



SLOVENSKI STANDARD

SIST EN 13499:2003

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Toplotnoizolacijski proizvodi za stavbe - Kontaktni fasadni toplotnoizolacijski sistemi (ETICS) na osnovi ekspandiranega polistirena - Specifikacija

Thermal insulation products for buildings - External thermal insulation composite systems (ETICS) based on expanded polystyrene - Specification

Wärmedämmstoffe für Gebäude - Außenseitige Wärmedämm-Verbundsysteme (WDVS) aus expandiertem Polystyrol - Spezifikation

Produits isolants thermiques pour bâtiments - Systemes composites d'isolation thermique par l'extérieur a base de polystyrene expansé (ETICS) - Spécification

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EUROPEAN STANDARD

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Thermal insulation products for buildings - External thermal insulation composite systems (ETICS) based on expanded polystyrene - Specification

Produits isolants thermiques pour bâtiments - Systèmes composites d'isolation thermique par l'extérieur à base de polystyrène expansé (ETICS) - Spécification

Wärmedämmstoffe für Gebäude - Außenseitige Wärmedämm-Verbundsysteme (WDVS) aus expandiertem Polystyrol - Spezifikation

This European Standard was approved by CEN on 10 July 2003.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document EN 13499:2003 has been prepared by Technical Committee CEN/TC 88 "Thermal insulating materials and products", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.

This European Standard contains two annexes:

Annex A (normative) Factory production control

Annex B (informative) Additional information for customers and designers

This European Standard is one of a series of standards for insulation products used in buildings, but can be used in other areas where appropriate.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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EN 13499:2003 (E)**1 Scope**

This European Standard specifies the requirements for factory made products for external thermal insulation composite systems (ETICS) based on expanded polystyrene, delivered as a kit, and used as thermal insulation for buildings.

The standard describes product characteristics and includes procedures for testing, marking and labelling.

ETICS are applied to external surfaces of new or existing walls and/or soffits to improve the thermal insulation. ETICS include special fittings (base profiles, corner profiles, etc.) to connect them to adjacent building structures (apertures, corners, parapets, etc.). ETICS give protection against weathering and improve the appearance of the buildings. They do not contribute to the stability of the wall and/or soffits on which they are installed.

The standard covers systems where the thermal insulation material is required for the load transfer to the substrate.

This standard covers systems with a declared thermal resistance equal to or greater than 1 m²·K/W.

The requirements from national regulations concerning the mechanical resistance and stability of ETICS should be taken into account.

This standard does not cover the strength between the ETICS and the building surface to which it shall be fixed, i. e. the substrate.

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2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1062-3, *Paints and varnishes - Coating materials and coating systems for exterior masonry and concrete - Part 3: Determination and classification of liquid-water transmission rate (permeability).*

EN 1062-11, *Paints and varnishes – Coating materials and coating systems for exterior masonry and concrete – Part 11: Methods of conditioning before testing.*

EN 12085, *Thermal insulating products for building applications - Determination of linear dimensions of test specimens.*

EN 13163, *Thermal insulation products for buildings – Factory made products of expanded polystyrene (EPS) – Specification.*

EN 13172, *Thermal insulating products – Evaluation of conformity.*

EN 13494, *Thermal insulation products for building applications – Determination of the tensile-bond strength of the adhesive and of the base coat to the thermal insulation material.*

EN 13495, *Thermal insulation products for building applications – Determination of the pull off resistance of external thermal insulation composite systems (ETICS) (foam block test).*

EN 13496, *Thermal insulation products for building applications – Determination of the mechanical properties of glass fibre meshes.*

EN 13497, *Thermal insulation products for building applications – Determination of the resistance to impact of external thermal insulation composite systems (ETICS).*

EN 13498, *Thermal insulation products for building applications – Determination of the resistance to penetration of external thermal insulation composite systems (ETICS)*.

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

prEN 13820, *Thermal insulating materials for building applications – Determination of organic content*.

EN 13823, *Reaction to fire tests for building products – Building products excluding floorings 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)*.

prEN ISO 4628-2, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 2: Assessment of degree of blistering (ISO/FDIS 4628-2:2003)*

prEN ISO 4628-4, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 4: Assessment of degree of cracking (ISO/FDIS 4628-4:2003)*

prEN ISO 4628-5, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 5: Assessment of degree of flaking (ISO/FDIS 4628-5:2003)*

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EN ISO 6946, *Building components and building elements – Thermal resistance and thermal transmittance- Calculation method (ISO 6946:1996)*.

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EN ISO 7783-2, *Paints and varnishes – Coating materials and coating systems for exterior masonry and concrete – Part 2: Determination and classification of water-vapour transmission rate (permeability) (ISO 7783-2:1999)*.

