



SLOVENSKI STANDARD SIST EN 490:2012+A1:2017

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Betonski strešniki in fazonski kosi za prekrivanje streh in oblaganje sten - Specifikacije za izdelek

Concrete roofing tiles and fittings for roof covering and wall cladding - Product specifications

Dach- und Formsteine aus Beton für Dächer und Wandbekleidungen -
Produktanforderungen

Tuiles et accessoires en béton pour couverture et bardage - Spécifications des produits

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EUROPEAN STANDARD

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NORME EUROPÉENNE

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Concrete roofing tiles and fittings for roof covering and wall cladding - Product specifications

Tuiles et accessoires en béton pour couverture et bardage - Spécifications des produits

Dach- und Formsteine aus Beton für Dächer und Wandbekleidungen - Produktanforderungen

This European Standard was approved by CEN on 18 September 2011 and includes Amendment 1 approved by CEN on 10 November 2015.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 490:2011+A1:2017) has been prepared by Technical Committee CEN/TC 128 “Roof covering products for discontinuous laying and products for wall cladding”, the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by July 2017, and conflicting national standards shall be withdrawn at the latest by October 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1 approved by CEN on 2015-11-10.

This document supersedes ^{A1} EN 490:2011 ^{A1}.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ^{A1} ^{A1}.

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

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

^{A1} This amendment to Annex ZA of EN 490:2011 implements EU Regulation no. 305/2011. ^{A1}

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

EN 490:2011+A1:2017 (E)**1 Scope**

This European Standard specifies requirements for concrete roofing tiles and fittings for pitched roof coverings and wall cladding and lining.

Concrete roofing tiles and fittings may incorporate surface coatings and glued concrete components.

NOTE 1 Information on surface characteristics is given in Annex A.

NOTE 2 Information on the performance of roof and wall assemblies is given in Annex B.

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 491:2011, *Concrete roofing tiles and fittings for roof covering and wall cladding — Test methods*

ENV 1187, *Test methods for external fire exposure to roofs*

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

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

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

EN 13501-5, *Fire classification of construction products and building elements — Part 5: Classification using data from external fire exposure to roof tests*

EN ISO 1716, *Reaction to fire tests for products — Determination of the gross heat of combustion (calorific value) (ISO 1716:2010)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1**aggregate**

concrete component consisting of uncrushed and/or crushed natural and/or artificial mineral substances with particle sizes and shapes suitable for the production of concrete

3.2**additive**

finely divided material that may be added to concrete in order to improve certain properties or to achieve special properties

3.3**pigment**

additive intended to add colour to the concrete

3.4**admixture**

material which is added in small quantities relative to the mass of the cement before or during mixing or during an additional mixing operation, causing required modifications to the properties

3.5**cement**

hydraulic binder, i.e. finely ground inorganic material, which, when mixed with water, forms a paste which sets by means of hydration reactions and processes and which, after hardening, retains its strength and stability

3.6**fitting**

component, of concrete, that is complementary to the tiles and has a special function

NOTE Fittings may contain inserts of other materials.

3.6.1**coordinated fitting**

fitting that is intended to align or interlock with the tiles with which it is to be laid (e.g. interlocking verge tile, interlocking ventilation tile, tile-and-a-half, aligning valley tile, interlocking or aligning angle tiles)

3.7**valley tile**

fitting for use at a meeting of two roof pitches forming a re-entrant angle

3.8**interlocking tile**

profiled or flat tile which has a side lock, with or without a head lock feature

3.9**non-interlocking tile**

profiled or flat tile without interlocks


3.10**tile with a regular front edge**

tile (interlocking or non-interlocking) which, by design, has a constant or regularly varying hanging length across the width

3.11**tile with an irregular front edge**

tile (interlocking or non-interlocking), which, by design, has an irregular varying hanging length across the width

**3.12****product type**

set of representative performance levels or classes of a construction product, in relation to its essential characteristics, produced using a given combination of raw materials or other elements in a specific production process 

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4 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

l_1	hanging length of a tile
l_2, l_3	hanging edge length of a tile, as defined in EN 491:2011, Clause 4
c_w	cover width of one tile
c_{wc}	cover width closed up value of 10 tiles
c_{wd}	cover width drawn out value of 10 tiles
d	profile depth of a tile
F_{min}	minimum transverse strength of all tiles
F_i	transverse strength of an individual tile
IL	interlocking
NL	non-interlocking
RF	regular front edge
IF	irregular front edge
/	not applicable or not declared characteristic for designation system

5 Requirements

5.1 Materials

The concrete used in the manufacture of tiles and fittings shall be formed by mixing cement, aggregate and water and produced by the hardening of the cement paste (cement and water).

NOTE In addition to the basic components, the concrete may also contain pigments, admixtures and/or additives.

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5.2 Dimensions

5.2.1 Hanging length and squareness

The tile hanging length shall be declared in the manufacturer's technical specification. For tiles with a regular front edge, the values of l_1 shall be ± 4 mm of the manufacturer's declared value when tested in accordance with EN 491:2011, 5.2.

