

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

The European Standard EN 13499:2003 has the status of a
British Standard

ICS 91.100.60

National foreword

This British Standard is the official English language version of EN 13499:2003.

The UK participation in its preparation was entrusted by Technical Committee B/540, Energy performance of materials, components and buildings, to Subcommittee B/540/1, European standards for thermal insulation, which has the responsibility to:

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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English version

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

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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of an identical text or by endorsement, at the latest by February 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.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.

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 $1 \text{ m}^2\text{K/W}$.

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.

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)*

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

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

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:

- ¾ a system specific adhesive and system specific mechanical fixing devices;
- ¾ a system specific thermal insulation material;
- ¾ one or more layers of a system specific base coat where at least one layer contains a reinforcement;
- ¾ a system specific reinforcement;
- ¾ 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

3.1.6

mechanical fixing devices for ETICS

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

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	E xternal T hermal I nsulation C omposite S ystem
EPS	E xpanded P oly S tirene
ITT	I nitial T ype T esting

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:

$$R \quad R_D = \frac{d}{D}$$

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.

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

$$X_d \geq S_d$$

$$S_d = S_k \times s$$

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

In absence of national partial safety factors for the design wind load suction, S_d , the partial safety factor $s = 1,5$ 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

- ¾ 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 1,00 m ² · K/W	Limit value
Tensile strength perpendicular to the surface	100 kPa	TR100
EPS boards fixed by an adhesive or by anchors ^a		
EPS boards fixed by rails ^a	150 kPa	TR150
Dimensional stability	0,2 %	DS(N)2
Squareness tolerance	2 mm/m	S2
Flatness tolerance	5 mm	P4
Length tolerance	2 mm	L2
Width tolerance	2 mm	W2
Thickness tolerance	1 mm	T2
Long term water absorption by partial immersion	0,5 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:

- ¾ 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;
- ¾ 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;

¾ the tensile strength after storage in aggressive medium, in accordance with EN 13496, shall be greater than 50 % of the initial tensile strength.

The metal lath or mesh reinforcement for the system shall be made of galvanised steel or austenitic stainless steel. For galvanized lath or mesh, minimum thickness of the zinc coat should be 20 µm (275 g/m²), and galvanising shall take place after welding the lath or mesh. The space between the filaments shall be 9 mm to 19 mm.

NOTE These requirements are minimum requirements. The system supplier of the ETICS is responsible for the performance of the system. Higher or additional requirements to the reinforcement can be considered necessary by the system supplier.

4.7 Liquid water permeability of the system surface

Liquid water permeability shall be determined in accordance with EN 1062-3. No test result shall be greater than 0,5 kg/(m²·h^{0,5}). If the base coat complies with this requirement the finishing material need not be tested.

4.8 Resistance to impact

Resistance to impact shall be determined in accordance with EN 13497. No test result shall be less than the requirement, given in Table 2, for the declared level.

Table 2 — Levels of resistance to impact

Level	Requirement
I2	No damages at 2 J
I10	No damages at 10 J

4.9 Resistance to penetration

Resistance to penetration shall be determined in accordance with EN 13498. No test result shall be less than the requirement, given in Table 3, for the declared level.

Table 3 — Levels of resistance to penetration

Level	Requirement
PE200	> 200 N
PE500	> 500 N

4.10 Water vapour permeability

The water vapour permeability of the base coat and the finishing material shall be measured in accordance with EN ISO 7783-2. No test result shall be less than 20 g/(m² · d).

NOTE It has been observed that with this result no harmful condensation will occur in the case during the heating period where in the daily average relative humidity of the indoor air is less than 60 %, and the temperature difference between indoor and outdoor air is less than 30 K. For other conditions the condensation can be calculated in accordance with EN ISO 13788.

4.11 Durability and adhesion of the finishing material on the base coat

The durability and the adhesion of the finishing material on the base coat shall be determined in accordance with prEN ISO 4628-2, prEN ISO 4628-4 and prEN ISO 4628-5 after conditioning according to EN 1062-11.

Characteristic	Requirements
Degree of blistering according to prEN ISO 4628-2	None
Degree of cracking according to prEN ISO 4628-4	Quantity of cracks: Rating 3 (moderate number of cracks) Size of cracks: Rating 2 (maximum 200 µm wide)
Degree of flaking according to prEN ISO 4628-5	Quantity of flaking: Rating 3 (flaked area 1 %) Size of flaking: Rating 2 (size of flaking 3 mm)

5 Test methods

5.1 Sampling

Test specimens shall be prepared as described in the relevant test method standards.

5.2 Conditioning

5.2.1 Conditioning of the test specimens for the determination of the tensile bond strength of the adhesive to the thermal insulation material

Test specimens shall be stored at a temperature of (23 ± 2) °C and at (50 ± 10) % relative humidity for at least 28 days.

