in one factory are considered together (as one production line)

3.2 Symbols, units and abbreviated terms

Symbols and units used in this standard:

b	is the width	mm
D_i	is the inside diameter	mm
d	is the thickness	mm
d_D	is the declared thickness of the product	mm
$\Delta\varepsilon_b$	is the relative change in width	%
$\Delta\varepsilon_d$	is the relative change in thickness	%
$\Delta\varepsilon_l$	is the relative change in length	%
L	is the deviation from linearity	mm
l	is the length	mm
λ	is the thermal conductivity	W/(m·K)
λ_D	is the declared thermal conductivity	W/(m·K)
μ	is the water vapour diffusion resistance factor	—
S_b	is the deviation from squareness for boards on length and width	mm/m
S_d	is the deviation from squareness for boards on thickness	mm
S_{max}	is the deviation from flatness	mm
σ_b	is the compressive strength	kPa
σ_m	is the bending strength	kPa
v	is the deviation from squareness for pipe sections	mm
ρ_a	is the apparent density	kg/m ³
X_t	is the deformation at time t	mm
Z	is the water vapour resistance	m ² h Pa/mg
BS	is the symbol of the declared level for bending strength	
CL	is the symbol of the declared level for soluble chloride ions	
F	is the symbol of the declared level for soluble fluoride ions	
CS(Y)	is the symbol of the declared level for compressive strength	
CS(10)	is the symbol of the declared level for compressive stress at 10 % deformation	
L	is the symbol of the declared level for linearity	
MU	is the symbol of the declared value for water vapour diffusion resistance factor	
ST(+)	is the symbol of the declared level for maximum service temperature	

Abbreviated terms used in this standard:

EP	is Expanded Perlite
EV	is Exfoliated Vermiculite
ITT	is Initial Type Test
ML	is Manufacturer's Literature
FPC	is Factory Production Control
RtF	is Reaction to Fire

4 Requirements

4.1 General

Product properties shall be assessed in accordance with clause 5. To conform with this standard, products shall meet the requirements of 4.2, and the requirements of 4.3 as appropriate.

For FPC, see Table A.1 and Table A.2.

NOTE 1 Information on additional properties is given in annex D.

One test result for a product property is the average of the measured values on the number of test specimens given in Table 3.

NOTE 2 Apparent density is a useful parameter, among others, for identification but it should not be used as a basis for the quality assessment of mineral wool products.

Apparent density of boards should be determined in accordance with EN 1602, *Thermal insulating products for building applications – Determination of the apparent density*. No mean value of a product should deviate by more than ± 10 15% from the declared value given in ML.

Apparent density of pipe sections, if voluntarily declared by the manufacturer, will be determined in accordance with EN 13470, *Thermal insulating products for building applications – Determination of the apparent density of preformed pipe insulation*. No mean value of a product should deviate by more than ± 15 % from the declared value given in ML.

4.2 For all applications

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4.2.1 Thermal conductivity

For flat specimens, thermal conductivity shall be based upon measurements carried out in accordance with EN 12667 or EN 12939 for thick products or EN 993-14 (this test is calibrated against EN 12939). For cylindrical specimens EN ISO 8497 is used as specified in 5.3.2. The thermal conductivity values shall be declared by the manufacturer and verified in accordance with EN ISO 13787. They shall be declared by the manufacturer at reference mean temperatures covering the product service temperature range. The following conditions apply:

- the measured values shall be expressed with three significant figures;
- the declared thermal conductivity curve shall be given as a limit curve, defined in EN ISO 13787;
- the values of the thermal conductivity, λ_D , shall be rounded upwards to the nearest 0,001 W/(m·K).

4.2.2 Dimensions and tolerances

4.2.2.1 Linear dimensions

The length, l , width, b , and thickness, d , of boards and the dimensions of pipe sections and special shapes shall be respectively determined in accordance with EN 822, EN 823 and EN 13467. No test result shall deviate from the manufacturer's declared values.

4.2.2.1 Squareness

Deviation from squareness of boards, S_b and S_d , shall be determined in accordance with EN 824 and deviation from squareness for pipe sections and segments, v in accordance with EN 13467. The deviation from squareness of boards on length and width, S_b , shall not exceed the manufacturer's declared values and the deviation from squareness of boards on thickness, S_d , shall not exceed the manufacturer's declared values. For pipe sections and segments the deviation from squareness, v , shall not exceed the manufacturer's declared values.

4.2.2.2 Flatness

Deviation from flatness, S_{\max} , shall be determined for boards in accordance with EN 825. The deviation from flatness, S_{\max} , shall not exceed the manufacturer's declared values.

4.2.2.3 Pipe section linearity

Deviation from linearity, L shall be determined in accordance with EN 13467. The deviation from linearity, L , shall not exceed the manufacturer's declared values.