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

EN ISO 10456, *Building materials and products - Procedures for determining declared and design thermal values (ISO 10456:1999)*.

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)*.

ISO 1887, *Textile glass – Determination of combustible-matter content*.

3 Terms, definitions, symbols, units and abbreviated terms

3.1 Terms and definitions

For the purposes of this European Standard the terms and definitions given in prEN ISO 9229 apply, together with the following.

3.1.1

adhesive for ETICS

system specific material for bonding the thermal insulation material to the substrate

3.1.2

base coat for ETICS

system specific layer applied directly on to the thermal insulation material. It contains the reinforcement. The base coat provides most of the mechanical properties of an ETICS

EN 13499:2003 (E)**3.1.3****external thermal insulation composite system (ETICS)**

on site applied system of factory made products, delivered as a complete system from the system manufacturer and comprising, as a minimum, the following components specifically chosen by the manufacturer of the system for the system and substrate:

- a system specific adhesive and system specific mechanical fixing devices;
- a system specific thermal insulation material;
- one or more layers of a system specific base coat where at least one layer contains a reinforcement;
- a system specific reinforcement;
- a system specific finishing material which can include a decorative coat.

All components of an ETICS are designed specifically for the system and the substrate by the manufacturer of the system.

3.1.4**finishing material for ETICS**

system specific mineral, organic and/or inorganic materials forming the final layer of an ETICS. The finishing material combined with the base coat provides protection against the weather. It also gives texture and colour to the system

3.1.5**glass fibre meshes for ETICS**

system specific textile fabrics consisting of continuous glass filament yarn in both the warp and the weft directions treated with alkali resistant finish

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3.1.6**mechanical fixing devices for ETICS**

system specific devices for securing thermal insulation systems to the substrate, for example rails or anchors

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3.1.7**reinforcement for ETICS**

system specific materials embedded in the base coat to improve its mechanical strength. Reinforcements for ETICS are usually glass fibre or metal meshes

3.1.8**soffit**

exposed horizontal undersurface of a part of a building

3.1.9**substrate**

surface of a new or existing wall or soffit. It can be faced with mineral or organic renders, or paint coatings

NOTE Substrates for reaction to fire test see EN 13238

3.2 Symbols, units and abbreviated terms

Symbols and units used in this standard:

N_{Anch}	is the number of anchors per m^2	n/m^2
R	is the declared thermal resistance of the ETICS	$\text{m}^2 \cdot \text{K}/\text{W}$
R_{D}	is the declared thermal resistance of the EPS-boards	$\text{m}^2 \cdot \text{K}/\text{W}$
S_{d}	is the design wind load suction	kPa
S_{k}	is the characteristic wind load suction	kPa
λ_{D}	is the declared thermal conductivity of the EPS-boards	$\text{W}/(\text{m} \cdot \text{K})$
d	is the thickness of the EPS-boards	mm
$X_{\text{d,Anch}}$	is the design pull-off resistance per anchor	kPa
X_{d}	is the design pull-off resistance of the ETICS	kPa
X_{k}	is the characteristic pull-off resistance of the ETICS	kPa
D	is the symbol of the class of the thickness tolerance for the EPS boards	
E	is the symbol of the class of the squareness tolerance for the EPS boards	
H	is the symbol of the class of the dimensional stability for EPS boards	
I	is the symbol of the level of the resistance to impact	
L	is the symbol of the class of the length tolerance for the EPS boards	
P	is the symbol of the class of the flatness tolerance for the EPS boards	
PE	is the symbol of the level of the resistance to penetration	
R	is the symbol of the level of the thermal resistance of the EPS boards	
T	is the symbol of the level of the tensile strength perpendicular to the surface for EPS boards	
W	is the symbol of the class of the width tolerance for the EPS boards	
γ_{x}	is the partial safety factor for the design pull-off resistance of the ETICS	
γ_{s}	is the partial safety factor for the design wind load suction	

Abbreviated terms used in this standard:

ETICS	External Thermal Insulation Composite System
EPS	Expanded Polystyrene
ITT	Initial Type Testing

4 Requirements

4.1 General

Product properties shall be assessed in accordance with clause 5. To comply with this standard, products shall meet the requirements of 4.2 to 4.11, as appropriate.

If there is no requirement for a product in use, than the properties do not need to be determined and declared by the manufacturer.

4.2 Thermal resistance

The thermal resistance value of ETICS shall be calculated in accordance with EN ISO 10456 and EN ISO 6946, using the declared EPS thermal resistance values derived from EN 13163. No value for the declared thermal resistance shall be lower than $1,0 \text{ m}^2 \cdot \text{K}/\text{W}$.