NOTE Other conditions can be agreed between parties.

5.2.2 Conditioning of the test specimen in accordance with EN 1062-11 for the determination of the tensile bond strength of the base coat to the thermal insulation material, liquid water permeability of the system surface, resistance to impact, resistance to penetration, water vapour permeability, durability and adhesion of the finishing material on the base coat

Test specimens shall be stored at a temperature of (23 ± 2) °C and at (50 ± 10) % relative humidity for at least 28 days and then be subjected to 3 complete conditioning cycles consisting of the following:

- $\frac{3}{4}$ store for 24 h in tap water at a temperature of (23 ± 2) °C, ensuring that the test specimens remain completely immersed (including the thermal insulation board);
- $\frac{3}{4}$ store for 24 h at a temperature of (50 ± 2) °C.

Afterwards, store the test specimens at a temperature of (23 ± 2) °C and at (50 ± 10) % relative humidity for at least 24 h before carrying out further tests.

NOTE 1 During interruptions between the cycles (e.g. at weekends, or for other reasons) the test specimens should be stored at a temperature of (23 ± 2) °C and at (50 ± 10) % relative humidity.

NOTE 2 Other conditions can be agreed between parties.

5.3 Testing

Testing shall be carried out as described in the relevant test method standards.

Table 4 gives the dimensions of the test specimens and the minimum number measurements required to get one test result and any other specific conditions which are necessary.

Table 4 — Test methods, test specimens and special conditions

Clause		Test method	Test specimens length and width ^a	Minimum number of measurements to get one test result	Special conditions
No	title				
4.2	Thermal resistance	EN ISO 10456 EN ISO 6946			
4.3.1	Bond strength of the base coat to the EPS board	EN 13494	200 mm × 200 mm	3	
4.3.2	Bond strength of the adhesive to the EPS board for ETICS fixed by an adhesive	EN 13494	200 mm × 200 mm	3	
4.3.3	Pull-off resistance of the ETICS fixed by mechanical fixing	EN 13495	500 mm × 1000 mm × 60 mm	3	
4.4	Reaction to fire	EN 13501-1	See EN 13501-1		
4.6	Tensile strength of the reinforcement	EN 13496	minimum (300 mm × 50 mm) ^b	7 test specimens in both the warp and the weft direction	Testing before and after storage in an aggressive medium
4.7	Liquid water permeability of the system surface	EN 1062-3	minimum 200 cm ²	3	
4.8	Resistance to impact	EN 13497	500 mm × 1000 mm × 60 mm	minimum 5 ^c	
4.9	Resistance to penetration	EN 13498	200 mm × 200 mm	minimum 5 ^c	
4.10	Water vapour permeability	EN ISO 7783-2	$D = 90$ mm	3	Filter disk porosity 4
4.11	Durability and adhesion of the finishing material on the base coat	prEN ISO 4628-2 prEN ISO 4628-4 prEN ISO 4628-5	200 mm × 200 mm	1	

^a The dimensions shall be measured in accordance to EN 12085.
^b The ratio of the length between the clamps to the width of the test specimen shall be 4 : 1. The test specimen shall contain a minimum number of 5 threads within the width.
^c A minimum distance of 100 mm (between the testing points) should be maintained.

6 Designation code

The system supplier shall give a designation code for the product. The following shall be included except when there is no requirement for a property described in clause 4.

- ¾ Declared thermal resistance R
- ¾ Reaction to fire Euroclasses A to F
- ¾ Resistance to impact li
- ¾ Resistance to penetration PEi

where "i" shall be used to indicate the relevant class or level number.

A designation code for ETICS is illustrated by the following example:

ETICS – EPS – EN 13499 – 2,5 – B – I2 – PE200

7 Evaluation of conformity

The system supplier of the ETICS or his authorised representative shall be responsible for the conformity of his products with the requirements of this European Standard. The evaluation of conformity shall be carried out in accordance with EN 13172 and shall be based on factory production control and tests of samples.

The minimum frequencies for factory production control shall be in accordance with annex A of this standard.

8 Marking and labelling

8.1 The entire and specific information of all components of the kit has to be given on an accompanying document that contains:

- ¾ Name of the system supplier
- ¾ Product identity (trade name) of the system
- ¾ Designation code of the system as given in in clause 6.
- ¾ Expiration date of the specification
- ¾ A specification of all components that are chosen specifically for the system (Materials should be described in a way that recognition of the components is easily possible by comparing the description with the marks on the product or the labels of the components as described in 8.2.)

