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**Skrilavec in izdelki iz naravnega kamna za polaganje streh in zidov - 2. del:
Preskusne metode za skrilavce in karbonatne skrilavce**

Slate and stone for discontinuous roofing and external cladding - Part 2: Methods of test for slate and carbonate slate

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Schiefer und Naturstein für überlappende Dachdeckungen und Außenwandbekleidungen - Teil 2: Prüfverfahren für Schiefer und carbonathaltige Schiefer

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Ardoises et pierres pour toiture et bardage extérieur pour pose en discontinu - Partie 2: Méthodes d'essais pour ardoises et ardoises carbonatées

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Slate and stone for discontinuous roofing and external cladding - Part 2: Methods of test for slate and carbonate slate

Ardoises et pierres pour toiture et bardage extérieur pour
pose en discontinu - Partie 2: Méthodes d'essais pour
ardoises et ardoises carbonatées

Schiefer und Naturstein für überlappende Dachdeckungen
und Außenwandbekleidungen - Teil 2: Prüfverfahren für
Schiefer und carbonathaltige Schiefer

This European Standard was approved by CEN on 19 May 2011.

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Foreword

This document (EN 12326-2:2011) 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of an identical text or by endorsement, at the latest by December 2011, and conflicting national standards shall be withdrawn at the latest by December 2011.

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 supersedes EN 12326-2:2000.

The most important changes in this version of the standard concern:

- Clause 10 "Determination of the modulus of rupture, and characteristic modulus of rupture";
- Clause 12 "Freeze-thaw test";
- Clause 13 "Determination of the apparent calcium carbonate and non carbonate carbon content by catalytic thermal decomposition";
- a new informative Annex B has been added "Petrographic examination of origin and identification of slate".

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EN 12326 consists of the following parts:

- *Part 1: Product specification;*
- *Part 2: Methods of test for slate and carbonate slate.*

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

EN 12326-2:2011 (E)**1 Scope**

This European Standard specifies test methods for slate and carbonate slate for roofing and wall cladding. It is applicable to natural roofing products as defined in EN 12326-1:2004 used for assembly into discontinuous roofs and external wall cladding.

NOTE Where the term "slate" is used in this document it means slate and carbonate slate unless otherwise indicated.

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 12326-1:2004, *Slate and stone products for discontinuous roofing and cladding — Part 1: Product specification*

3 Terms, definitions and symbols**3.1 Terms and definitions**

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

3.1.1**test piece (of slate)**

piece sawn from a slate and prepared for testing as defined by the relevant test procedure

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3.1.2**powdered test piece (of slate)**

piece or pieces of a slate or slates prepared for testing by grinding to a powder of a defined particle size

3.1.3**sampling**

process of selecting a slate or a set of slates for testing

3.1.4**constant mass**

mass achieved when two successive weightings taken 24 h apart do not differ by more than 0,001 g (or 0,01 % of the weight of the test piece)

3.1.5**modulus of rupture**

maximum stress sustained by a slate test piece when a bending moment is applied

NOTE In this European Standard the geometry of the test is three point bending.

3.2 Symbols

Symbol	Physical quantity	Unit
A_w	water absorption	%
a	rate of application of stress in the bend strength test	(N/mm ²)/s

b	width of a slate or a test piece	mm
C'_a	apparent mass percentage calcium carbonate in slate	%
C_c	carbonate carbon content of slate	%
\overline{C}_c	mean carbonate carbon content of a slate	%
C_d	carbon dioxide content of a test piece or standard preparation	%
C_T	total carbon in a slate	%
C_{nc}	non-carbonate carbon in a slate	%
e	thickness of a slate	mm
e_m	mean of three thickness measurements used to determine the rate of application of load in the bend strength test	mm
e_{max}	maximum of four thickness measurements carried out on one slate test piece	mm
\overline{e}	mean thickness of a slate test piece or series of test pieces	mm
\overline{e}_i	mean of 8 thickness measurements in the modulus of rupture test	mm
E_d	maximum deviation of the thickness of a slate from the mean thickness	%
e_s	thickness of the softened layer in the SO ₂ exposure test	mm
e_{1A} to e_{4A}	individual thickness measurements in the SO ₂ exposure test	mm
E_1	conductivity reading for total carbon	S/m
E_2	conductivity reading for non-carbonate carbon	S/m
f	gas volume reduction factor of the pump in the determination of non-carbonate carbon content by coulometry	-
f'	gas volume reduction factor of the pump in the blank determination of non-carbonate content by coulometry	-
$f_{\sqrt{2}}$	means of three dial gauge readings in the flatness test	mm
f_d	deviation from flatness of a slate	mm
F_d	deviation from flatness of a slate as a percentage of its length	%
I	number of pulses recorded in the determination of non-carbonate carbon content by coulometry	-
I'	number of pulses recorded in the blank determination of non-carbonate carbon content by coulometry	-
k	proportionality factor specific to the apparatus in the determination of non-carbonate carbon content by coulometry	-