The squareness for tiles with nominally constant hanging length, when tested in accordance with EN 491:2011, 5.2.2.1, shall be calculated as the difference between values l_2 and l_3 and shall be not greater than 4 mm.

This sub-clause does not apply for tiles that are designed, for example for aesthetic reasons, with an irregular front edge.

5.2.2 Cover width

5.2.2.1 General

The tile cover width c_w shall be declared in the manufacturer's technical specification.

NOTE The cover width shunts may also be declared in the manufacturer's technical specification.

This sub-clause does not apply for tiles that are designed, for example for aesthetic reasons, with a randomly varying cover width.

5.2.2.2 Interlocking tiles

When tiles with cover width shunts declared by the manufacturer are tested in accordance with EN 491:2011, 5.3.3.1, the cover width shall conform to the following:

- $c_{wd}/10 \geq c_w + \text{declared "plus cover width shunt"};$
- $c_{wc}/10 \leq c_w - \text{declared "minus cover width shunt"}.$

When tiles without cover width shunts, and tiles with cover width shunt but not declared by the manufacturer, are tested in accordance with EN 491:2011, 5.3.3.1, the mean cover width shall be ± 5 mm of the manufacturer's declared cover width.

5.2.2.3 Non-interlocking tiles

When non-interlocking tiles are tested in accordance with EN 491:2011, 5.3.3.2, the mean cover width shall be ± 3 mm of the manufacturer's declared value.

5.2.3 Flatness

When tiles are tested in accordance with EN 491:2011, 5.4, the gap between any designed contact point and the flat surface shall not exceed 3 mm or $c_w/100$ mm to the nearest millimetre, whichever is the greater.

This sub-clause does not apply where the manufacturer declares that:

- tiles are designed to have less than four contact points to a flat surface, and/or
- tiles are designed to be irregular in flatness.

5.2.4 Fittings

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The manufacturer shall identify and declare the dimensions and tolerances and method of measurement of the fitting relevant to its use. Where relevant, the tile element of a coordinated fitting shall conform to 5.2.1, 5.2.2 and 5.2.3.

5.3 Mass

The mass of tiles and fittings shall be declared in the manufacturer's technical specification.

When tiles are tested in accordance with EN 491:2011, 5.5, the mean mass shall be:

- a) manufacturer's declared mass $\pm 0,2$ kg for tiles with a declared mass not greater than 2 kg;
- b) manufacturer's declared mass ± 10 % for tiles with a declared mass greater than 2 kg.

5.4 Fixing holes (where provided)

Fixing holes, where provided, shall be arranged so that an intended connection between the tiles and/or fittings and the batten can be achieved.

NOTE Information on fasteners and fixings is given in Annex C. Details of the size and position of the fixing holes may be given in the manufacturer's technical and/or commercial literature.

5.5 Mechanical resistance (transverse strength)

When tiles are tested in accordance with EN 491:2011, 5.6:

- a) value of F_{\min} shall be not less than the appropriate value given in Table 1, or

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- b) number of individual tiles with transverse strength values (F_i) less than the appropriate value in Table 1, shall be not more than the appropriate acceptance value in 7.3.

Tiles tested prior to 28 days after manufacture shall be deemed to conform if they reach at least 80 % of the values specified in Table 1 and the manufacturer can demonstrate statistically that the values given in Table 1 are achieved at 28 days.

Fittings shall conform to 5.2.4 and 5.7.2 (and 5.7.3 in the case of valley tiles).

Table 1 — Minimum transverse strength F_{\min} of tiles

Property	Interlocking tiles						Non-interlocking tiles
	Profiled				Flat		
Profile depth	$d > 20\text{mm}$		$20\text{ mm} \geq d \geq 5\text{ mm}$		$d < 5\text{mm}$		
c_w (mm)	≥ 300	≤ 200	≥ 300	≤ 200	≥ 300	≤ 200	
F_{\min} (N)	2 000	1 400	1 400	1 000	1 200	800	550

The profile depth (d) shall be declared by the manufacturer and, if $d < 20$ mm, shall be measured in accordance with EN 491:2011, 5.6.4.1.

For interlocking tiles between 200 mm and 300 mm cover width, the minimum transverse strength shall be determined by linear interpolation between the values given in Table 1.

5.6 Water impermeability

When tested in accordance with EN 491:2011, 5.7 the underside of the tiles and/or valley tiles may show drops of water but no drops shall fall before the completion of the test (20 h).

Fittings, other than valley tiles, are not required to be tested for water impermeability, provided they conform to 5.2.4 and 5.7.2.

5.7 Durability (freeze-thaw resistance)

5.7.1 Tiles

When tested in accordance with EN 491:2011, 5.8, the tiles shall conform to the requirements for impermeability (see 5.6) and transverse strength (see 5.5).

5.7.2 Fittings

Fittings, other than valley tiles, when tested in accordance with EN 491:2011, 5.8, shall not be broken, separated into parts or cracked.