8.2 Components conforming to this standard shall be clearly marked, either on the product or on the label with the following information:

All components:

- ¾ Name or identifying mark of the manufacturer
- ¾ Product identity (trade name)
- ¾ Day, month and year (the last two digits) of manufacturer
- ¾ Location of manufacturing
- ¾ Additional information as described in 8.3

8.3 Additional information:

8.3.1 Reinforcement

- ¾ Type
- ¾ Nominal length, nominal width and number in the package

8.3.2 Adhesive:

- ¾ Type
- ¾ Mass

8.3.3 Base Coat:

- ¾ Type
- ¾ Mass

8.3.4 Finishing coat

- ¾ Type
- ¾ Mass

8.3.5 EPS-Boards

- ¾ Marking and labelling according to EN 13163 including the required level of the tensile strength and the limit value for long term water absorption by immersion.

8.3.6 Rails

- ¾ Type
- ¾ Nominal length and number in the package

8.3.7 Anchors

- ¾ Type
- ¾ Nominal length and number in the package

Annex A (normative)

Factory production control

Table A.1 — Minimum product testing frequencies

Clause		Minimum testing frequencies ^a		
No	Title	Direct testing	Indirect testing	
			Test method	Frequency
4.3.1	Bond strength of the base coat to the EPS board	1 per month or 2 per year	System supplier's method	1 per month
4.3.2	Bond strength of the adhesive to the EPS board for ETICS fixed by an adhesive	1 per month or 2 per year	System supplier's method	1 per month
4.3.3	Pull-off resistance of the ETICS fixed by mechanical fixing	ITT		
4.4	Reaction to fire	see Table A.2		
4.6	Tensile strength of the reinforcement	2 per year	loss of ignition according to ISO 1887 and mass per unit area	1 per month 1 per month
4.7	Liquid water permeability of the system surface	ITT		
4.8	Resistance to impact	ITT		
4.9	Resistance to penetration	ITT		
4.10	Water vapour permeability	ITT		
4.11	Durability and adhesion of the finishing material on the base coat	ITT		

^a Testing of relevant properties of the system shall be repeated when changes or modifications are made that are likely to affect the conformity of the system

Table A.2 — Minimum product testing frequencies for the reaction to fire characteristics

Clause		Minimum testing frequency ^a					
No	Title	Direct testing ^b		Indirect testing ^d			
4.4	Reaction to fire class	of ETICS		Components			
		Test method	Frequency	Insulating board		Adjacent components ^c	
				Test method	Frequency	Test method	Frequency
		A1	EN ISO 1182 and EN ISO 1716	1 per 2 years and indirect testing	prEN 13820	1 per month	prEN 13820
Manufacturer's method	1 per month				prEN 13820	1 per week	
A2	EN ISO 1182 or EN ISO 1716 and EN 13823	1 per 2 years and indirect testing	prEN 13820	1 per month	prEN 13820	1 per week	
			Manufacturer's method	1 per month	prEN 13820	1 per week	
B C D	EN 13823 and EN ISO 11925-2 Exposure 30 s ^e	1 per month or 1 per 2 years and indirect testing			prEN 13820	1 per week	
			1 per day or 1 per month and indirect testing	Euroclass E or better according to EN 13163		prEN 13820	1 per week
E	EN ISO 11925-2 Exposure 15 s ^e	1 per day or 1 per month and indirect testing	Euroclass E or better according to EN 13163		prEN 13820	1 per week	
F	-	-	-	-	-	-	

NOTE Not all Euroclasses can apply for the products conforming to this standard.

^a Testing of relevant properties of the system shall be repeated when changes or modifications are made that are likely to affect the conformity of the system.

^b Direct testing may be conducted either by third party or by the system supplier.

^c Adjacent components, which are adhesive, base coat, reinforcement and finishing materials.

^d Indirect testing is possible only where correlation to direct testing can be satisfactorily established, e.g. defined by limit values for indirect test results in the quality manual.

^e Test specimens are tested with surface flame impingement.

Annex B (informative)

Additional information for customers and designers

B.1 Resistance of the system surface to cracking

ETICS should be designed and applied in such a way that no harmful cracks in the reinforced layer are caused. Harmful cracks are:

- $\frac{3}{4}$ cracks on the joints of the boards, and/or
- $\frac{3}{4}$ cracks having a width of more than 0,2 mm.

Bibliography

- [1] EN 1542, *Products and systems for the protection and repair of concrete structures – Test-methods – Measurement of bond strength by pull-off.*
- [2] EN 1990, *Eurocode – Basis of structural design.*
- [3] EN 13238, *Reaction to fire tests for building products – Conditioning procedures and general rules for selection of substrates.*
- [4] EN ISO 13788, *Hygrothermal performance of building components and building elements – Internal surface temperature to avoid critical surface humidity and interstitial condensation – Calculation methods (ISO 13788:2001).*

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