NOTE Saving energy by application of ETICS is essentially influenced by the thickness d and the declared thermal conductivity λ_{D} of thermal insulation material used. The declared thermal resistance R can be calculated as follows:

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$$R \approx R_D = \frac{d}{\lambda_D}$$

4.3 Mechanical resistance and stability of the system

The ETICS shall be stable to the combined stress generated by loads such as mass, wind suction, temperature, humidity and shrinkage as well as from loads under normal use.

The ETICS shall be designed and applied in such a way that it satisfies the requirements to the mechanical resistance and stability.

NOTE The figures given in 4.3.1, 4.3.2 and 4.3.3 below are based on experience and determined by the expected wind suction. They also depend on the characteristics of the materials used as components of the respective ETICS.

4.3.1 Bond strength of the base coat to the EPS board

Bond strength of the base coat to the EPS board shall be determined in accordance with EN 13494. No test result shall be less than 80 kPa.

4.3.2 Bond strength of the adhesive to the EPS board for ETICS fixed by an adhesive

ETICS fixed by an adhesive are defined as systems where the connection to the substrate is ensured by the adhesive. They may include supplementary mechanical fixings.

Bond strength of the adhesive to the EPS board shall be determined in accordance with EN 13494. No test result shall be less than 80 kPa.

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NOTE ETICS can be fixed solely to a substrate suitable for gluing by using an adhesive. In case of doubt the minimum bond strength of the adhesive to the substrate, measured in accordance with EN 1542 should exceed 80 kPa, and at minimum 40 % of the surface of the EPS boards should be bonded to the substrate by the adhesive.

4.3.3 Pull-off resistance of the ETICS fixed by mechanical fixing

Pull-off resistance of the ETICS fixed by mechanical fixing shall be determined in accordance with EN 13495 without using an adhesive between insulation and substrate. The design pull-off resistance X_d of the ETICS shall be greater than the designed wind load suction S_d .

NOTE The design pull-off resistance X_d of the ETICS should be calculated as

$$X_d \geq S_d$$

$$S_d = S_k \cdot \gamma_s$$

$$X_d = \frac{X_k}{\gamma_x}$$

In absence of national partial safety factors for the design wind load suction, S_d , the partial safety factor $\gamma_s = 1,5$ according to EN 1990 should be used.

The necessary number of anchors per m^2 , N_{Anch} , should be calculated as follows:

$$N_{Anch} = \frac{X_d}{X_{d,Anch}}$$

where the design resistance per anchor $X_{d,Anch}$ is the lower value of either

- the pull-out design resistance of the anchor in the substrate according to the European Technical Approval of the anchor or the pull-off design resistance of the ETICS according to EN 13495. In absence of national partial safety factors, the pull-off design resistance is calculated by using the partial safety factor $\gamma_x = 1,5$.

The number of anchors per m² for different wind suction loads can be given by the supplier as a table for each ETICS.

The connection of the insulation panel to the substrate can be also performed by profiles fixed onto the substrate by anchors. In this case, special care should be taken on the required minimum area for a representative sample tested according to EN 13495.

4.4 Reaction to fire

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

4.5 EPS boards

EPS boards used as the thermal insulation material in ETICS shall comply with the requirements specified in EN 13163 and those listed in Table 1:

Table 1 — Product requirements for EPS boards

Characteristic	Requirements	
	Value	Level/Class/Limit value
Declared thermal resistance	$R_D \geq 1,00 \text{ m}^2 \cdot \text{K/W}$	Limit value
Tensile strength perpendicular to the surface	$\geq 100 \text{ kPa}$	TR100
EPS boards fixed by an adhesive or by anchors ^a EPS boards fixed by rails ^a	$\geq 150 \text{ kPa}$	TR150
Dimensional stability	$\pm 0,2 \%$	DS(N)2
Squareness tolerance	$\pm 2 \text{ mm/m}$	S2
Flatness tolerance	$\pm 5 \text{ mm}$	P4
Length tolerance	$\pm 2 \text{ mm}$	L2
Width tolerance	$\pm 2 \text{ mm}$	W2
Thickness tolerance	$\pm 1 \text{ mm}$	T2
Long term water absorption by partial immersion	$\leq 0,5 \text{ kg/m}^2$	Limit value

^a EPS boards fixed by anchors or rails in combination with an adhesive will be treated like a system without an adhesive.

NOTE The requirements in Table 1 are minimum requirements. The system supplier of the ETICS is responsible for the performance of the system. Higher or additional requirements to the EPS boards can be considered necessary by the system supplier.

4.6 Tensile strength of the reinforcement

The tensile strength of the glass fibre meshes shall be determined in accordance with EN 13496. The following requirements shall be satisfied:

- the mean value of the tensile strength shall be greater than 40 N/mm and no individual value shall be less than 36 N/mm at the initial state;
- the relation of the tensile strength to the elongation at failure, stored under normal conditions and in aggressive medium, shall be not less than 1 kN/mm;