4.2.3 Dimensional stability

Dimensional stability under specified temperature and humidity conditions shall be determined in accordance with EN 1604. The test shall be carried out after storage for 48 h at (23 ± 2) °C and (90 ± 5) % relative humidity. The relative changes in length, $\Delta\varepsilon_l$ and width, $\Delta\varepsilon_b$ shall not exceed the manufacturer's declared values. The relative change in thickness, $\Delta\varepsilon_d$ shall not exceed the manufacturer's declared values.

4.2.4 Reaction to fire

Reaction to fire classification (Euroclasses) shall be determined in accordance with EN 13501-1.

For products applied on a flat surface or a curved surface with a diameter above 500 mm, EN 13501-1 shall be used.

If a flat product, which has a classification according to EN 13501-1, is used in a linear application, it does not require an additional classification.

The product shall be tested according to annex B.

EP/EV Products containing less than 1% organic content are classified without testing as class A1 products.

NOTE For products applied on linear objects or with a diameter below or equal 500 mm, an amendment of EN 13501-1:2002 is in preparation in accordance with Commission Decision of 26 August 2003 amending Decision 2000/147/EC implementing Council Directive 89/106/EEC published in the Official Journal L 220, 3.9.2003, p.5.

4.2.5 Durability characteristics

4.2.5.1 General

The appropriate durability characteristics have been considered and are covered in 4.2.5.2, 4.2.5.3 and 4.2.5.4.

4.2.5.2 Durability of reaction to fire against ageing/degradation and high temperature

The reaction to fire performance of EP/EV products does not change with time or when subjected to high temperature.

4.2.5.3 Durability of thermal resistance against ageing/degradation

The thermal conductivity of EP/EV products does not change with time. This is covered by 4.2.1 thermal conductivity, 4.2.2 dimensions and tolerances and 4.2.3 dimensional stability or 4.3.2 maximum service temperature (dimensional stability).

4.2.5.4 Durability of thermal resistance against high temperature

The thermal conductivity of EP/EV products does not change with time at any specific temperature within the service temperature range. This is covered by 4.3.2 maximum service temperature (dimensional stability).

4.3 For specific applications

4.3.1 General

If there is no requirement for a property described in clause 4.3 for a product in use, then that property does not need to be determined and declared by the manufacturer.

4.3.2 Maximum service temperature

The maximum service temperature, ST(+), for flat products shall be determined in accordance with EN 1094-6.

At the maximum service temperature, ST(+), the relative changes in length $\Delta\epsilon_l$, and width $\Delta\epsilon_b$, shall not exceed 2,5%.

The maximum service temperature, ST(+), shall be declared in centigrades in levels with steps of 50 °C.

Table 1 — Levels for maximum service temperatures

Level	Requirement °C
ST(+) 650	≥ 650
ST(+) 700	≥ 700
ST(+) 750	≥ 750
ST(+) 800	≥ 800
ST(+) 850	≥ 850
ST(+) 900	≥ 900
ST(+) 950	≥ 950
ST(+) 1000	≥ 1000
ST(+) 1050	≥ 1050
ST(+) 1100	≥ 1100
ST(+) 1150	≥ 1150
ST(+) 1200	≥ 1200
ST(+) 1250	≥ 1250
ST(+) 1300	≥ 1300

4.3.3 Compressive strength of flat products

Compressive strength at 10 % deformation shall be determined in accordance with EN 826. No test result shall be less than the value, given in Table 2, for the declared level.

Table 2 — Levels for compressive strength

Level	Requirement kPa
CS(10)250	≥ 250
CS(10)500	≥ 500
CS(10)1000	≥ 1000
CS(10)2000	≥ 2000
CS(10)5000	≥ 5000
CS(10)10000	≥ 10000
CS(10)15000	≥ 15000
CS(10)20000	≥ 20000
CS(10)30000	≥ 30000

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NOTE EN 826 is not applicable to pipe sections.

4.3.4 Water vapour transmission

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The water vapour transmission shall be determined in accordance with EN 12086, and declared as the water vapour diffusion resistance factor, μ .

4.3.5 Trace quantities of water soluble ions and the pH value

Trace quantities of water soluble chloride, fluoride, silicate and sodium ions and the pH value shall be determined, if required, in accordance with EN 13468. The manufacturer shall declare one or more as appropriate as levels in mg per kg of product, and the pH value as levels in steps of 0,5.

4.3.6 Release of dangerous substances

NOTE see annex ZA.

5 Test methods

5.1 Sampling

Flat test specimens shall be taken from the same sample and sufficient to cover the needed tests.

Pipe section specimens shall be taken from a sample consisting of at least 3 full size sections.

If this is not possible, the properties of the product shall be measured on the boards from which the product is fabricated. In all cases dimensions and when relevant squareness and flatness shall be measured on the finished product.