SLOVENSKI STANDARD
oSIST prEN 14437:2020

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Ugotavljanje dvižne odpornosti vgrajenih opečnih ali betonskih strešnikov - Preskusna metoda

Determination of the uplift resistance of installed clay or concrete tiles for roofing - Roof system test method

Bestimmung des Abhebewiderstandes von verlegten Dachziegeln oder Dachsteinen (Dachpfannen) - Prüfverfahren für Dachsysteme

Détermination de la résistance au soulèvement des tuiles en terre cuite ou en béton mises en œuvre sur la toiture - Méthode d'essai par système de toiture

Ta slovenski standard je istoveten z: **prEN 14437**

ICS:

91.060.20	Strehe	Roofs
91.100.25	Gradbeni izdelki iz terakote	Terracotta building products
91.100.30	Beton in betonski izdelki	Concrete and concrete products

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT prEN 14437

July 2020

ICS 91.060.20

Will supersede EN 14437:2004

English Version

Determination of the uplift resistance of installed clay or concrete tiles for roofing - Roof system test method

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 128.

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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 14437:2020) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 14437:2004.

In comparison with the previous edition, the following technical modifications have been made: the test method has not changed, but the interpretation of the results includes the introduction of serviceability and ultimate failure loads in accordance with Eurocode EN 1990.

Introduction

This document gives a test method and failure criteria for determining the uplift resistance of clay or concrete tiles for roofing.

The results of this test may be used to determine the uplift force which can be withstood by the fixing, e.g. to withstand wind force.

1 Scope

This document specifies a test method to establish the uplift resistance of installed clay or concrete tiles for roofing, complying with the relevant product standard, EN 490 or EN 1304, which are unfixed or mechanically fixed to the substructure.

NOTE The test method has been developed for clay or concrete tiles for roofing, but can apply to other discontinuously laid small elements, such as: slates; fibre cement slates; stones; and, adopted accordingly, to photovoltaic and solar thermal panels.

The test method is applicable to mechanical fixings such as clips, hooks, screws and nails.

The method is not applicable to fixed tiles having fixing patterns with less than every third tile fixed.

The test method is not applicable to under and over tiles. Examples of these tiles are given in Annex G.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp/ui

3.1
discontinuously laid small elements
elements to be used for roof covering and wall cladding which are installed as separate elements and collectively form the roof covering

3.2
roof pitch
pitch of the roof structure, e.g. the rafters, counter battens, panels

3.3
characteristic value
value of roof system or product having a prescribed probability of not being attained in a hypothetical unlimited test series. This value generally corresponds to a specified fractile of the assumed statistical distribution of the particular property of the material

3.4
roof system
comprises the structure of the battens, mechanical fixings (clips, hooks, nails and screws) as well as the clay and concrete tiles and fittings together with their laying specification

3.5
ultimate limit states
states associated with collapse or with other similar forms of structural failure

Note 1 to entry: They generally correspond to the maximum load-carrying resistance of a structure or structural member.

[SOURCE: EN 1990:2002/A1:2005, Eurocode – Basis of structural design; 1.5.2.13]

3.6
serviceability limit states
states that correspond to conditions beyond which specified service requirements for a structure or structural member are no longer met

[SOURCE: EN 1990:2002/A1:2005, Eurocode – Basis of structural design; 1.5.2.14]

4 Symbols and abbreviations

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

d_{max} the maximum permissible displacement;

F_t force exerted on 16 tiles;

L_h the hanging length of the tile;

R_i uplift resistance of 16 tiles in test i;

W_i mean weight of a roofing tile;

Additional symbols and abbreviations are used in the annexes and they are listed and defined at the point of use.

5 Sampling

The tiles, battens and fixings selected shall be representative of the system to be used.

In selecting the number of elements, refer to Clause 7 and Clause 9, taking into consideration the number of fixing patterns. At least 3 tests shall be conducted for each pattern, one of which can be a trial test.

The specification of the battens may include a reference to a national code of practice.

6 Test conditions

Unless otherwise specified, the roofing tiles, fixings and the test frame shall be conditioned for at least 24 h in an environment of (20 ± 10) °C, and (55 ± 25) % relative humidity, prior to the test. The manner of storage shall not interfere with the free exchange of moisture from or into the materials. The test shall be conducted in the same conditions as the storage.

7 Test material

The test materials shall be randomly chosen from the samples.

8 Apparatus

8.1 Test rig

The test rig consists of a roof structure and auxiliary equipment to exert a force on the clay or concrete tiles for roofing. The roof structure shall have a roof pitch of (45 ± 2)°.

The test rig shall be able to exert a nominally equal uplift force on 16 roofing tiles from a minimum distance of 0,9 m to the surface of the roof covering and at an angle of (90 ± 2)° to the roof structure, at the start of the test.

The test rig shall have sufficient capacity and stiffness for the test as not to influence the test result. The test rig shall be capable of applying an uplift force at a rate of not more than 50 N/s.

NOTE Annex A includes an example test rig meeting the specification.

8.2 Cables

The uplift force shall be exerted by using a cable. The cable shall be flexible, such that it minimizes any overturning moment on the connection point, where the force is applied.

8.3 Force measuring device

A calibrated force measuring device shall be used to determine the total uplift force on the 16 roofing tiles (refer to 9.3), having a maximum inaccuracy in combination with the reading equipment of 1 % of the measured value or 10 N, whichever is larger.