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$\lambda K\alpha$	wavelength of the α radiation used in the x-ray diffraction analysis	nm
l_s	length of a slate	mm
l_t	distance between the bending supports to base	mm
m_o	dry mass of a test piece in the water absorption test	g
m_p	mass of a powdered test piece of slate	mg
m_c	mass of a powdered test piece used for total carbon in the determination of apparent calcium carbonate content by the conductivity of sodium hydroxide	mg
m_{nc}	mass of a powdered test piece for non-carbonate carbon in the determination of apparent calcium carbonate content by the conductivity of sodium hydroxide	mg
m_s	mass of calcium carbonate used in the determination of apparent calcium carbonate content by conductivity of sodium hydroxide	mg
m_w	wet mass of a test piece in the water absorption test	g
m_1	total carbon content in the determination of apparent calcium carbonate content by catalytic thermal decomposition	%
m_2	content of non-carbonate carbon in the determination of apparent calcium carbonate content by catalytic thermal decomposition	%
m_3	content of carbonate carbon in the determination of apparent calcium carbonate content by catalytic thermal decomposition	%
n	number of slates subject to a test	-
P_i	failure load of individual slates in the bending strength test	N
r_d	individual measurements of the deviation of a slate from a rectangle	mm
r_{dmax}	maximum deviation of a slate from a rectangle	mm
R_d	deviation of a test slate from a rectangle as a percentage of its length	%
$R R_i$	modulus of rupture of test slates	N/mm ²
\bar{R}	sample mean modulus of rupture of test slates	N/mm ²
\bar{R}_l	sample mean modulus of rupture of test slates measured in the longitudinal orientation	N/mm ²
\bar{R}_t	sample mean modulus of rupture of test slates measured in the transverse orientation	N/mm ²
R_c	characteristic modulus of rupture of test slates	N/mm ²
\bar{R}_1	sample mean modulus of rupture of the control test pieces in the freeze-thaw test	N/mm ²

\bar{R}_2	sample mean modulus of rupture of the frost exposed test pieces in the freeze-thaw test	N/mm ²
s	sample standard deviation of the modulus of rupture	-
s_l	sample standard deviation of the modulus of rupture in the longitudinal orientation	-
s_t	sample standard deviation of the modulus of rupture in the transverse orientation	-
s_1	sample standard deviation of the modulus of rupture of the control test pieces after the freeze-thaw test	-
s_2	standard deviation of the modulus of rupture of the frost exposed test pieces after the freeze-thaw test	-
s_d	deviation of the edge of a slate from a straight edge	mm
S_d	deviation of the edge of a slate from a straight edge as a percentage of its length	%
v_1	rate of application of the load in the bend strength test	N/s
α	deviation of a slate from rectangle	°
θ	angle of incidence of the beam in the X-ray diffraction analysis	°

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4 Surveillance sampling procedure

Sampling shall be carried out by selecting slates from each lot separately in a random way so that every slate has an equal chance of being selected. Selected slates shall be marked so as to identify which lot they came from. Table 1 indicates the number of slates required for each test. In the case of disputes test slates need only be taken for those tests which are in doubt.

Table 1 — The number of slates required to carry out each test

Test	Number of slates required from each lot for each test
Length and width	1
Straight edges	1
Rectangularity	1
Individual thickness	1
Curvature	1
Bend strength	20/40*
Water absorption	5
Freeze-thaw	20/40*
Non-carbonate carbon content	3
Carbonate content	3
Sulfur dioxide exposure for less than or equal to 20 % carbonate	12
Sulfur dioxide exposure for more than 20 % carbonate	6 or 12*
Thermal cycle	6
NOTE 1	Because many of the tests do not require whole slates it is possible to carry out a full set of tests with fewer than the total number of slates listed in this table.
NOTE 2	For the tests marked * the number of slates required depends on their size.
NOTE 3	The individual tests indicate the size and number of test pieces or powdered test pieces required.
NOTE 4	Where there is a possibility that the slates being tested may contain localised harmful inclusions such as calcite veins or oxidisable minerals the preparation of the test pieces or powdered test pieces should be modified to ensure sufficient inclusions are contained in the test piece to provide a representative result.
NOTE 5	Sampling should preferably be carried out by the recipient or his representative in the presence of the supplier.

5 Determination of the length and width and the deviation from the specified length and width

5.1 Principle

The dimensions of slates are measured using a steel rule placed on the midline of the length and the width. The percentage deviation from the specified dimension is calculated.

5.2 Apparatus

5.2.1 A steel rule capable of reading to 0,5 mm.

5.2.2 Two steel bars longer and thicker than the slates under test.

Each bar shall have one edge which shall not deviate from a straight edge by more than $\pm 0,1$ mm.

5.3 Preparation of test pieces

Whole slates are used and do not need any preparation unless any corners are oversized within 50 mm of the corner. In this case remove the over size corner(s) at an angle of approximately 45° from a point 50 mm from the corner, using a suitable cutting tool.

5.4 Procedure

Place the slate with the chamfered edge facing down. Align the straight edges of the two steel bars along the long edges of the slate. Using a steel rule find the midpoints of the length of the slate on each side to the nearest 1,0 mm at each end and mark the positions on the slate. Place the steel rule across the distance between the bars at the marked points. Read off and record the width to the nearest 1,0 mm.

Repeat for the length.

5.5 Expression of the results

Calculate the difference of the length from the specified length as a percentage.

Calculate the difference of the width from the specified width as a percentage.

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5.6 Test report <https://standards.iteh.ai/catalog/standards/sist/77a6fcfd-1d35-4fc0-b831-ad96d95be0b0/sist-en-12326-2-2011>

Report the length and width in millimetres and the deviation in percentage from the specified length and width.

The test report shall also include the identification of the product, reference to this method and the identifier of this European Standard, i.e. EN 12326-2:2011.

6 Determination of the amount by which the edges deviate from a straight edge

6.1 Principle

The deviation of the long edges of slates from a straight edge is measured using a steel rule. For slates 500 mm long or longer the deviation is calculated as a percentage of the length.

6.2 Apparatus

6.2.1 A steel rule capable of reading to 0,5 mm.

6.2.2 A steel bar longer and thicker than the slates under test with one edge which shall not deviate from a straight edge by more than $\pm 0,1$ mm.