5.7.3 Valley tiles

When tested in accordance with EN 491:2011, 5.8, valley tiles shall conform to the requirements for impermeability (see 5.6).

5.8 Nib support

Tiles with nib(s) shall be tested in accordance with EN 491:2011, 5.9. The tile nib(s) shall support the tile in the test position so that the tile does not fall.

5.9 Fire performance

5.9.1 External fire performance

5.9.1.1 Requirements

Where subject to regulatory requirements, the external fire performance of the products shall be declared according to the provisions of 5.9.1.2.

5.9.1.2 Test and assessment methods

5.9.1.2.1 Products satisfying the requirements for external fire performance, without the need for testing

Tiles and fittings covered by this European Standard meet the requirements for external fire performance without the need for testing, provided that they satisfy the definitions given in Commission Decision 2000/553/EC [1], i.e. that:

- they satisfy the provisions of Commission Decision 96/603/EC [2], and
- any external coating shall be inorganic or have a gross calorific potential (PCS) $\leq 4,0$ MJ/m² or a mass ≤ 200 g/m².

For this purpose the calorific value or mass of the organic coating shall be measured over the exposed area only.

NOTE Member States may have national 'deemed to satisfy' lists, which include more products than those given in Decision 2000/553/EC.

5.9.1.2.2 Other products

Products not meeting the provisions of 5.9.1.2.1 shall be tested and classified in accordance with EN 13501-5 using the classification(s) relevant for the country of destination of the products. The products to be tested shall be installed, in addition to the general provisions given in ENV 1187, in a manner representative of their intended use.

5.9.2 Reaction to fire performance

5.9.2.1 Requirements

This characteristic shall be declared when subject to regulatory requirements, and may be declared when not subject to such regulatory requirements. The reaction of products to fire shall be determined and declared according to the provisions of 5.9.2.2.

This characteristic does not apply to glued tiles or fittings. For such products, no indication needs to be given related to their reaction to fire performance, nor does Class F need to be given.

5.9.2.2 Testing and assessment methods

5.9.2.2.1 Products satisfying the requirements for the fire reaction Class A1, without the need for testing

Tiles and fittings are classified Class A1 of the characteristic reaction to fire, in accordance with the provisions of Commission Decision 96/603/EC [2], as amended, without the need for testing, provided that:

- they contain $\leq 1,0$ % by weight or volume (whichever is the lower) of homogeneously distributed organic material (other than glue);

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- any coating system (i.e. organic layer and cement slurry layer, if relevant), which contains $\leq 1,0$ % by weight or volume (whichever is the lower) of homogeneously distributed organic material, is itself Class A1.

5.9.2.2.2 Other products

Products not meeting the requirements of 5.9.2.2.1 shall be tested and classified in accordance with EN 13501-1 as follows:

- for a coating system with a gross calorific potential (PCS) $\leq 2,0$ MJ/kg, when tested according to EN ISO 1716, the product may be classified A1;
- for a coating system with a PCS $\leq 2,0$ MJ/m², the product may be classified A1 provided that the coating system, when tested according to EN 13823, meets the requirements for this given in EN 13501-1;
- for a coating system with a PCS $> 2,0$ MJ/kg and $\leq 4,0$ MJ/m², when tested according to EN ISO 1716, the complete coating system shall be tested according to EN 13823, and mounted on either the calcium silicate or fibre cement substrates given in EN 13238. If the coating system meets the requirements of Class A2, the product shall also be classified Class A2 with appropriate smoke and droplets sub-classification;
- for any coating system other than those stated above, the coating shall be tested for the requirements of classes lower than A2 and the product shall be given the same class as the coating system;
- as an alternative to the above requirements, the coated product itself shall be tested and the classification requirements of EN 13501-1 shall apply. For tests to EN 13823, the product shall be mounted and fixed in a manner which is representative of its intended application (i.e. mounted on timber battens with no underlying insulation or organic material) in accordance with EN 491.

The requirements above relate to uncoated tiles or fittings which are Class A1. Where the uncoated tiles or fittings contain $> 1,0$ % by weight or volume (whichever is the lower) of homogeneously distributed organic material and are not Class A1, coated products shall be classified in accordance with EN 13501-1.

Results obtained for a coating system including an organic layer, apply to any other coating systems containing the same composition as the system tested (e.g. the same generic type of polymeric binding) but having less organic material and, therefore, a PCS which is less than that tested.

The classification obtained from tests of any tile profile or design also applies to tiles of the same body material and the same composition of organic coating, for:

- any other tile design (i.e. any other tile profile and single lap or double lap tiles), and fittings;
- tiles with a different surface texture (i.e. smooth, patterned or granulated);
- tiles laid with headlap greater than that tested;
- tiles laid in straight or broken bond
- tiles laid with or without mechanical fixings;
- tiles laid on other timber or metal battens, with or without counterbattens;
- tiles used for pitched roofs, wall cladding or wall lining; laid with any or no thermal insulation.