8.4 Monitoring device for displacement of the roofing tiles

A calibrated displacement monitoring device shall be used to determine the displacement of the roofing tiles and shall have a maximum inaccuracy of 0,5 mm. The displacement monitoring device shall not exert forces larger than 1 % of the uplift force measured on the 16 roofing tiles.

This may be achieved by rigidly attaching a small flat plate to the measuring head, such that it always contacts the highest point on the roofing tile.

If serviceability failure occurs before ultimate failure, the monitoring device may be removed to protect it from damage when ultimate failure occurs.

8.5 Measuring device for weight

A calibrated weighing device shall be used to determine the weight of roofing tiles with a maximum inaccuracy of 1 % of the measured value.

9 Test procedure

9.1 Measurement of the weight

Determine the mean tile weight W_i by measuring at least 10 roofing tiles, after the conditioning described in Clause 6.

9.2 Installation of battens, roofing tiles and fixings

The battens shall be fixed to the test rig in a manner that does not influence the test result.

The roofing tiles shall be installed on the battens in the layout intended to be tested. The overlap of the roofing tiles shall be the maximum specified for the intended use in the codes of practice or by the manufacturer.

The test tiles shall be surrounded by at least 2 courses and 2 columns of identical roofing tiles. The test requires a set of roofing tiles, sufficient to cover at least 8 courses high and 8 columns wide, or at least 1,5 m high and 1,5 m wide, whichever is larger.

NOTE 1 For interlocking single lap clay or concrete tiles, the lowest course on the test rig can be omitted without loss of accuracy of the test result.

The fixings shall be installed representatively of the intended use of the fixings and shall take into account the layout of the roofing tiles.

NOTE 2 Various fixing patterns might need to be tested, refer to Annex C.

9.3 Determination of the location of the forces on the test roof

A total of 16 roofing tiles to be lifted shall be selected and placed on the test roof. These 16 roofing tiles shall be located as defined in Annex B. The fixing pattern shall be chosen such that the roofing tile in the lower right corner of the 16 is fixed. Annex C gives examples of suitable fixing patterns.

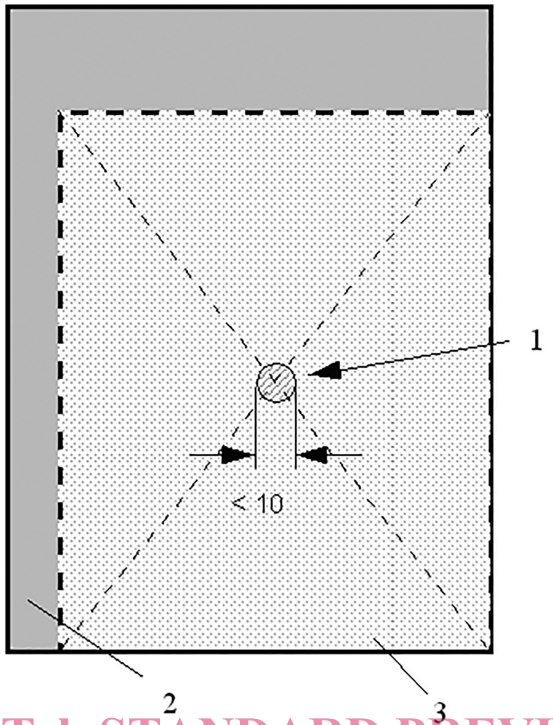
The connection point is within 5 mm of the centre of the projected visible area of the roofing tile, normal to the roof surface (see Figure 1).

The cable may be connected to the tile by feeding the cable through a hole to be made at the location of the connection point and locking the cable at the back side of the roofing tile and may include a load spreading device to prevent an unrepresentative failure mode of the roofing tile.

NOTE Figure 1 shows a typical example of a tile in the centre of the roof, overlapping along its edge and head regions. Some tiles might not have a side lap, e.g. double lap tiles and some single lap verge tiles.

The connection point of beaver tiles in double-lap tiling (see Figure 2a) or crown covering (see Figure 2b) should be on the centre line of the tile and at 40 % of the visible length of the tile from the tail of the tile.

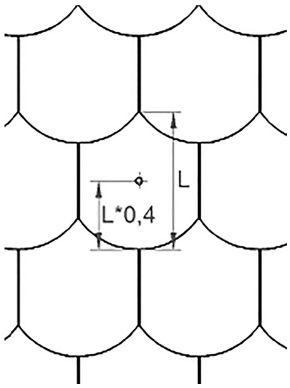
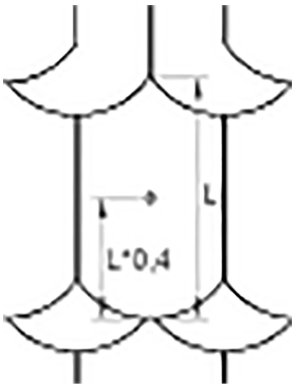
Dimensions in millimetres



Key

1 location of connection point
2 overlapped part of tile
3 visible part of tile

Figure 1 — Location of the connection or loading point on a rectangular tile

a)	b)
	

Key

L visible length

Figure 2 — Location of the connection point of beaver tiles laid a) double-lap or b) crown covered